ELEMENTS OF CLINICAL MEDICINE

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VOLUME V

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DAR EL-MAARFF

PREFACE TO FIRST EDITION

This book is volume five of the series of clinical subjects in medical practice. It is written along the same lines as the previous four volumes. Each subject includes a clinical sign or a symptom and is dealt with in the following order. First of all explanation of its pathologic physiology then mention of the disease which can present by this symptom or clinical sign Lastly the chapter includes a diagnostic appssoach to the diagnossis of this clinical presentation.

By this means the medical student, practitioner or specialist in internal medicine is able to proceed to emeover the causative disease.

This book completes all the clinical subjects a doctor can come across or a medical student is examined for his M. B. degree.

We would like to thank members of the staff of the Department of Internal Medicine, Alexandria.

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DYSPHAGIA

Definition

Difficulty in swallowing is termed dysphagia. It may or may not be associated with pain, painfull dysphagia is termed odynophagia.

Dysphagia is the subjective sensation experienced during the act of swallowing (deglutition). If in the middle or lower esophagus it is felt as a sticking sensation behind the sternum as the bolus of food descends. Dysphagia is usually felt at the level of the lesion.

NORMAL MECHANISM OF SWALLOWING

Swallowing consists of three stages with no pause between them.

1. The first stage is the passage of food from the mouth to the pharynx. It is a voluntary action. Food collects in a bolus on the dorsum of the tongue, the tongue is then pressed up against the palate and the bolus driven through the fauces.

2. The second stage is the passage of the bolus of food from the pharynx to the esophagus. It is voluntary. This is done through the contraction of the mylohyoid muscle and possibly pharyngeal contration as well. The posterior nares is protected by elevation of the soft palate by the palati muscles supplied by the vagus nerve. If this nerve is paralysed for example after diphtheria, food regurgitates into the nose. The larynx is also raised under the back of the retracted tongue and closed by the aryteno-epiglottidian ring.

3. The third stage includes the passage of food down the esophagus. It is involuntary. The food is carried down by peristaltic waves each of which consists of a wave of relaxation followed by a wave of

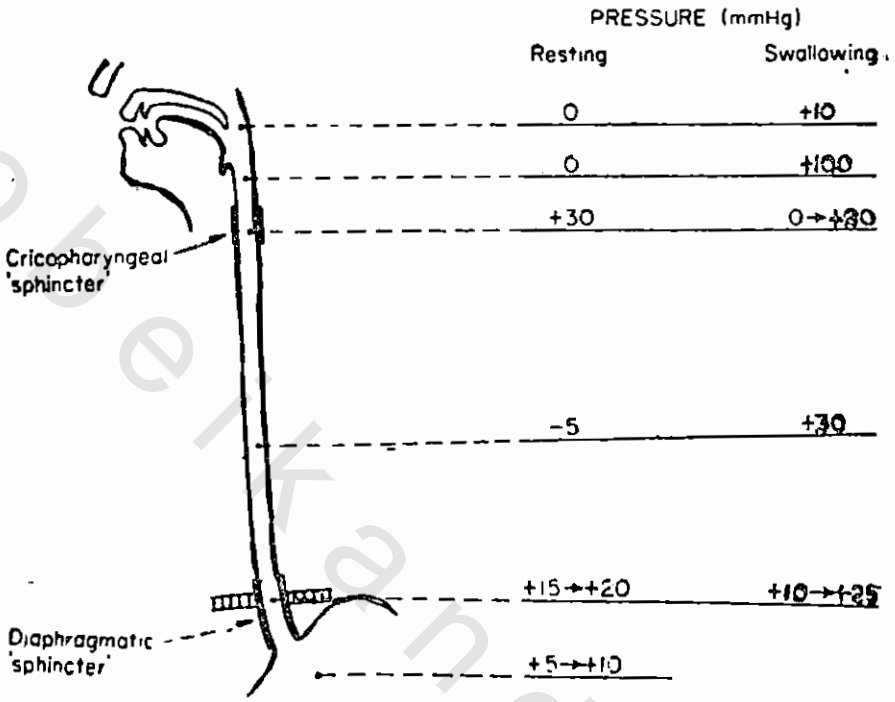


Fig. 1 : Pressures in the pharynx and along the esophagus at rest and during swallowing

contraction. Food may be held up at the cardiac orifice until a peristaltic wave reaches it, then it is inhibited and food passes through and the orifice closes again. The lower part of the esophago - gastric vestibule is distinct from both esophagus and stomach and acts as a valve and sphincter at the same time. It relaxes when the wave of relaxation reaches it. When all the meal has passed into the stomach the cardia closes to prevent regurgitation of the contents back into the esophagus. This is supposed to be the effect of the high acidity of the gastric contents.

CLASSIFICATION OF DYSPHAGIA

Dysphagia may be classified according to its mechanism of production into three types.

1. Pain : Painful Dysphagia.
2. Mechanical : Mechanical Dysphagia.
3. Neurogenic : Neurogenic Dysphagia.

CAUSES OF DYSPHAGIA

Painful Dysphagia

1. In the Mouth

a. Ulcers of Tongue : These may be simple (from a broken tooth), syphilitic, or malignant.

b. Cheeks and Gums : Ulcers in them may be either dental or herpetic. They may be due aplastic anaemia, leukaemia, or agranulocytosis.

c. Salivary Glands : Infections such as mumps or septic parotitis.

d. Miscellaneous : Dental abscess and non-fitting dentures.

2. *In the Throat* : Dysphagia due to diseases of the throat may be Vincent's angina, tonsillitis, quinzy, diphtheria, leukaemia, aplastic anaemia, agranulocytosis, herpetic and malignant ulcers.

3. *In the Pharynx* : Septic pharyngitis, retro-pharyngeal abscess, foreign body or tuberculosis of the larynx may be causes of painful dysphagia.

4. *Esophagus* : Impaction of a foreign body, peptic ulceration, malignancy and diaphragmatic hernia can cause painful dysphagia.

Mechanical Dysphagia

1. Mouth and Throat

Lesisns in the mouth and throat causing dysphagia can be

a. Diphtheria.
b. Marked tonsilitis with excessive swelling of the tonsils.
c. Zinker's diverticulum.
d. Tumour in throat or tonsils.
e. Inflammatory stricture.

2 *Esophagus*

Esophageal mechanical dysphagia can be due tc lesions in the lumen, in the wall or extra luminal (pressure from sutside).

a. Intraluminal Lesions.
   i. Foreign body.

b. Lesions in the Wall of the Esophagus
   i. Lower esophageal ring (Schatzki's ring)
   ii. Malignancy
   iii. Lower esophageal sphincter spasm (hypertrophic sphincter)
   iv. Peptic esophagitis
   v. Inflammatory stricture
   vi. Caustic stricture
   viii. Scleroderma of the esophagus
   ix. Infections e. g. Candidiasis
   x. Scleroderma.

C. Lesions from Outside the Esophagus

This dysphagia is due to compression.

i. Diverticulum of the esophagns.
ii. Enlarged lymph nodes.
iii. Bronchogenic carcinoma.
iv. Retrosternal thyroid
v. Mediastinal abscess and effusion.
vi. Cardiac and vascular lesions as aneurysm of the aorta, aberrant right subclavian artery, right-sided aortic arch, enlargement of the left atrium (giant left atrium) in mitral valve disease and huge pericarditis with effusion.

Neurogenic Dysphagia

Dysphagia due to disturbel nervous control can be due to one of the following.

a. Post-diphtheretic
b. Mysathenia gravis
c. Syringomyelia
d. Hydrophobia
e. Pseudo-bulbar palsy
f. Progressive bulbar palsy
g. Plummer Vinson syndrome (partly due to an esophageal web. i. e. mechamical.)
h. Tetany
i. Achalasia
j. Diabetic neuropathy
l. Diffuse esophageal spasm

m. Scleroderma and amyloidosis (infiltration of wall including the nerve plexuses of the esophagus).

n. Chaga's disease (parasitic trypanosomal infection)

Neurogenic dysphagia can divided into two groups.

1. *Paralytic States* : Post-diphtheretic, myasthenia gravis, and syringomyelia.

2. *Spastic States* Hydrophobia, pseudo-bulbar palsy, proressive bulbar palsy, Plummer-Vinson syndrome, tetany and hysterical.

DIAGNOSTIC CLINICAL APPROACH

Dysphagia should never be considered functional (hysterical) except after doing all possible efforts to detect an organic lesion.

Dysphagia should not be confused with globus hystericus which is a functional complaint. It is a sensation of a "lump in the throat". It is usually not associated with deglutition. It is intermittent, not associated with regurgiation and foods and fluids can be swallowed without difficulty.

History

a) Age

i. Young Age : Dysphagia in a young patient suggests diphtheria, mumps, tonsillitis, pharyngitis, retropharyngeal absess, or a foreign body as a cause of dysphagia.

ii. Middle Age : In this age the dysphagia may be due to

cancer of the esophagus, Plummer-Vinson syndrome or achalasia.

b) Sex

i. Female : Dysphagia in a female may be due to Plummer-Vison syndrome, or achalasia.

ii. Male : Cancer of the esophagus is a common cause of dysphagia in males.

c) History : Dysphagia may have a short, long, continuous or intermittent course and history.

i. Short : A short history suggests a foreign body, infective conditions or paralytic dysphagia.

ii. Long : A long history points to pressure on the esophagus, cancer of the esophagus or achalasia as causes of dysphagia.

iii. Intermittent : Intermittent dysphagia may be the result of a diaphragmatic hernia, achalasia, esophageal diverticulum, Plummer-Vison syndrome or my be hysterical.

iv. Continuous : Continuous dysphagia results from cancer of the esophagus, pressure from outside, esophageal strictures, or is neurogenic in origin.

d) Onset : The onset of dysphagia may be acute or chronic.

i. Acute : Acute dysphagia may be the result of mechanical obstruction by a foreign body, may be inflammatory due to Vincent's angina, tonsillitis, pharyngitis, a retropharyngeal abscess or it may be due to acute paralysis.

ii. Chronic : Dysphagia due to the other causes are usually chronic.

e) Pain : The presence of pain with dysphagia points to inflammatory conditions, ulcers or cancer as the cause of dysphagia.

f) Site : Usually the patient can tell exactly where the obstruction is, especially in the esophagus where every spinal segment is represented in the esophagus at the same level as on the chest.

g) Dysphagia due to Fluids only or due to Everything : If dysphagia starts first to solid food then to fluids this suggests cancer of the esophagus or an increasing pressure from outside. If drinking a certain amount of fluid overcomes the dysphagia then this suggests achalasia as its cause.

Dysphagia which starts with solid foods suggests a mechanical cause for it, while dysphagia starting with fluids is a neurogenic dysphagia.

Associated Complaints

Dysphagia may be associated with other complaints which may help to point to its cause.

i. Sore throat suggests the cause to be in the pharynx

ii. Pain in the chest or back suggests a mediastinal mass as a cause of the dysphagia.

iii. Regurgitation : If from the nose it suggests diphtheria, if it occurs on pressure on the neck it suggests a diverticulum of the esophagus as causes of the dysphapia.

iv. Respiratary Symptoms : Dyspnea or cough when present point to a mediastinal mass or a cardiac condition as causes of of dysphagia. When the dyspnea and cough are nocturnal they may be due to aspiration of esophageal contents into the trachea. Esophageal disease must always be considered as a possible cause in patients suffering from recurrent pneumonitis.

v. Haemtemesis : If haematenesis is present it suggests esophageal varices or cancer of the esophagus, achalasia or esophageal diaphragmatic hernia as causes of the dysphagia.

vi. Hoarseness of voice, points to inflammatory or paralytic conditions affecting the pharynx

vii. Heartburn : Heartburn suggests an inflammatory stricture or disease that involves the lower esophageal sphincter.

viii. Halithosis : Dysphagia with halithosis occurs in the presence of Zenker's diverticulum.

Clinical Signs

a) General Examination

i. Wasting : Its presence suggests cancer of the esophagus, cancer of the larynx or bronchogenic carcinoma as causes of the dysphagia.

ii. Anaemia : The presence of anaemia suggests Plummer-Vison syndrome, leukaemia, aplastic anaemia, diaphragmatic esophageal hernia or malignancy as possible causes of the dysphagia.

iii. Raynaud's Phenomenon : Raynaud's phenomenon associated with dysphagia suggests a collagenic disease as scleroderma to be the cause of dysphagia.

b) Eyes

i. Exophtholmos : This suggests the presence of a retrosternal thyroid.

ii. Argyl-Robertson Pupils . Its presence suggests aneurysm of the aorta or tabetic crisis as possible causes of the dysphagia.

iii. Horner's Syndrome : This may point to the presence of a mediastinal swelling.

iv. Catarract : This may be due to tetany.

v. Jaundice : This may be due to cancer of the esophagus with secondaries in the liver.

c) Mouth

i. Tongue : Examination of the tongue may reveal the presence of ulcers, malignency, glazing (Plumer-Vinson syndrome) or pseudo-bublar palsy.

ii. Throat : Examination of the throat may show diphtheria, enlarged or inflamed tonsils, or ulcers suggesting aplastic anaemia, agranulocytosis, leukaemia, Vincent's angina, or syphilis as the cause of the dysphagia.

iii. Palate : It may be paralysed due to diphtheria or may share the ulcers of the rest of the throat.

iv. Retropharyngeal Abscess : This can cause both mechanical and painful dysphagia.

v. Salivary Glands : These may show that mumps or septic parotitis are the causes of dysphagia,

d) Neck

Examination of the neck may show the cause of dysphagia to be

i. Diverticulus of the esophagus.

ii. Enlarged Lymph Node : The supraclavicular group are enlarged in esophageal malignancy, in Hodgkin's disease, leukaemia or draining from inflamed tonsils, pharynx or malignant, or may be tuberculous.

iii. Larynx : A post-cricoid carcinoma or cancer larynx may be the cause of dysphagia.

iv. Distended Cervical Veins : These may be due to mediastinal compression or pericardial effusion.

v. Tracheal tugging points to aneurysm of the aorta.

vi. Enlargement of the thyroid gland which may be also retrosternal suggest a mediastinal compression as a cause of the dysphagia.

c) Chest

i. Dilated veins suggest a mediastinal mass.

ii. Pleural effusion and areas of collapse of lungs also suggest a mediastinal compression as a cause of the dysphagia.

iii. Plusations may be due to aortic aneurysm.

f) Heart

Examination of the heart may reveal the presence of one of the following conditions which may be the cause of the dysphagia.

i. Pericardial effusion.

ii. Aneurysm of aorta with or without aortic regurgitation.

iii. Hugely enlarged left atrium in mitral stenosis.

r) Abdomen

i. Enlarged Spleen : This may suggest Hodgkin's disease, leukaemia or cirrhosis of the liver with esophageal varies as causes of the dysphagia.

ii. Liver : There may be cirrhosis with ulcerating or inflamed esophageal varices, or it may show the presence of secondaries. A cardiac liver, which is enlarged, tender and pulsating points to a cardiac condition responsible for the dysphagia.

iii. Enlarged Lymph Nodes : These may be due to abdominal Hodgkin's.

i) Nervous System

Examination of the nervous system is of utmost importance in any case of dysphagia.

i. Tabes Dorsalis : This suggests, aortic aneurysm or tabetic crisis as causes of the dysphagia.

ii. Tetany : Tetany may give rise to paralytic dysphagia

iii. Peripheral Neuropathy : This may suggest the presence of alcoholism and cirrhosis of the liver with inflamed esophageal varices as causes of the dysphagia.

Investigations

1. *Radiological Examination* : This includes a plain X-ray of the chest for the lungs, mediastinum or restrosternal thyroid gland. A barium swallow is not only useful for carcinoma of the esophagus or achalasia, but also to reveal mechanical pressure from outside especially a giant left atrium and the filling defects (wormy in shape) of esophageal varices.

2. *Esophagoscopy* : This procedure is very useful, but it must be done with care. It will reveal carcinoma, st ictures, achalasia, varices and foreign bodies.

3. *Blood Examination* : This will include a blood picture for the presence of iron deficiency anaemia of the Plummer-Vinson syndrome, or the bleeding of esophageal varices, diaphragmatic esophageal hernia and carcinoma of the esophagus. It will also reveal the presence of aplastic anaemia, leukaemia and Hodgkin's disease as the possible cause of dysphagia. A postive blood Wasserman may show that a syphilitic lesion is the cause of dysphagia.

4. *Stools* : The examinaion of stools for occult blood may point to an ulcerating bleeding lesion in the esophagus as the cause of dysphagia.

5 *Cineradiography* : This procedure with barium is helpful to

diagnose motility disorders. The addition of a barium-soaked cotton is more definite to locate the site of dysphagia.

6. *Esophageal Biopsy and Exfoliative Cytologic Studies* : when performed properly can give valuable information in cases of malignancy. However, only a positive result is of value.

7. *Esophageal Acid Perfusion Test (Bernstein test)* : This test is of value when esophageal reflux is suspected.

CHAPTER TWO

VOMITING

VOMITING

DEFINITION

MECHANISM

CAUSES

- Stimulation of Chemo-Receptor Trigger Zone
- Cerebral
- Reflex : Gastrointestinal
  - Other Organs
- Psychic

ACT OF VOMITING

CLINICAL APPROACH

- Vomiting or Not ?
- Age
- Sex
- History
  - Onset of Vomiting
  - Time of Vomiting
  - Precipitating Factors
- Symptoms Preceding Vomiting
- Associated Conditions
- Examination of Vomitus
- Examination of Patient
- Investigations.

VOMITING

Definition

Vomiting is the forcible expulsion of gastrointestinal contents from the mouth.

There are two other symptoms, similar and related to vomting.

1. *Wretching (retching)* : This is the laboured rhythmic activity of the respiratory muscles which usually precedes or accompanies vomiting

2. *Nausea* : This is the psychic epexrience of human beings which may or not be followed by vomiting. It can be defined as the urge to vomit or a sensation of sickness without actual vomiting.

Vomiting must be distinguished from regurgitation which is the expulsion of gastric and esophageal contents without the muscular activities charachteristic of vomiting.

MECHANISM OF VOMITING

Vomiting is controlled by the "vomiting centre".

This vomiting centre is divided into 2 parts.

1. The "Emetic Centre" or the original "Vomiting Centre"

   This centre receives afferant impulses and sends away efferent impulses.

2. The "Chemo-Receptor Trigger Zone"

   This is an area beside the vomiting or the emetic centre. It receives afferent impulses. From this chemoreceptor trigger zone,

impulses go to the vomiting centre and from the vomiting centre efferent impulses are discharged. In other words, the chemo-receptor trigger zone is intermediate between them.

CAUSES OF VOMITING

Vomiting must be through stimulation of the vomiting centre. This stimulation is by the following causes (See figure 2).

Stimulation of the Chemo-Receptor Tigger Zone

This is done by chemicals, drugs or metabolites circulating in the blood. Thus, stimulation of vomiting by these circulating substances is done through the chemo-receptor tigger zone. These substances may be either exogenous or endogenous.

a) Exogenous : Morphine, apomorphine, digitalis, ergot, tartar emetic, emetine, ... etc.

b) Endogenous : Stimulation of the chemoreceptor trigger zone may be done by endogenous causes such as

i. Renal failure

ii. Metabolic Acidosis : Diabetic keto-acidosis.

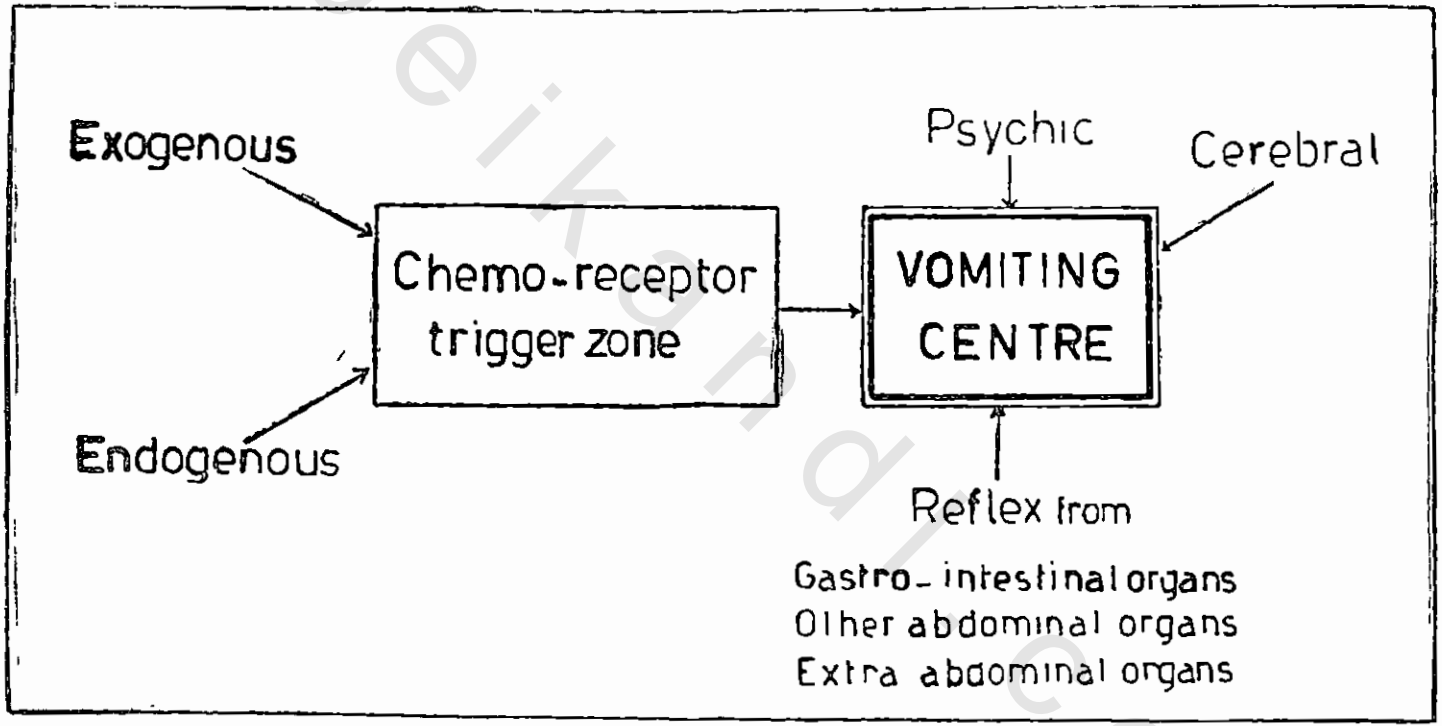
iii. Electrolyte Disturbances : Hyponatraemia, hypercalcaemia and hyperkalaemia.

iv. Hypothyroidism and hyperthyroidism.

v. Adrenal insufficiency (hypocorticism)

vi. Pregnancy.

vii. Acute febrile illness.



Factors Stimulating THE VOMITING CENTRE

Cerebral Causes

Here the centre is stimulated directly by a lesion in the brain. These include

a) Increased intracranial pressure due to any cause.

b) Meningitis.

c) Encephalitis.

d) Vascular occlusion around the centre.

e) Haemorrhage : Cerebral and subarachnoid.

f) Migraine.

g) Cyclic Vomiting : This is a condition related to migraine but occurs in childern.

h) Laberynthine disorders (Meniere's disease and motion sickness).

Reflex Vomiting

This mechanism of vomiting represents the biggest percentage of causes of vomiting and the most frequent cause. However, it is purposely mentioned as the third cause to stress the fact that vomiting is not only or even mainly a gastrointestinal tract disease. In fact the cause of vomiting from the gastrointestinal tract is reflex i.e. an afferent impulse passes to the centre and an efferent discharge goes out from it.

Reflex vomiting can arise from one of the following .

A. Gastrointestinal Diseases

Vomiting can be due to diseases of the gastrointestinal tract starting from .

1. Diseases of the Pharynx : Pharyngitis, tonsillitis, smokers, long uvula and allergy.

2. Esophageal Diseases : These may also give rise to vomiting which is reflex vomiting. These may be diverticulae, esophagitis, hiatus hernia, achalasia of the cardia and carcinoma of the esophagus.

3. Diseases of the Stomach : These include gastritis with all its types; the acute and chronic, peptic ulcer (acute and chronic), obstruction with all its causes, and benign and malignant tumours of the stomach. Other causes include gastric atony (ileus) and post surgery.

4. Diseases of the Duodenum : These include, peptic ulcer, duodenitis, duondenal ulcers and intestinal parasites such as ankylostoma and lamblia.

5. Liver and Gall Bladder Disease : These include chronic cholecystitis with or without stones, acute cholecystitis and the post cholecysectomy syndrome. Liver diseases which cause reflex vomiting are hepatitis especially virus hepatitis and congestion of the liver as in congestive heart failure.

6. Diseases of the Small Intestine : The commonest is food poisoning. Other less frequent causes are tuberculous enteritis, Crohn's disease, Mickel's diverticulum, adhesions, thrombosis of the mesenetric vessels either artery or vein and acute and chronic appendicitis. Other causes are are intestinal obstuction ond paralytic ileus.

7. Colonic Diseases : These include dysentery with its various causes, ulcerative colitis, diverticulitis and carcinoma of the colon.

8 Pancreatic Diseases : Acute pancreatitis and carcinoma of the pancreas are associated with vomiting.

9. Diseases of the Peritoneum : Peritonitis and peritoneal carcinomatosis can cause vomiting.

B. Other Abdominal Organs

Examples of these are the kidneys due to renal colic and pyelitis. The reproductive organs especially in females may be the seat of inflammation or malignancy. These conditions may all give rise to reflex vomiting.

C. Organs Outside the Abdomen

Diseases of some organs outside the abdomen may give rise to reflex vomiting such as the heart (cardiac infarction, congestive heart failure and pericarditis), the lungs and pleura (basal pneumonitis and diaphragmatic pleuritis),... etc.

Psychic Vomiting

The mechanism of this type of vomiting is through corticobullbar connections. The vomiting centre is stimulated through these cortico-bulbar connections in the following conditions.

a. Vomiting of pregnancy.

b. Functional vomiting.

c. Surruptitous vomiting.

THE ACT OF VOMITING

Usually nausea and increased salivation precede vomiting but they do not necessarily do. They may occur without vomiting or vomiting may occur not preceded by them.

For vomiting to occur certain phenomena have to take place.

1. Nausea is felt accompanied by increased salivation, the breathing becomes deep, rapid and irregular.

2. Retcihng may accur due to simultaneous spasmodic incoordinated contractions of the respiratory muscles such an the descent of the diaphragm (an inspiratory movement) with contractions of the expiratory muscles.

3. The glottis, closes and remains closed until expulsion of the vomited material occurs, to prevent its entry into the larynx.

4. The pyloric part of the stomach closes firmly and at the same time the body of the stomach relaxes to accept the gastric contents pushed into it. Anti-peristalses may occur in this stage but are of little importance and are not the main mechanism.

5. This flaccid stomach is compressed by the raised intra-abdominal pressure due to the simultaneous contraction of the abdominal wall muscles and descent of the diaphargm.

6. The cardiac opening is inhibited and the gastric contents are thus pushed into the esophagus. Some of these contents are driven at once into the mouth and expelled, the rest is moved up and down the esophagus.

7. At the end of vomiting the diaphragm relaxes i.e. ascends and the

muscles of the abdominal wall contract, this, accompanied with a closed glottis will result in rising of the intra-thoracic pressure. The result is compresison of the esophagus and expelling of the remainder of its contents into the mouth. This may be helped by a wave of antiperistalsis moving along the esophagus.

8. During the whole procedure the palate is raised to shut off the nasal cavity from the throat.

Because of the locality of the vomiting centre in the medulla the vomiting centre is near the vaso-motor and respiratory centres and cerebellar connections, these may be stimulated also, when the vomiting centre is in action. Thus, with vomiting there is associated increased salivation, spasmodic respiration (expiration and inspiration) vasomotor changes such as collapse, pallor, and a drop in blood pressure. Postural tone changes may also occur because of the cerebral and cerebellar connections.

The threshold of vomiting varies between several people, the same cause of vomiting can cause vomiting in one person and not in another.

The severity of vomiting is not an indication of the severity of the disease causing it, for example there is severe vomiting in functional vomiting, while in other conditions where there are serious diseases there may be only mild vomiting.

CLINICAL DIAGNOSTIC APPROACH

Vomiting is not a disease, it can be a presenation of many diseases. Vomiting may be due to any acute or chronic illness or to a functional or organic cause. Vomiting may be the first presentation of a serious systemic disease or an abdominal emergency.

Although gastrointestinal diseases are the commonest cause of vomiting, yet the physician must always keep in mind that it can be due to a systemic disease, a febrile illness, drugs, cerebral diseases or of psychogenic origin.

Vomiting is uncommonly an isolated presentation, it is usually accompanied by other symptoms and signs which help to nail down the disease causing the vomiting.

Complications

Persistent vomiting may have serious complications as aspiration penumonitis, dehyration, electrolyte and acid-base disturbances and internal haemorrhage due to tears at the gastrointestinal junctions, intra-ocular haemorrhage and cerebral haemorrhage. Persistent vomiting can cause distressing upper abdominal pain of muscle origin.

Vomiting or Not ?

One must be sure that the case is vomiting and not regurgitation of food or water-brash due to excessive salivation or regurgitation of esophageal contents. These can be differentiated by that they are usually not associated with retching, the food is not acidic and is not digested.

Age of the Patient

In children and infants vomiting can occur due to any disturbance in the body, mainly in the gastrointestinal tract, and in anxious irritable (hypertonic) children. Nevertheless vomiting in children may be of serious significance as in cases of hypertrophic pyloric stenosis, or due to increased intracranial pressure.

Sex

In girls vomiting may be hysterical if no organic lesion can be detected.

In pregnancy, in the early months it is of functional origin or due to endocrinal disturbances, in the late months, it may be due to eclampsia or acute liver necrosis.

History

a) Vomiting dating since birth may be cyclic vomiting, in adults presenting as migraine.

b) History of allergic manifestations for example urticaria, eczema, rhinitis or asthma.

c) Past history of endocrine disturbances or metabolic disturbances for example, jaundice diabetes or a history of peptic ulceration, the latter may suggest that the patient induces vomiting to relieve himself of the pain, or the development of pyloric obstruction.

d) History of drug intake such as morphia, apomorphine, emetine, digitatis or gastric irritant drugs.

e) History of trauma to the skull.

f) History of previous thrombotic cerebral episodes or other cerebral conditions.

g) Past or present history of gastrointestinal surgery.

h) Weight loss.

i) History of psychologic or social disorder.

Onset of Vomiting

a) Sudden : Sudden vomiting suggests the cause to be an acute surgical abdomen, specific fevers, intake of a toxin or a drug.

b) Chronic : Chronic vomiting occurs in hysterical girls, chronic pyloric obstruction, migraine, premenstrual and menstrual, and peptic ulceration (for relief of the pain).

Time of Vomiting

a) Morning : Vomiting occurs in the morning in alcoholic gastritis, postnasal discharge, in pharyngitis most common in heavy smokers, in allergic patients, in pregnant females, in renal disturbances and with brain tumours.

b) After Meals : Vomiting occurs after intake of the food if the patient is hysterical, or if there is a fault in the food such as toxins, bacteria or mechanical irriation, or if the patient is allergic to that particular food. In these conditions the patient usually vomits after intake of a certain type of food. Vomiting may occur a few hours after food intake in duodenal peptic ulceration or pyloric obstruction.

Vomiting having no relation to food and no exact time of occurence suggests brain tumour or toxaemia of any cause, as a cause of the vomiting.

Precipitating Factors

a) Trauma to the skull, or the testicles may be the precipitating factor for vomiting.

b) Motion Sickness : Travelling by air, sea, car or train can precipiate vomiting reflexly through labyrenthine stimulation.

c) Relation to bad small or bad sight.

d) Operations : These can precipitate vomiting due to

i. Anaesthesia.

ii. Acute dilatation of the stomach.

iii. Operations on the thyroid gland by precipitating a thyyrotoxic crisis.

iv. Vomiting occurring a few months or weeks after an abdominal operation may be due to intestinal adhesions.

e) Intake of drugs that can cause vomiting. (emetine, tatar emetic, morphia,...).

f) Middle Ear Disease : This can lead to vomiting either by affection of the labyrinth or from a brain abscess.

Symptoms which precede the Vomiting

a) Hemicranial Headache : If this type of headache occurs immediately before the vomiting, it suggests migraine as the cause of vomiting.

b) Nausea : Vomiting preceded by nausea is usually due to a gastrointestinal cause.

c) Projectile Vomiting : Vomiting which is projectile and sponaneous suggests a cerebral lesion as its cause.

Some Associations with Vomiting

1. Vomiting with Headache : Vomiting may be due to migraine or cerebral disease.

2. Projectile Vomiting : This type of vomiting is due to increased intracranial pressure.

3. Vomiting with Vertigo : This type of association points to labyrenthine disease, Minier's disease and posterior inferior cerebellar artery syndrome as the cause of vomiting.

4. Early Morning Vomiting : Early morning vomiting on awakening and before breakfast occurs in pregnancy, chronic alcohlism, chronic atrophic gastritis of heavy smokers, renal failure, obstructive air way disease (usually in heavy smokers and psychoneurosis).

5. Diarrhea : Diarrhea suggests the cause of vomiting to be acute gastro-enteritis, food allergy, ureamia or one of the crices of endocrine disturbances such as in Addison's disease and thyroid crisis.

6. Constipation : It may accompany any chronic vomiting. It is common with cyclic vomiting and intestinal obstruction.

7. Fever : Vomiting occurs in acute febrile conditions in childern. The vomiting may be due to meningitis or cholera.

8. Psychogenic Vomiting : This is characterized by

   i. Long history

   ii. Maintenance of good nutrition (except in anorexia nervosa)

   iii. Vomiting during or shorthy after meals

   iv. Often induced by the pateint.

   v. Evidence of psychogenic troubles as anxiety, depression etc.

g. Delayed and Repeated Vomiting after Meals : This type of vomiting occurs with gastric dilatation whether obstructive or paralytic. The vomit contains food particles and may be brownish in colour.

Examination of the Vomitus

This must always be done. It will give a lot of useful information and helps a great deal to discover the cause of vomiting.

a) Amount : Vomiting of a great amount suggests pyloric obstruction and acute dilation of the stomach as the cause of the vomiting. Vomiting of a small amount which is repeated suggests irritative lesions of the stomach and hysterical vomiting.

b) Odour : The vomit may contain alcohol suggesting alcoholism as the cause of vomiting.

It may contain caustic material suggesting it as the cause.

The odour may be fcecal as in intestinal obstruction and acute peritonitis.

c) Food Particles : The vomit may contain food particles. If these food particles are not digested, it means that the patient has vomited a short time after the intake of food.

If the food particles present in the vomitis are those due to food ingestel several hours before, then the vomiting may be due to pyloric obstruction.

d) Examination of Gastric Seceretion. : If the vomitus is pure gastric secretion, this suggests a duodenal ulcer with increased gastric secretion with a possible associated pylorospasm.

The presence of excessive mucus in the vomit suggests the

presence of an irritative disease of the stomach in the form of gastritis (acute or chronic).

e) Blood : Diseases giving rise to this bleeding are either in the stomach or duodenum down to the ligament of Treitz at the end of the third part of the duodenum. In the order of frequency, in this country, haematemesis is the result of

i. Bleeding Esophageal Varices : This is the most common cause in Egypt, especially in patients coming from the country.

ii. Chronic Duodenal Ulceration : Gastric ulcer is rare in this country especially in town dwellers. Chronic duodenal ulceration is the commonest cause of bleeding in patients living in the town.

iii. Carcinoma of the Stomach : specially in old people.

iv. Gastritis (usually associated with acute ulcers).

Examination of the Patient

A patient presenting with vomiting should have the following organs examined.

a) Eyes

i. Congested eyes with a steamy cornea occurs in acute congestive glaucoma.

ii. Bilateral exophthalmos occurs in hyperthyroidism.

iii. Unilateral exophthalmos occurs in cavernous sinus thrombosis suggesting a cerebral cause for the vomiting.

v. Errors of refraction such as astigmatism can also cause vomiting especially after focussing for long periods as in cinemas.

vi. Fundus examination may reveal the presence of albuminuric or diabetic retinopathy.

vii. Jaundice : The presence of jaundice suggests cholaemia. liver necrosis, or biliary colics as the cause of vomiting.

b) Mouth

i. The smell of alochel in alcoholic gastritis or corrosives in corrosive poisoning suggests these conditions as the cause of vomiting.

ii. Palatal paralysis occours with posterior inferior cerebellar thrombosis.

c) Pharynx

i. A postnasal discharge or enlarged tonsils may be the cause of vomiting.

ii. Palatal paralysis orcurs with posterior inferior cerebellar thrombosis.

d) Neck

Enlarged lymph nodes may denote gastric cancer.

e) Cardiovascular System

Acute pericarditis, cardiac infarction, heart failure with or without digitatis therapy, high blool pressure with hypertensive encephalopathy may point to the cause of vomiting.

f) Chest

Enlarged mediastinal lymh nodes, whooping cough or pulmo-orary tuberculosis may be responsible causes the vomiting.

g) Abdomen

i. Peristalsis can be seen in pyloric obstruction, in small intestinal obstruction (step ladder fashion)

ii. One form of vomiting is the psychogenic vomiting of pregnancy.

h) Functional Vomiting

The characteristies of functional vomiting is that it is not related to food and is inspite of its long duration, up to months and sometimes years, it is not associated with any appreciable nutritional defieinncies.

Investigations

1. *Stomach and Gastrointestinal Tract*

a) Radiology and cineradiology of the stomach and intestines, plain and with barium meal.
b) Radiology of colon with barium enema.
c) Gastric aspiration for volume and retained food.
d) Gastroscopic endoscopy.

2. *Gall Bladder*

a) Cholecystography, plain and with dye ; oral and intravenous.
b) Duodenal intubation
c) Sonography and C-T scanning.

3. *Pancreas*

a) Serum and urine amylase

b) Serum lipase

c) Plain X-ray film

d) Pancreatic exocrine function tests

e) Sonography and C-T scanning.

4. *Liver*

a) Liver function tests (bilirubin, transminases, alkaline phosphatase, ... etc.

b) Liver biopsy

c) Ultrasonography, hepatic scanning and computarized tomograply.

5. *Pregnancy tests*

6. *Kidney Functions*

a) Electrolytes (soduim, potassuim, ... etc)

b) Blood urea and urea clearance

c) Blood creatinine and creatinine clearance

d) Radiology (plain and intravenous pyelography).

e) Acid phosphatase

f) Scanning and sonography.

7. *Haematologic Studies*

a) Leucocytosis

b) Anaemia

c) Estimation of vitamin B 12 and folic acid in blood.

d) Estimation of serum iron.

8 *Nervous System*

a) Cerebrospinal fluid for pressure, white cells, red cells, proteins, xanthochromia, chlorides, glucore, ... etc.

b) Electroencephalography

c) Brain scan

d) X-ray skull

e) Cerebral angiography

9. *Diabetes Mellitus*

a) Blood glucose, fasting and after glucose load.

b) Ketone bodies

c) Blood lipids.

10. *Thyroid Functions*

a) Basal metabolic rate

b) Protein bound iodine

c) Radioactive iodine uptake and excretion

d) T3 and T4 estimations

e) Blood cholesterol

11. *Chest Diseases*

a) Radiology (plain and bronchography)

b) Sputum for acid fast bacilli and culture.

12. *Cardiovascular System*

a) Radiology (plain and angiography)

c) Ecchocardiography

13. Toxic Conditions

a) Estimation of alcohol in blood.

b) Estimation of drugs and toxic materials

14. Motion Sickness Tests (labyrenth and labyrenthine connections)

a) Caloric tests

b) Audiometry.

CHAPTER THREE

GASTROINTESTINAL HAEMORRHAGE (HAEMATEMESIS AND MELAENA)

DEFINITION

Differentiation from Haemoptysis

CAUSES

Diseases of Esophagus

- Varices (common)
- Esophagitis and Esophageal Peptic Ulcer
- Esophageal Hiatal Hernia
- Diverticulae
- Trauma
- Achalasia
- Carcinoma

Diseases of Stomach and Doudenum

- Peptic Ulceration (common)
- Gastric Carcinoma
- Gastritis
- Gastric Varices
- Anastomotic Ulcer
- Acute Ulcer
- Drugs
- Benign and Malignant Tumours
- Diverticulae

Diseases of Small Intestine

Diseases of Caecom and Ascending Colon

Blood Diseases

Thrombocytopenic Purpura

Coagulation Defects

Cardiovascular Causes

Allergy

Neurological Diseases

Toxaemias

Sarcoidosis

COMPLICATIONS

Cardiovascular

Biochemical

Complications of Hypoxemia

Complications of Recumbency

Complications of Recumbency

DIAGNOSTIC APPROACH

Haemetemesis or Not ?

Age

Sex and Occupation

Habits

Family. Drugs. Dysphagia.

Previous bleedings from other sites. Fever.

Clinical Examination

Wasting. Anaemia. Lymph nodes. Skin. Eyes.

Face. Neck. Heart. Lungs. Abdomen. Lower limbs.

Investigations

Stomach — Radioligy

Endoscopy

Stomach Functions

Blood

Liver Functions Tests

Flourescin String Test

Clinical Assessment of Severity of Bleeding

TREATMENT

The Patient

Shock

Sedation

Oxygen

Correction of Blood Clotting

Gastric and Intestinal Lavage

Feeding

Surgery

GASTROINTESTINAL HAEMORRHAGE

Haematemesis and melaena are among the grave conditions the practitioner and the physician may come across and usually calls not only for an emergency treatment built on a quick decision, but needs for the management a pre-arranged plan for this management which must be clear in the mind of the treating doctor. In addition an open mind to the possible complications and emergencies that may arise, must be kept, and a known method of treatment to be at hand.

Haematemesis and melaeta, in other words gastrointestinal haemorrhage will be discussed as one entiy because their causes may be intermingled and related. The same diseases can give rise to both haematemesis and melaena. The effects of both on various systems is the same and the mangement of both is the same, in most instances, at least regarding the broad lines of treatment.

CAUSES OF GASTROINTESTINAL HAEMORRHAGE

One is confronted when dealing with gastrointestinal bleeding by an important question, namely the site of this bleeding. First, other sites of bleeding must be excluded, such as swallowed blood from the gums, teeth or epistaxis which may be vomited, and haemoptysis.

Swallowed blood from the gums, teeth and nose which is vomited is usually of small quantity and a careful history taking, in addition to local examination will exclude this as a cause of haematemesis.

Haemoptysis is rather more diffcult, and sometimes truely misleading, especially during a hasty examination and because of the rather confusing

circumstances of the bleeding itself in addition to the low intelligence of some patients on top of the mental confusion in them resulting from the loss of a great amount of blood. Differentiation between haemoptysis and haematemesis lies in that haematemesis is vomited while haemoptysis is coughed. Although this may seem a simple thing, yet it may be actually difficult to elicit this simple fact from patients. Examination of the voided blood itself is of extreme importance and the doctor must insist upon it, not only for its examination but to discover malingerers. Blood of haematemesis is usually dark due to it being either venous from esophageal varices or being altered by the acid gastric secretion. The blood of haematemesis may contain particles of food or clots of blood, while that of haemoptysis is usually frothy because of the air in it coming from the lungs and bronchi. Examination of the blood for its reaction (pH) will reveal it to be acid in haematemesis (usually) and alkaline or neutral in haemoptysis.

		Haemoptysis	*Haematemesis*
Cause	:	Cough	Vomiting
Colour	:	Bright red	Dark red
Contents	:	Froth	Food
Reaction	:	Acid (usually)	Alkaline or neutral

After definitely excluding haemoptysis and swallowed blood as the cause of bleeding, the physician should attempt to answer the important question of the site of bleeding in the gastrointestinal tract. Bleeding arising from any part of the gastrointestinal tract above the ligament of Treitz gives rise to haematemesis, below it, no haemetemesis occurs. Melaena can occur from bleeding anywhere in the gastrointestinal tract from the esophagus down to the caecom and ascending colon. Melaena signifies bleeding from a site that allows blood before passing into the outside in the the stools to be altered through its passage in the intestines, thus

bleeding from the rectum and lower part of the colon are excluded from the causes of melaena as not enough time is allowed for this alteration.

The best approach to the causes of haematemesis and melaena is that which combines a systematic way in addition to stressing the frequency of the causes. The following presentation is aimed at this, in addition. in the diagnostic approach to the patient the importance of the common causes is going to stressed. (See figure three),

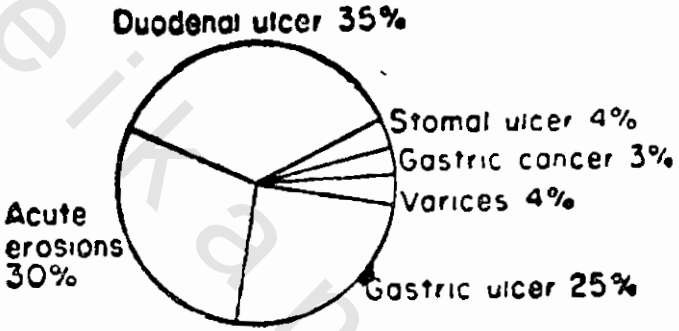


Fig. 3 : Frequency of causes of haematemesis. In Egypt, bleeding varices represent 45% of the causes

Diseases of the Esophagus

A. Esophageal Varices

This is one of the commonest causes of bleeding in this country. It occurs as a result of portal hypertension due to schistosomal (Bilharzial) fibrosis (cirrhosis) of the liver. These varices are among the collaterals communicating the congested portal bed to the systemic venous circulation. Statistics from general hospitals show that this cause of bleeding constitutes one half to two thirds of the causes of bleeding, stressing its extreme importance in this class of patients and the nescessity of its careful exclusion as a cause of bleeding. However, the statistics of a general hospital may be misleading as it does not include the whole population, the type of a general hospital patient is a poor class and usually is coming from the country, both

factors, explaining the unduly high percentage of this cause of bleeding. Inclusion of a wider sector of population will result in reduction of this percentage to about one quarter out of all causes of gastrointestinal haemorrhage. Thus, the locality from which the patient came, his work and social standard are important guides in the diagnosis of this condition as a cause of bleeding.

B. Uncommon Causes

1. Esophagitis and Esophageal Peptic Ulcer : This condition occurs when there is chronic reflux of gastric acidity into the lower end of the esophagus, whether or not it gives rise to actual peptic ulceration. The amount of blood here is undoubtedly small, but the condition should not be overlooked.

2. Esophageal Hiatal Hernia : This condition does not usually give rise to haemorrhage unless an ulcer occurs in it. Being usually in association with a duodenal ulceration which must be considered as the cause of bleeding, as the hernia itself does not give rise to massive haemorrhage.

3. Diverticulae of the Esophagus : This also may be the source of bleeding if ulceration, due to stasis of food occurs in them.

4. Trauma to the Esophagus : This trauma may occur from swallowing a foreign body either accidentally especially occurring in children or intentionally for suicidal purposes and by acropats. Trauma can also occur as a consepuence of faulty or hasty endoscopy to the esophagus and stomach. The Mallory-Weiss syndrome, which is also a form of trauma, is laceration of the mucosa and submucosa of the cardia and the lower esophagus following vomiting, this condition is asscociated with profuse bleeding and usually calls for prompt surgical correction.

5. Achalasia of the Esophagus : The amount of bleeding in this condition is usually slight and never massive. It results from stasis of food giving rise to ulcerations of the wall of the dilated esophagus.

6. Carcinoma and Other Benign Tumours of the Esophagus

Carcinoma of the esophagus is responsible for 3 percent of bleeding.However the bleeding is only rarely massive.

Diseases of the Stomach and Duodenum

A. Common Causes

1. Peptic Ulceration of the Stomach or Duodenum : This is considered in other countries to be the commonest cause of massive gastrointestinal bleeding and may constitute from half to three quarter of all cases. However, in this country as mentioned before, and because of the prevalance of schistosomel hepatic fibrosis, bleeding from peptic ulcer comes second, although its frequency depends on the class of patients included in the statistical study and whether they come from the country or the town. About 10 percent of peptic ulcers are complicated by massive bleeding at one time or another and may even bleed more than once especially in the old. The rather uncommon incidence of gastric ulceration is responsible for the greater number of duodenal ulcers that bleed, although the bleeding from a gastric ulcer is more massive. Postbulbar duodenal ulcers usually bleed more massively than bulbar duodenal ulcers. Bleeding may be the first manifestation of a peptic ulcer in 10 percent of bleeding ulcer patients. It is worth-while to note than many peptic ulcers heal with the disappearance of symptoms after they bleed.

2. Acute Ulcers : The importance of this condition as a cause of bleeding has been stressed in the last few years. This has resulted from

the great number of haematemsis in whom no diagnosis could be found to explain the bleeding. This may occur in about one quarter of patients with haematemesis. Acute ulcers are more common in the duodenum, and the lesser curvature and are usually single. Some of them have been observed gastroscopically by the technique of early gastroscoping patients with haematemesis. Autopsy evidence is also present.

3. Gastric Carcinoma : This disease is responsible for about 5 to 10 percent of massive haemorrhage. It is more common in the ulcerating type of gastric carcinoma, and may be occasionally the presenting symptom.

4. Gastritis : Acute gastritis and chronic superficial gastritis can cause haematemesis which may be massive. In these condition and especially in acute gastritis, the cause of the gastritis can be found. The type of gastritis previously called chronic hypertrophic gastritis, which is really a gastroscopic description rather than a pathological or clinical entity, can also be responsible for gastric bleeding.

5. Gastric Varices : This cause of bleeding constitutes part of the bleeding in esophageal varices due to portal hypertension resulting from cirrhosis or fibrosis of the liver. The varices extend in the stomach, especially its cardiac side and ito the esophagus, all of them constituting one system of collaterals joining the congested hypertensive portal bed with the azygos systemic venous system. The gastric varices are more supported than the esophageal and thus should be less liable to bleed, nevertheless they are more prone to the gastric acidity with its eroding and ulcerating action, which makes them also a cause of haematemesis either alone or in combination with esophageal varices. This bleeding from gastric varices calls for attention in applying the Sangstaken tube for compression of the esophageal varices, to ensure proper inflation of the gastric balloon not only for the purpose of locking it in the cardia to prevent dislodging of the tube but also to compress, to a certain degree the gastric varices.

B. Uncommon Causes

1. Anastomotic Ulcer : Bleeding can occur after partial gastrectomy or gastroenterostomy. It is more common in the form of melena than haematemesis. The cause of bleeding may be either gastritis, or recurrance of the duodenal ulcer in addition to ulceration of the site of anastomosis.

2. Drugs : Certain drugs especially the anti-rheumatic group including salicylates (all their types), aspirin, cortisone and adrenocorticotrophic hormone (ACTH), phenylbutazone, the uncontrolled use of anti-coagulants and reserpine, all these, can cause gastrointestinal haemorrhage which can be quite massive or on the other hand the bleeding may be occult giving rise to iron deficiency anaemia. The mechanism how these druge especially the salicylates and aspirin group cause bleeding has been investigated a great deal recently. It has been shown by autopsy and by gastroscopy that they produce superfical erosions, edema and congestiin of the gastric mucosa, accompanied by reduction in the acid enzyme secretion. These changes are not related to whether the drug is soluble or insoluble and occur not only in the stomach but also in the duodenum. It seems that a local allergic factor is responsible. Studies on intravenous salicylates demonstrate that they also can cause gastric bleeding, which has been suggested to be of central origin, similar to the ulcers produced by Cushing. Cortisone and ACTH, can induce activity in a dormont ulcer, increase the activity of an already active ulcer and cause it to bleed and produce a new ulcer in a constitutionally ulcer patient with a big parietal acid-secreting cell mass. It should be noted here in this respect that cortisone (and its derivatives) produce these effects much more when administered orally than by parenteral administration, they produce either an increase in the parietal cell mass or increase their secretory power or both.

3. Benign and Malignant Tumours of the Stomach and Duodenum : This group includes (besides gastric carcinoma) benign tumours of the stomach such as adenoma, leiomyoma, lipoma, neurofibroma, haemangioma and lymphangioma and tumours of the duodenum as papillomata. The malignant tumours of the stomach besides carcinoma are of the sarcoma group, namely, leiomyosarcoma, lymphosarcoma and reticulosarcoma. Secondaries in the stomach wall may also give rise to bleeding. Malignant tumours of the duodenum include carcinoma of the ampulla of Vater; they produce melaena only. The rarity of all these condition should not be an excuse for overlooking them.

4. Diverticulae of the Stomach and Duodenum : These are decidedly rare. They are of two types; congenital or acquired. The congenital type is usually associated with diverticulae in other parts in the gastrointestinal tract, for example the small intestine and colon. Diverticulae are discovered accidentally during x-ray examination, but there may be epigastric pain, dysphagia, cardiospasm, vomiting and sometimes massive haemorrhage.

Diseases of the Small Intestine

These are all uncommon causes of gastrointestinal bleeding. They account for melaena only, and usually do not present with any previous symptoms. They include benign tumours, Peutz-Jegher's syndrome (multiple polyposis of the small intestine), ulcers of the jejunum and ileum which are primary and non-specific, Mickel's diverticulum when peptic ulceration occurs in its gastric mucous lining, other diverticulae of the small intestine besides Mickel's, regional enteritis and other chronic inflammatory conditions such as tuberuclous entertitis and necrotising forms of enteritis due to clostridium Welchii. Recently, stress has been laid upon vascular conditions of the small intestines especially in the old as causes of melena, they include mesenteric vein thrombosis and mesenteric artery occlusion.

Disease of the Caecum and Ascending Colon

Diseases of the colon usually give rise to blood in the stools. However,

diseases of the caecum and ascending colon which may give rise to bleeding especially if slow may result in melaena. Thus, melaena may result from diverticulosis, malignant and benign tumours, ulcerative clolitis, tuberculous typhlitis, amoeboma of the caecum, colonic telengiectasia and granuloma similar to Crohn's disease.

System Diseases

Besides local diseases and conditions of the gastro-intestinal tract, other general diseases can cause bleeding in this system in addition to other organs or only in it. Thus, examination of a patient with gastrointestinal haemorrhage should always include the look-out for general non-gastrointestinal causes.

Blood Diseases

These can be divided into purpura and coagulation defects.

1. Thrombocytopenic Purpura : This is really a group of diseases sharing inbetween a common feature of reduced number of blood platelets, which gives rise to bleeding which may occur in any part of the body. including the gastrointestinal tract. Thrombocytopenic purpura is of various types.

a) Thrombocytopenic Purura Haemorrhagica : (Werlhof, Essential thrombocytopenic purpura).

b) Secondary or Symptomatic Thrombocytopenic Peurpura

c) Thrombotic Thrombocytopenic Purpura

d) Allergic Purpura : (Henoch-Schonlein or Non-thrombocytopenic Purpura)

e) Thrombasthaenia (Glanzmann's)

f) Polycythaemia Rubra : In about 12 percent of cases of polycytheamia there is a gastric or duodenal ulcer, probably on a vascular basis, these may bleed. Thrombosis of the portal vein occasionally occurring in this disease may lead to esophageal varices and bleeding. Mesenteric vein thrombosis causes small intestine infarction and melaena.

2 Coagulation Defects : In this group the cause of bleeding is a defect in the coagulation mechanism.

a) Haemophilia

b) Christmas Disease (Factor IX deficiency)

c) Hypoprothrombinaemia : Gastrointestinal bleeding occurs when the prothrombin content is less than 10 percent of the normal. This excessive reduction may be a congenital enzymatic defect in the liver, or extensive liver diseases and may be a factor in the bleeding of esophageal varices in patients with cirrhosis and fibrosis of the liver. Hypoprothrombinaemia may occur also as a result of prolonged obstructive (posthepatic) jaundice, malabsorption syndromes either primary or secondary to small intestine disease due to deficient absorption of the fat soluble vitamin K. Antibiotics and salicylates have a hypoprothrombin action, these drugs can thus, when given without proper control or in patients with peptic ulcer, cause massive gastrointestinal haemorrhage.

d) Fibrinogenopenia.

e) Increased Plasma Fibrinolytic Activity : This factor is contributing to the bleeding from esophageeal varices. It also occurs in patients with carcinoma of the pancreas and prostate and during operations on these organs ond on the lungs. It occurs also in extensive bruns and after blood transfusions.

Cardio Vascular Causes

Diseases of the heart in the form of heart failure and of the blood vessels; arteries, capillaries and veins can be responsible for gastrointestinal bleeding either mild and intermittent or massive.

1. Telengiectasia of the Gastrointestinal Tract : Several hereditary forms of this disease are present.

a) The commonest is Osler's disease (hereditary haemorrhagic telengiectasis), in which there is cutaneous telengiectasis in addition to the gastrointestinal tract. It consists of dilation of capillaries and venules.

b) Less Common Telengictases

i. Cavernous Haemangiomas : These are present in the gastrointestinal tract in addition to the skin.

ii. Pseudoxanthoma Elasticum : Widespread inherited deterioration of collogen and elastic tissue all over the body, resulting in very lax and wrinkled skin, destruction of the arterial walls resulting in bleeding which when occurs in the stomach wall give rise to haematemesis.

iii. Parkes Weber-Klippel syndrome (haemangiectatic hypertrophy of the limbs).

iv. Turner's syndrome (webbed neck and infantile genitalia and breasts).

v. Vascular tumours of the small intestine (Kaposis sarcoma).

2. Polyarteritis Nodosa : Gastroitestinal bleeding can occur in a res-

pectable percentage of patients with this disease as a result of infarction and ulceration of the small intestine.

3. Aneurysm of the Aorta : Aneurysm of the abdominal aorta may rupture into the intestines this may also result from rupture of aortic homografts. Dissection of the aneurysm may occur resulting in occlusion of one or more of the mouths of the mesenteric arteries resulting in small intestine infarction and bleeding.

5. Malignant Hypertension : This disease, in addition to pheochromocytoma and nectrotising occlusive endarteritis can be a cause of gastric or intestinal bleeding,with or without the presence of ulcers. The bleeding however, in the absence of concomitant arterial disease is self limited.

6. Congestive Heart Failure and Cardiac Infarction : Gastric and intestinal bleeding can occur in these conditions as a result of congestion of the stomach and intestines. However massive haemorrhage must be attributed to other local disease of these organs, and must also be carefully differentiated from haemoptysis. Haemorrhagic duodenitis with bleeding can occur with severe cardiac infarction.

Allergy

Allergy can be a cause of gastrointestinal bleeding as in Henoch-Schonlein purpura. Besides this, allergy can be a cause of gastric bleeding due to allergy of the gastric and intestinal mucosa and is associated with skin, bronchial and nasal manifestations of allergy.

Neurological Diseases

Gastric bleeding has been noted to occur in some cerebral vascular accidents and after brain operations especially those involving the hypothalamus, simulating Cushing's experiments.

Toxaemia

The best example of this endogenous toxaemia is the melaena occurring in the small intestine, caecum and ascending colon supposidely due to superficial ulcers occurring in the small intestine, caecum and ascending colon supposidely due to excretion of certain toxic substances by them in this disease.

Sarcoidosis, Primary Amyloid Disease and Multiple Myeloma

Gastrointestinal bleeding has been reported to occur in these diseases due to ulcerations in the mucosa of the stomach and intestines.

This long list of causes of gastrointestinal bleeding is meant for the sake of covering all the possible causes of bleeding. For the practising doctor and the physician is strongly advised to think first and look first for the common causes as they cover the great majority of them. Only occasionally and possibly at wide intervals of time should one come across one of the rare causes as an agent in this type of bleeding.

COMPLICATIONS OF MASSIVE GASTRO-INTESTINAL HAEMORRHAGE

Complications of gastrointestinal haemorrhage, especially when massive are those common to any massive haemorrhage and those particular to haemorrhage in this type of bleeding.

Cardiovascular Complications (shock)

The major effect of massive gastrointestinal haemorrhage is shock. Shock occurs after failure of the compensatory mechanisms. Thus, it may occur immediately after the haemorrhage, especially if massive, or it may not occur in the beginning because of the efficiency of the compensatory mechanisms, but occurs later due to the occurence of an additional, even trivial bleeding which can overcome these compensatory mechanisms.

It is the blood volume which is the factor responsible for shock, hence the importance of knowing the amount of blood loss and the occurence of fresh bleeding is difficult to do in the gastrointestinal tract because it is a closed system and not every bleeding comes out from the mouth or the rectum. The intestines and the stomach can accomodate in them a great amount of blood, and even if it is expelled by haematemesis or by melaena, this may occur a long time after the bleeding has occurred and may even occur after it has stopped completely.

Tests : Two tests are useful to guide the physician in this problem.

i. The Tilt Test : In this test the patient is tilted to more than 75 degree for 3 minutes. The test is positive if the pulse accelerates more than 30 beats per minute with syncope of the patient, indicating failure of the compensatory mechanisms and need for blood transfusion. Caution must be exercised for fear of shock occurring.

ii. The Transfusion Test : This test is the transfusion of 2 to 3 liters in a patient who has stopped bleeding for 24 hours. This should restore all circulatory changes back to normal. If this does not happen, it means the presence of continued or new haemorrhage. Further, the failure of rapid administration of blood (0.5 litre every half hour, up to 3 liters) to restore and maintain reasonable circulatory haemodynamics is a signal for the physician to seak an emergancy surgical intervention.

The essential mechanism of any circulatory changes either compensatory or due to failure are all secondary to blood loss resulting in a reduced blood volume. This reduction in blood volume will cause reduction in the cardiac output, reduction in right atrial pressure, vasocostriction of the skin and splanchnic areas in an attempt to utilise the remaining blood for the more vital organs of the body namely the heart and brain. There is also slight fall in the blood pressure. The pulse rate may bacome rapid or slow. Slowing of the pulse rate can happen with moderate losses

of blood giving rise to a syncopal vasovagal attack with slowing of the pulse rate. Excessive blood loss, however, will result in shock and tachycardia. This tachycardia in addition to a shallow and occasionally sighing respiration, restlessness and a dry mouth are strong indications of the occurence of new bleeding even if no fresh haematemesis or melaena have occurred. Severe bleeding on the other hand will give rise to vasodilatation of the muscular arterioles resulting in reduction of the peripharal resistance, which will lower markedly the blood pressure leading to loss of consciousness.

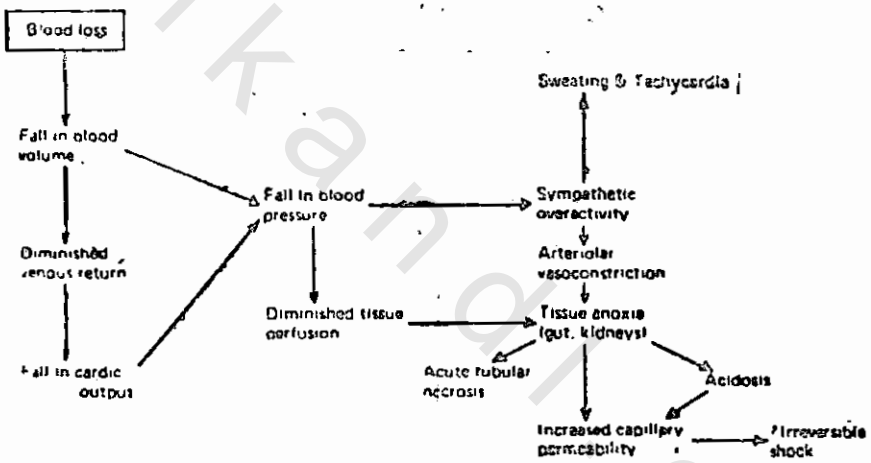
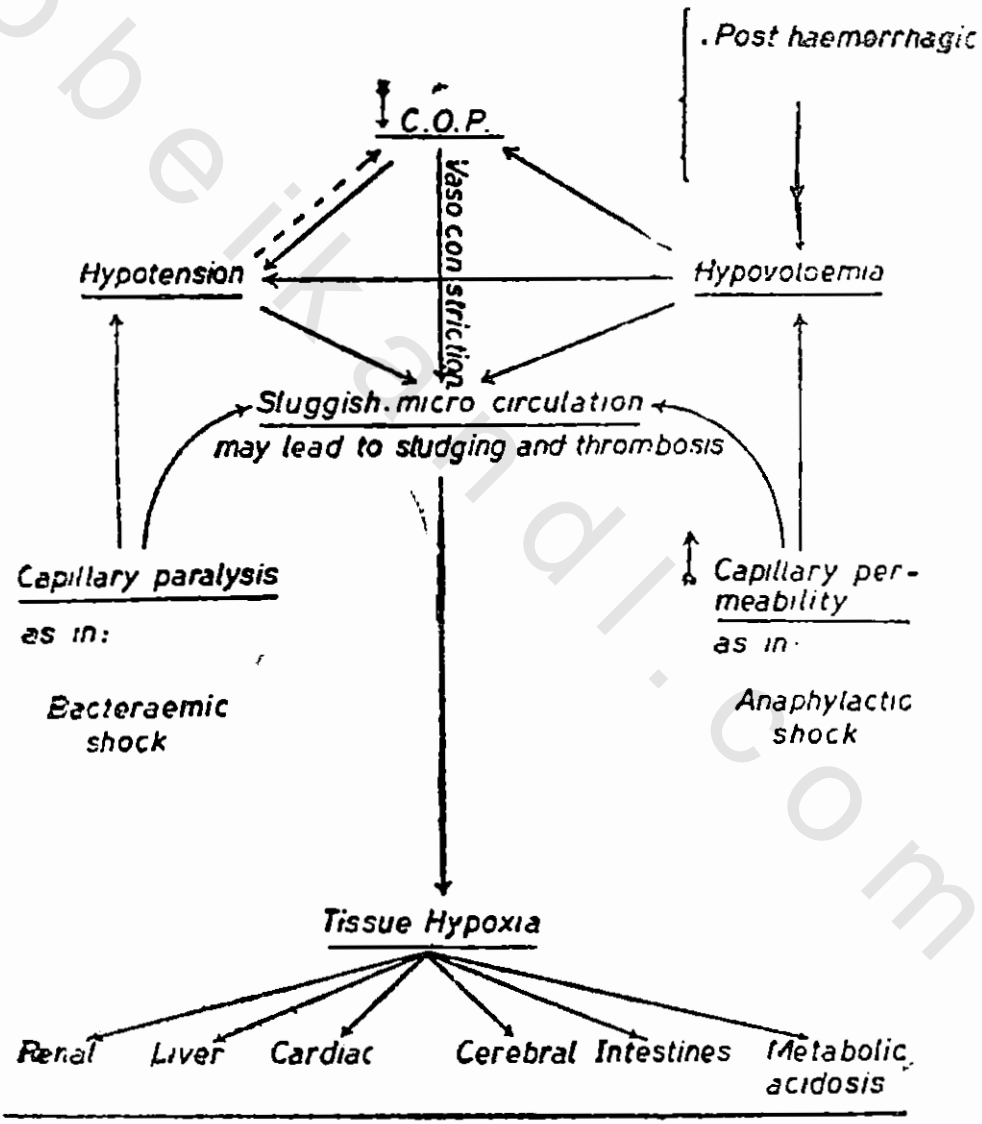


Fig. 4 : The sequence of events in haemorrhage shock

During the few hours following bleeding, the body attempts to correct the reduction in blood volume by entrance of tissue fluid, containing proteins, into the circulation and by cardiovascular mechanisms to overcome the circulatory effects of the reduced blood volume. These are acceleration of the pulse rate and raising the venous pressure which increases the cardiac filling resulting in an increase in the cardiac output. This is called the hyperkinetic phase, with a bounding pulse, big pulse pressure and apparent jugular pulsations. The importance of this phase is that blood transfusion,

PATHOLOGIC PHYSIOLOGY OF SHOCK



C.O.P = CARDIAC OUTPUT

After Prof. M. Salat

if administered during it, must be done with great care as it may induce left heart failure by overloading the circulation and increasing the venous return and the cardiac output.

Biochemical Complications

1) Uraemia (hyperazotaemia)

The main cause of this increase of blood urea nitrogen is the absorption of the products of digestion of blood, occurring after upper gastrointestinal bleeding, and its height is an index of its severity, mild to moderate bleeding usually raises the blood urea to 70 mg per 100 ml, or 100 mg at most. Levels higher than this (up to 150 mg) denote severe haemorrhage. Higher than 150 mg per 100ml blood urea denote the presence of alkaosis, dehydration or chronic nephritis in addition. This hyperazotaemia is also controlled by the time which the blood remains in the intestines. However, absorption and digestion of blood are not the only mechanism of this hyperazotaemia, a pre-renal element resulting from hypotension plays also a role especially in those patients who present with hyperazotaemia of a level higher than 70 mg/100 ml blood urea. The mechanisms are decreased renal blood flow, glomerular filtration rate and renal excretion with reduced urea clearance values. An additional factor in this hyperazotaemia is breakdown of tissue protein occurring with prolonged starvation and diminished protein intake with chronic bleeding.

a. Hypochloraemia and alkalosis do not occur except if there is vomiting associated with the bleeding. If the patient has pyloric obstruction in addition to a bleeding duodenal ulcer, then he may develop in addition hypochloraemia and increase in the sodium bicarbonate (alkalosis), hyponatraemia and hypokalaemia.

b. There is rise of blood ammonia level especially if the cause of bleeding

is esophageal varices. The plasma proteins fall then return again to normal within a few days.

c. There may be also hyperglycaemia due to the effect of stress on the adrenal cortex.

d. Hyperbilirubinaemia and urobilinuria as a result of a hypofunctioning liver also occur.

Complications of Hypoxaemia

1) *Mental* : Hypoxaemia will make the patient restless, uncooperative and sometimes delerious, these manifestations will add to the difficulties of blood transfusion.

2) Permanent Blindness : This may occur as a result of intense vasoconstriction of the retinal vessels in addition to the anaemia produced by the haemorrhage. Examination of the fundus may show no changes or there may be haemorrhages or exudates, with or without papilledema.

3) Hapatic Coma : This is the result of the dual action of hypoxia of the liver cells due to reduced pressure in the hapatic artery plus the anaemia and the absorption of ammonia into the circulation which goes to the brain.

4) *Cerebral and Coronary Thrombosis* : These occur especially in old patients. Confusion up to delerium may occur especially if there is alkalosis or dehydration in addition. Hypotension and hypoxaemia can cause cardiac infarction especially in patients with coronary atheroma.

Complications of Recumbency

Hypostatic pneumonitis especially in patients with previous pulmonary infection and in the old, may occur.

These old patients are especially liable to prostatism resulting from prolonged recumbancy. Hence their early mobilization is recommended.

Recurrence of the Haemorrhage

Recurrence of bleeding in a peptic ulcer occurs in about a quarter of them within one day.

Recurrence in patients with esophageal varices occurs within a few days in more than half of them. The importance of a clear recognition of this is that the second bleeding is of extreme danger and carries with it a high mortality. It seems this is due to that the liver is still suffering from the hypoxia of the previous bleeding and a new one will knock it out completely. The prothrombin activity remains low for a long time after the previous bleeding and a fresh one in the presence of this impairement of the blood coagulation system will render the bleeding unmanageable. In addition to this the esophageal varices either those that have healed after the previous bleeding or others that have been traumatised by the Sangstaken tube, are liable to bleed profusely. Actually, the management of these patients if not impossible is extremely difficult and the prognosis is poor, even calling the surgeon will not help as he will not be able to perform any operation in the pressence of this low prothrombin activity. This should always be kept in mind and a patient who has recovered from the first bleeding from his esophageal varices is urged to submit himself to an operation to relieve the congestion of these varices by one of the operations mentioned before.

DIAGNOSTIC APPROACH TO GASTROINTESTINAL HAEMORRHAGE

Haematemesis or Not ?

The first thing the doctor must be sure about is whether the bleeding

is truely haematemesis. Other causes such as swallowed blood from the nose, throat or teeth must be carefully excluded. Haemoptysis must be differentiated from haematemesis. Not every black stools is melaena. The stools may be black due to drug intake such as iron, vitamins or charcoal. The stools of melaena are not only dark but they are tarry and stick to the wall of the container and when washed the water is pink in colour.

The usuall mode of onset of significant haemorrhage is a sudden desire to defaecate accompanied by weakness, faintness, lightheadedness, sweating and nausea, followed by the evacuation of tarry (black) or reddish stools. The same symptoms occur with haematemesis.

Melaena with diarrhea suggests active bleeding with bowel hypermotility.

Lower gastrointesinal bleeding is suggested by the pesence of blood in the stools, loose stools, weight loss, abdominal mass, history of diverticular disease or pelvic irradiation.

If the haemorrhage is massive, clinical examination and history taking should be limited. Primary attention should be directed to the vital signs and institution of ressuscitation measures.

Age

Old age suggests carcinoma of the stomach or carcinoma of the caecom and ascending colon.

Young age may suggest a hereditary bleeding tendency.

Sex

Carcinoma of the stomach is rare in females.

Hemophilia never occurs in females.

Peptic duodenal ulcers occur with nearly equal frequency in both sexes.

Endometriosis of the ceacom and asecnding colon in a female may be the cause of melaena.

Occupation

In a peasant the bleeding may be the result of schistosomal hepatic fibrosis.

Certain occupations which entail certain mental stress on the patient, irregular times of taking meals as lorry drives, waiters and factory labourers may suggest peptic duodenal ulceration as the cause bleeding.

Habbits

Alcoholism results in Laennec's cirrhosis of the liver with esophageal varices and haematemesis.

Certain nations are used to eating highly spiced foods which can cause gastritis, duodenitis and bleeding.

History

1. Family History : A family history of bleeding tendency, as haemophilia, telengiectasis and other hereditary thrombocytopenias is suggestive of the cause of bleeding in this patient.

A peptic ulceration constitution runs in families, each having a big parietal cell mass, liable under conditions of stress to cause an ulcer, which may show itself by bleeding as the first symptom.

2. History of Drug Intake : Drugs that cause gastrointestinal bleeding must be inquired into the history of their intake, such as aspirin, salicylates of all kinds, butazolidine, cortisone and its derivatives, anti-coagulants, reserpine, ... etc. They alone in a non-ulcer stomach can produce gastrointestinal haemorrhage.

3. *History of Dyspepsia :* A history of dyspepsia preceding the bleeding directs the attention to a peptic ulcer (gastric or duodenal), hiatus hernia, carcinoma of stomach, gastritis and benign tumours of the stomach.

5. *History of Previous Bleedings from Other Sites :* This suggests the cause of bleeding to be a blood disease either a capillary defect or a blood clotting defect.

6. *History of Fever :* This suggests the cause of bleeding to be one of the exanthem group of diseases, malaria,... etc.

7. *History of Alcoholism :* This implicates gastritis or bleeding esophageal varices due to cirrhosis of the liver as possible causes of bleeding.

8. *Gastrointestinal Instrumentation :* Gastrointestinal endoscopy, if note done by competent hands may cause a tear in the esophagus or stomach.

9. *Repeated and Severe Vomiting :* This may suggest the haemorrhage to be due to a tear in the wall of the esophagus (Mallory Weiss syndrome).

10. *Single Bout of Haematamesis :* A single bout of bleeding whatever its amount, usually with a good or moderate condition of the patient is suggestive of drug intake (aspirin, ... etc) as the cause of bleeding.

Clinical Examination

A thorough and proper examination of all the patient from the top of his head down to his toes is essential, every clinical sign noted may be a directing pointer to the cause of the bleeding. For example

1. *Wasting :* This suggests the presence of carcinoma of the stomach and is characteristic of it, especially if associated with prominent loss of

appetite. It can also occur in gastric peptic ulceration, carcinoma of the esophagus, gastritis, and chronic liver disease.

2. *Anaemia :* The presence of anaemia manifesting as pallor suggests the cause to be gastritis, carcinoma of the stomach, carcinoma of the caecom and ascending colon, blood diseases and chronic liver disease.

3. *Enlarged Lymph Nodes :* These if present in the cervical group especially in the left side may be draining lymph nodes of carcinoma of the stomach. They may also be part of generalised lymphadenopathy due to a blood disease, giving rise to this bleeding as well.

4. *Skin :* The skin may show jaundice which may be of the conjugated bilirubin (obstructive) type attributing by deficient absorption of vitamin K, to hypoprothrombinaemia or may be of the hepatic type and contributing to it also by deficient transformation of vitamin K into prothrombin.

   There may be a purpuric rash in the skin denoting the cause of bleeding to be of blood coagulation defect or a vascular defect, the same as the presence of telengiectasis.

5. *Eyes :* The sclera may be yellow due to jaundice or may be red due to sub-conjunctival haemorrhage resulting from blood diseases.

   There may be an Argyl-Robertson pupil associated with a syphilitic liver.

   The presence of retro-bulbar neuritis suggests an alcoholic patient with Laennec's cirrhosis of the liver.

   Examination of the fundus may show exudates or haemorrhages in addition to papilledema resulting from the haemorrhage itself or

due to hypertension or arteriosclerosis or a generalised bleeding disease.

6. *Face :* The presence of spider angiomata directs the attention to an alcoholic liver with portal hypertension and esophageal varices as the cause of bleeding.

Telengiectasis may indicate the cause of bleeding as gastro-intestinal telengiectasia.

Tremors of lips may occur in a chronic alcoholic with cirrhosis of the liver and bleeding esophageal varices.

Epistaxis when present, besides being possibly mistaken for haemetemesis, may indicate a bleeding tendency due to a vascular, capillary or blood coagulation defect. It may also occur in hypertension which may be the cause of haematemesns.

Examination of the gums and fauces must not be overlooked for the presence of scurvy, leukaemia, agranulocytosis and aplastic anaemia as causes of the gastrointestinal haemorrhage.

7. *Neck :* The neck should be examined for engorged cervical veins which may indicate an overloaded circulation resulting from an enthusiastic and rapid blood transfusion. It may indicate a mediastinal glandular enlargement as part of generalised glandular disease or blood disease.

The presence of enlarged cervical lymph nodes suggests the cause of bleeding to be leukaemia, Hodgkin's disease, carcinoma of the stomach or gastric and intestinal tuberculosis.

8. *Heart and Lungs :* Examination of the lungs may reveal the presence

of pulmonary tuberculosis associated with gastric or intestinal tuberculosis.

Pleural effusion can be the result of a Hodgkin's disease, leukkaemia or it may be haemorrhagic due to a bleeding tendency.

Examination of the heart may show cardiac infarction resulting from or associated with the haemorrhage.

9. *Abdomen :* Although the majority of causes of gastrointestinal bleeding arise from local disease of the stomach and duodenum, yet one is often faced with negative clinical findings on examination of the abdomen.

There may be localized tenderness on the ulcer area in the epigastrium, either to the left of the middle line in gastric ulcer or to the right in duodenal ulcer.

The presence of a mass may be gastric carcinoma, or abdominal malignancy or abdominal Hodgkin's.

The liver may be cirrhotic indicating the cause of bleeding as esophageal varices due to portal hypertension, in addition, extensive and acute liver disease may result in hypoprothrombinaemia which can be the cause of this bleeding. Cancer of the liver and a syphilitic liver with jaundice can also be a cause of bleeding.

An enlarged spleen may indicate the cause of bleeding to be esophageal varices due to portal hypertension and liver cirrhosis or fibrosis, which must always be kept in mind to be the commonest cause of bleeding in this country. The enlarged spleen may be due to leukaemia, Hodgkin's disease or thrombocytopenic purpura.

Ascites may be present due to cirrhosis or fibrosis, of the liver,

malignancy of the abdomen or lymph node enlargement resulting in an exudative type of ascites.

10. *Lower Limbs :* Examination of this part of the body must never be missed in the course of examination of any patient for any cause.

The presence of edema may be due to associated ascites, may be nutritional as occurring in prolonged illness with loss of appetite as in carcinoma of the stomach, chronic gastritis and some ulcer patients, it may be due to enlarged abdominal lymph nodes obstructing the venous or lymphatic draining from the legs.

Varicose veins may be present which should in itself make the treating doctor cautious about recumbancy for fear of thrombosis.

The presence of peripheral neuropathy directs the attention to an alcoholic patient with Laennec's cirrhosis of the liver.

11. *Central Nervous System :* Alcoholic dementia can occur in an alcoholic patient with cirrhosis of the liver.

The haemorrhage itself can cause cerebral thrombosis with monoplegia or hemiplegia or varicus degrees of confusion.

Investigations

1. *Stomach Investigations*

Recently the trend is towards early gastroscopy, x-ray and stomach function tests within 48 hours. The application of these investigations although useful as ragards reaching an early diagnosis with a possible benefit to the patient regarding a therapeutic approach, yet they are, on the other hand tiring to him especially in his state of health and the information they render are either not useful at all even for diagnosis, or even if so,

will not add any benefit to his immediate therapy. Late therapy of course, can depend upon performing these investigations at a later time when his general condition allows. Thus, it is a wise thing to judge every patient singly and not to apply these investigations blindly and as a routine to every patient.

a) Radiology : Early radiological examination of the esophago-gastro-duodenal part by the non-manipulative technique can reveal an ulcer which could otherwise not be visualised if the X-ary is done 2—3 weeks later. It will also reveal a hiatus hernia and esophageal varices.

b) Endoscopy : Early endoscopy of the esophagus and stomach is helpful in localising the site of bleeding in one of them or lower down in the duodenum or intestines. This procedure in competent hands can reveal the presence of acute ulcers, a gastric ulcer, carcinoma in the stomach and esophageal varices and the Mallory-Weiss syndrome in the esophagus.

c) Stomach Functions : Stomach functions can be assessed by leaving a tube in the stomach, administered through the nose. This will allow the early recognition of fresh gastric bleeding. If fresh bleeding occurs without blood appearing in the tube, this means that the cause of bleeding is below the pylorus which is closed. Hourly estimations of the pH of the stomach aspirates is valuable in the diagnosis of the cause of bleeding, the acidity could be high in duodenal ulcer, neutral in gastric ulcer and achlorhydria in acute peptic ulcers. Gastric secretory and motor functions can also be performed to detect the secretory and motor status of the stomach which may be useful in the decision on the line of treatment either immediately or in the future. The stomach secretory status can be examined by the usual routine methods of introduction of gastric tubes or by measuring the pepsinogen level in the blood and urine.

2. *Blood Examination*

The blood should be examined first of all for its group including the Rh and other sub-groups for blood transfusions. Determinations of haemoglobin, haematocrit, red and white cell counts, platelet counts blood volume, prothrombin activity and thrombotest are useful both for evaluation of the extent of bleeding and the cause of it.

3. *Liver Function Tests*

Disease of the liver may be the cause of bleeding and at the same time the bleeding itself may have a deteterious effect by the hypoxia it produces, on the liver. Thus estimations of plasma bilirubin and urine urobilinogen, thymol and zine turbidity, transaminases and bromosulphathalein excretion, as liver function tests are essential. The estimation of the ammonia in blood as an index of liver hypofunction and collaterals is also of great importance especially when the bleeding is due to esophageal varices.

4. *Fluorescin String Test*

This test is useful in detecting the site of bleeding which continues to ooze after a massive haemorrhage. The patient is instructed to swallow a thread which is left in the stomach and duodenum overnight, when removed next morning the stain of blood on the thread localizes the site of bleeding.

5. *Emergency Arteriography*

This procedure is usually reserved for the patient who is bleeding massively. It is useful to define the site of bleeding. It is also of a therapeutic value by perfusion of the involved artery with vasopressin which may help to control the bleeding. It also may have beneficial effects in

patients with bleeding esophagegeal varices and severe haemorrhage due to gastric causes.

Clinical Assessment of Severity of Bleeding

This may be very difficult, as bleeding in the gastrointestinal tract is concealed and the part that is voided by the patient, either as haematemesis or melaena is usually much less than the true amount of bleeding. The difficulties arise also from that a vasovagal reaction may suggest that the bleeding is more that what has really occurred.

1. The pulse and blood pressure may be misleading, a slow pulse may occur due to vasovagal reaction, a strong or bounding pulse may result from strong compensatory mechanisms with an increase in the cardiac output, the systolic pressure may even rise. Thus, the diastolic pressure is a better guide to the reduction in blood volume. One has to be guided by other clinical manifestations such as the colour of the hands which become waxy with ivory like nails and dark constricted veins, if the hands are cyanosed this is a bad sign.

2. The measurement of haemoglobin concentration, considered as a clinical bed side procedure can be sometimes helpful if the results are carefully assessed. Immediately after the bleeding it is of no value as what is lost is whole blood and there is no dilution. After that and during the next 3 days the haemoglobin concentration falls gradually, not due to fresh bleeding but due to haemodilution from tissue fluid. The anaemia of bleeding is slowly replaced along several weeks according to the condition of iron stores.

3 Another important indication of the severity of bleeding is the state of consciousness, anxiety and restlessness of the patient. The appearance of these in a patient who has stopped bleeding for some time indicates a fresh bleeding.

TREATMENT OF GASTROINTESTINAL HAEMORRHAGE

Gastrointestinal haemorrhage especially if massive is a medical emergency. A team of a physician, gastroenterologist, surgeon, anaesthetist and laboratory personnel are essential for proper management.

Besides the quick request for infusions including blood, a wide nasogastric tube should be inserted and continuous suction applied. If the site of bleeding is suspected to be the stomach, it should be lavaged with iced water or saline. Early endosoopy (esophagogastroduodenoscopy) is of value in establishing the diagnosis.

Management of the Patient

The treatment of massive gastrointestinal haemorrhage must include proper management of the patient. The patient must always be kept under supervision.

i. The pulse must be recorded every half or one hour, the blood pressure measured every one to two hours.

ii. The daily urinary output must be collected and recorded for its volume, tested for its specific gravity, for the presence of albumen and casts and the chloride output to be on the look out for renal or pre-renal changes.

iii. The haemglobin concentration and haemotocrit should be tested every day not to assess the degree of bleeding but to judge the compensatory power for correction of blood volume and anaemia.

Treatment of Shock

The shock here is hypovolaemic shock, consequently its correction is correction of the blood volume. This should be accomplished, whenever possible by whole blood transfusion. There is no limit to the amount of blood that should be given, the aim is correction of the blood volume, which must be done, when it is not available, or not available in enough quantities, it can be replaced by other infusions such as plasma or saline. Blood transfusion must be given as early as possible and at a rapid rate as long as the systolic pressure is below 100 or 90 mm. of mercury and the pulse rate more rapid than 100 per minute. However, care must be taken in the compensatory stage occurring after bleeding in which there is increase in the venous pressure which increases the cardiac filling resulting in a higher cardiac output, the danger of a rapid transfusion in this phase is the development of left ventricular failure. Therefore, blood transfusion in this stage must be done with constant supervision of the neck veins and the heart and lungs for the development of basal pulmonary crepitations and a gallop on the heart.

Infusion of big amounts of blood caries with it the damages of intoxication by citrate, this can be combated by parenteral calcium administration (not with the blood).

Infusion of saline or other solutions containing potassium may be needed especially in patients with pyloric obstruction. A urinary output of 800ml. per must be maintainted, this will need a fluid intake in the range of two to two and a half liters. If big amounts of saline are needed it is preferable to give solutions containing a lesser amount of sodium chloride either by special preparation or by adding suitable quantities of 5 percent glucose solution. If glucose is given in big quantitities, vitamin B 1 (aneurin) intramuscularly must also given as glucose causes deficiency of this vitamin.

Sedation

These patients are usually restless, anxious and worried about their condition. Assurance by the doctor and the nurse are of utmost importance. Some patients, especially in the presence of shock need more than simple assurance and sedatives must be given. Morphia can be used in these cases, except in patients with cirrhosis or fibrosis of the liver. Phenobarbitone intramuscularly in a dose of 0.1 to 0.2 gm. every 4—8 hours will usually calm the patient, this drug however, should also be administered with caution in liver patients, a lowered dose and prolonged intervals are recommended or substituted by paraldehyde.

Oxygen

This is a useful measure, especially when cyanosis occurs and should be preferably given by a tent. Its benefit is more in bleeding due to esophageal varices where hypoxia of the liver has a bad influence and induces hepatic coma.

Correction of Blood Clotting

A defect in blood coagulation may be the cause of the bleeding or may be the cause of perpetuation of the bleeding or of fresh bleeding. This defect may either need vitamin K given intramuscularly in cases of hypoprothrombinaemia or even fresh blood in other bleeding condition.

Gastric and Intestinal Lavage

Gastric lavage with the purpose of removeing blood clots used to be done, now it is largely abandoned because of the trauma it induces to the stomach and duodenum, any blood clots in the stomach can be easlly vomited without any extra effort. The washing of the stomach however with ice water may be of value in post - gastrectomy bleeding, acute and bleeding

gastric varices. Intestinal lavage (colonic lavage) is done with the aim of washing the intestines from the blood to reduce the development of hyper azotaemia, especiaily when the bleeding is due to esophageal varices.

Feeding

Early feeding is advocated in the treatment of massive gastrointetsinal haemorrhage. This will avoid wasting and exhaustion, it may help in healing of a peptic ulcer and even some cases of melaena. The presence of food in addition to acid inhibition, may protect the stomach from the action of acid on the wall of the stomach. Thus, it is now agreed upon to start feeding early, the food should consist of milk, eggs, jellies, pudding, mashed potatoes, cream soup, minced meat or fish in addition to butter and bread, cheese and cream. This food however, should be administered in small quantities with short periods inbetween to avoid stimulation of gastric secretion and motility. If an active ulcer is suspected to be the cause of bleeding, milk drip can be instituted from the beginning.

Surgery

The selection of surgery in patients with massive gastrointestinal bleeding should be considered only if medical treament does not show promising results in stopping the bleeding and combating its effects on the body. The question of later surgical treament is decided according to the case.

In case of bleeding due to peptic ulcer the indications of surgical intervention during the first 48 hours are continuance and recurrence of the haemorrhage, the old age of the patient (due to higher mortality in them), gastric ulcer, a chronic duodenal ulcer, a long history of ulcer with or without complications such as bleeding and relapses under medical

treatment. In some instances blood is not available in sufficient quantities for treatment and surgical intervention may then be a necessity.

The problem of operative intervention in patients with bleeding esophageal varices is an intricate and difficult one. There is no doubt that a second bleeding occurs after a few days to few months after the first one and an operation of decongestion of the varices or a shunt operation must be performed, provided the condition of the patient, the liver and the prothrombin activity are favourable. However, the difficulty arises in patients who are actually bleeding, if the bleeding does not stop with the ordinary measures mentioned before, including the use of a Sengstaken tube, an immediate operation must be decided upon, as playing with time will make the patient lose this chance and possibly his life with it as he will become a bad operative risk without stoppage of the bleeding. In fact,decision has to be done in the first hours of bleeding. An emergency operation like that of Tanner or Hassab's modification of it can be considered.

CHAPTER FOUR

JAUNDICE

CHAPTAER FOUR

JAUNDICE

Bile Metabolism.

CLASSIFICATION I OF JAUNDICE

Prehepatic Jaundice

Features and Causes

Hepatic Jaundice

Features and Causes

Post-hepatic Jaundice

Feutures and Causes

CLASSIFICATION II OF JAUNDICE

Unconjugated Bilirubin Jaundice

Features and Causes

Conjugated Bilirubin Jaundice

Features and Causes

Differentiation between Intra and Extra-hepatic Cholestasis

SOME PRESENTATIONS OF JAUNDICE

Rapidly developing jaundice

Jaundice of long duration

Recurrent jaundice

Jaundice with splenomegaly

Jaundice with ascites

Jaundice with bleeding

Post-operative jaundice

Jaundice with coma

DIAGNOSTIC APPROACH TO A CASE JAUNDICE

Is jaundice present ?

What is the mechanism of jaundice ?

History .

The Jaundice .

Associated mainfestations.

Laboratory findings.

TABLES

Pre-hepatic, hepatic, post-hepatic jaundice

Unenjugated, conjugated bilirubin jaundice

Intra-hepatic, extra-hepatic cholestasis

JAUNDICE

Jaundice occurs when bilirubin accumulates in the blood, the resulting "hyperbilirubinaemia" stains the skin, conjunctivae (sclerotics) and the tissues of the body.

BILE METABOLISM

Jaundice results from disturbance in one or more of the steps of bile metabolism resulting in hyperbilirubinaemia. These defects in bile metabolism are either its excessive formation or deficient conjugation, excretion or drainage. Bile metabolism has been complicated by some recent findings, mainly enzymatic actions, disturbances of which result in the proper understanding of the mechanism of certain types of jaundice,hitherto not well categorised. (See figures four to six)

Bilirubin is formed in the reticuloendothelial cells found in the spleen, bone marrow, liver,lungs and the wondering tissue cells. The old erythrocytes which have lived up to 100-120 dayes, are broken down by these cells and haemoglobin released.

This haemoglobin is broken down into its three components .

a) Globin, which is a protein, is broken down into amino acids returned to the protein pool to be available for the formation of new haemoglobin.

b) Iron, which is oxidised and stored in the body for use in the formation of new haemoglobin.

c) Protoporphyrin the part not used again, is cenverted into bile pigments (bilirubin), by opening of one of the methene bridgs of the porphyrin ring forming a straight chain of four pyrrole nuclei which is the basic structure of bile pigments.

However, by the use of isotopic studies it was found that the breakdown of old erythrocytes accounts for only 85-90 precent of bilirubin. The

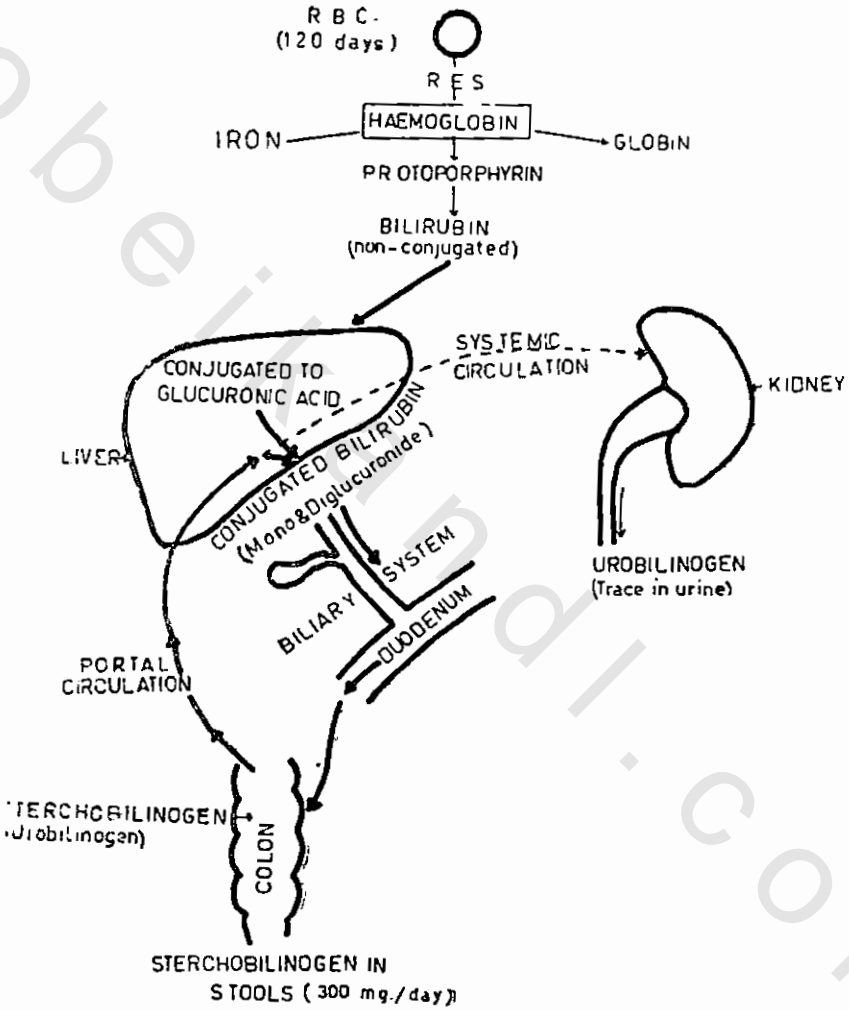
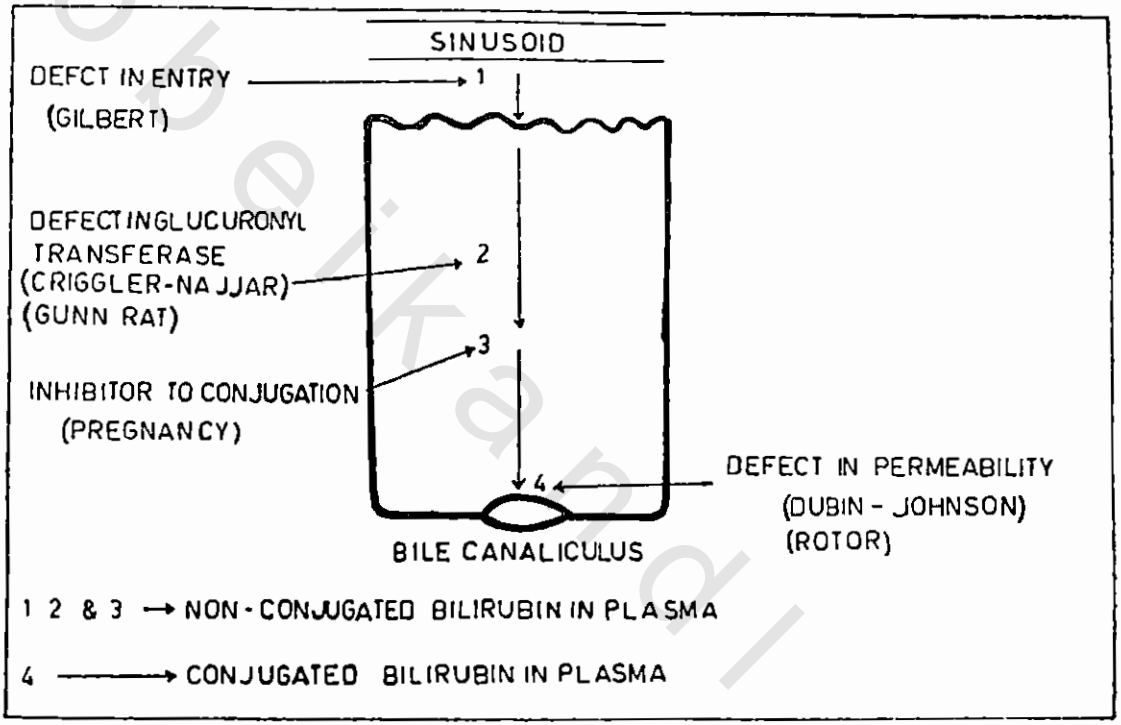


Fig. 5 : Normal bilirubin metabolism.



TYPES OF ENZYMATIC DEFECTS IN LIVER CELL & THEIR CORRESPONDING TYPES OF JAUNDICE

Fig. 6 : Conjugated and non - conjngated jaundice in relation to the liver cell.

remaining 10-15 percent are due to excessive formation of haem synthesized for the formation of haemoglob n, but not used and is broken down into iron and prtoporphyrin again.

Other expianations of this bilirubin not arising from the breakdown of RBC living 120 days are the degradation of haemoglobin within immature erythrocytes in the bone marrow, excessive formation of cytoplasmic haemoglobin in newly formed erythrocytes in the bone marrow and the rapid turnover of other haem prcteins such as catalase and cytothromes.

Normally, bilirubin in the blood is in the range of 0.5 to 1.5 mg per 100 ml of serum. The liver was thought to be able to deal with as much as 20 times the normal load of bilirubin but recent studies, including exprimental work showed that if the bilirubin load exceed 3 times the normal, hyper-bilirubinaemia will occur.

Types of Bilirubin

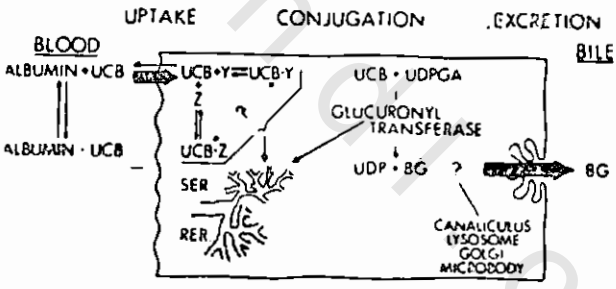
By the use of reverse phase chromatography, three types of bilirubin were separated.

The First Type (the unconjugated bilirubin) : This type is insoluble in water at neutral or acid pH, but soluble in chloroform and lipid solvents, it cannot pass through the glomerulus of the kindey. It is not found in bile but present in the blood and has an affinity tc brain tisseu (responsible for kernicterus). It contains no glucuronic acid and gives the indirect Van den Berg test.

The Other Two Types, called Bile Pigments I and II (the conjugated bilirubin) : These are on the contrary soluble in water, insoluble in lipid solvents, give a direct or immediate Van den Berg reaction. They are found in normal bile and in the plasma of post-hepatic (conjugated bilirubin) jaundic but not in normal plasma and have no affinity for brain tissue.

Their conjugation with glucoronic acid differs inbetween them, pigment II is conjugated with two glucoronic acid moleules forming the diglucoronide of bilirubin, while pigment I is conjugated with one molecule forming the monoglucoronide of bilirubin.

This conjugatin of bilirubin to glucoronic acid occurs inside the liver cell. The bilirubin enters the liver cell, the conjugation is catalysed by a microsomal enzyme called "glucoronyl transferase". The donor of glucoronic acid is uridine diphosphate glucoronic acid. This glucoronide is derived from glucose or glycogen and not from exogenous glucoronic acid, glucose is converted into glucose —1— phosphate which in turn is changed into uridine diphosphate glucose. This by a dehydrogenase reaction is changed into uridine diphosphate glucoronic acid.



The site of formation of bile I, the monoglucoronide, is the normal liver and has a higher renal threshold than of pigment II, the diglucoronide. Diglucoronide is thought to be formed only in the liver. It represents 80 percent of total bile-pigments.

Table 97-1. THE MAJOR DIFFERENCES BETWEEN CONJUGATED BILIRUBIN AND UNCONJUGATED BILIRUBIN

Characteristics	Bilirubin	
	UNCON-JUGATED	CON-JUGATED
Water solubility	0	+
Lipid solubility	+	0
Lipid membrance permeability	+	0
Presence in bile	0	+++
Renal excretion	0	+
Van den Bergh reaction	0	+
	Indirect	Direct
Uncouple oxidative phosphorylation in vitro	(total minus direct) +	0

Absorption of Bilirubin

It is unlikely chat bilirubin is absorbed from the intestines. Conjugated bilirubin passes unchanged along the small intestine. In the colon it is hydrated into sterchobilinogen (urobilinogen) by dehydrogenase enzymes of the bactria of intestinal flora. Unconjugugated bilirubin, if given by mouth is not changed in the colon or small intestine into sterchobilinogen

There is no absorption of bilirubin from the intestines, while sterchobilinogen (urobilinogen) is absorbed into the portal venous system, goes back to the liver where it is re-excreted into the bile, the part not absorbed is excreted into the stools and accounts for is normal colour. The normal daily output of sterchobilinogen is 300 mg. On exposure to air, sterchobilinogen or urobilinogen is oxidised into sterchobilin and urobilin. A small part of the absorbed sterchobilinogen (urobilinogen) escapes the liver parenchyma and goes into the systemic circulation, from there to the kidneys

where it is excreted as urobilinogen, in turn when left in the air is oxidised into urobilin. Thus, normally a trace of urobilinogen is present in the urine, the absence of this trace indicates absence of urobilinogen (sterchobilinogen) in the stools as occurs in post-hepatic (obstructive) jaundice. On the other hand its excess in the urine denotes either extensive parenchymal liver disease, unable to deal with all the amounts absorbed from the intestines, or its excessive formation due to excessive breakdown of haemoglobin, thus the amount asborbed is too much for even a normal liver to deal with, hence the amount that escapes from it is greater, resulting in increased excretion, in the urine.

Types of Jaundice

From this discussion of the bile metabolism, jaundice can be classified in two ways.

CLASSIFICATION I OF JAUNDIC

Three types of jaundice can be differentiated, all three having different mechanisms.

1. Pre-hepatic (haemolytic) Jaundice

Here destruction of erythrocytes, is excessive more than the liver can deal with the bilirubin formed from it. Hence, hyperbilirubinaemia occurs and the bilirubin in the plasma is the non-conjugated bilirubin which gives the indirect Van den Berg reaction.

2. Hepatic Jaundice

Here there is either

a) Diffuse parenchymal liver disease interfering with the function of the liver cell to allow entry of the bilirubin, conjugate bilirubin to glucu-

ronic acid and its excretion out into the bile canaliculi. In addition, because of the swollen inflamed liver cells there is obstruction or attenuation of the microvili causing a cholestatic type of jaundice of the fine intra-hepatic bile canaliculi interfering with the flow of the small amount of conjugated bile. Thirdly the destoryed liver cells may allow communication between the bile canaliculi and blood sinusoids, normally separated only by a column of liver cells, allowing a mixture of bile (containing conjugated bilirubin) and blood. In addition the suviving liver cells will be separated from their bile capillaries and canaliculi, the result will be that the bile coming out of them will go through lymph back to the blood. The final result will be that the plasma of patients of this type of jaundice will contain both non-conjugated bilirubin which the diseased liver could not conjugate although formed in normal amounts and conjugated bilirubin which has resulted from regurgitation due to obstruction of the intrahapatic sinusoids and through the lymph.

b) A defect in one or more of processes concerned with bile metabolism in the liver cell itself, including the enzymes in the liver cell concerned with the process of conjugation of bile to glucuronic acid.

i. A defect in the entry of bile into the liver cell (Gilbert or Hommaker and post-virus hepatitis).

ii. A defect in the conjugation enzyme (glucoronyl transferase) as in Crigler Najjar disease in children and the "Gunn" rat in animals. In this condition there is no bromosulphthalein retention

iii. The presence of an inhibitor substance to conjugation, as occurs in pregnancy.

iv. A defect in the permeability of the liver cell to the already conjugated bilirubin glucoronide; the Dubin-Johnson type and the Rotor type, in

this condition there is high serum alkaline phospatase. The Rotor type differs from Dubin-Johnson in the absence of the brown pigment lipofuscin in Rotor.

In this type of hepatic jaundice (excluding this last defect of defevtive permeability) the bilirubin in plasma tnd serum is unconjugated bilirubin which gives the indirect or delayed Van den Berg reaction and no bile is in the urine as this bilirubin does not pass through the glomerulus of the kidney.

c) A defect in the microvilli uptake of bilirubin will lead to a cholestatic (conjugated) type of jaundice. The most simple example of this is the early cholestatic phase of jaundice in virus hepatitis due to swelling of cells encroaching on the canaliculus. Canalicular damage giving rise to jaundice is that due to drugs as phenothiazine, methyl testesterone,... etc.. The canaliculus has a function related to propelling bile flow, in phenothiazine jaundice the micronilli are attenuated and bile plugs are seen by biopsy. Another condition in young children is the inspissated bile syndrome particularly seen in dehydration or severe haemolytic crisis of sickle cell anaemia. Jaundice due to a canalicular defect is the cholestatic type of jaundice in repeated pregnancies, called idiopathic recurrent cholestasis.

d) Bile then passes to the cholangioles which are bigger channels and intercellular. A defect in the cholangioles leads to cholestatic jaundice, the most common form is the cholestatic form of virus hepatitis also. Other forms of this cholestatic jaundice are those occurring in acute alcoholic hepatitis, primary biliary cirrhosis due to peri-cholangiolar fibrosis of autoimmune origin.

e) Later as bile passes into small bile ducts in the liver, jaundice can be due to a defect at this level as when the liver is infiltrated with lymphoma or there is atresia, of these ducts. Lymphoma can produce jaundice

by either an auto-immune process causing unconjugated (haemolytic; pre-hepatic jaundice) intra or extra-hepatic cholestasis by lymph nodes in the porta hepatis.

3. Post-hepatic (obstructive) Jaundice

Here, jaundice results from regurgitation of bile (conjugated bilirubin and other constituents) from ruptured biliary capillaries, back, into the blood.

Features and Causes of Pre-Hepatic (Haemolytic) Jaundice

Excessive blood destruction leads to excessive bilirubinaemia, of the non-conjugated type. The normal liver although it attempts to excrete more than the normal amounts, yet there still remains an excess in the blood.

Evidences of Haemolysis

1) Evidence of increased haemoglobin breakdown

   i. Hyperbilirubinaemia and jaundice.
   ii. Inreased excretion of sterchobilinogen.
   iii. Diminution of serum haptoglobins (normal 100 mg).
   iv. Haemoglobinaemia, haemoglobinuria, methaemalbuminaemia and haemosiderinuria.

2) Evidence of compensatory erythropoietic hyperplasia

   i. Reticulocytosis.
   ii. Macrocytosis.
   iii. Normoblastic hyperplasia of the bone maarow.
   iv. Skeletal radiological changes.

3) Evidence of red cell damage

i. Spherocytosis.

ii. Change in the red cell osmotic fragility.

iii. Fragmentation of red cell.

4) Demonstration of shortened red cell life span by

i. Ashby's differential agglutination technique.

ii. Radioactive chromium (Cr. 51).

Mechanisms of Haemolytic Anaemia

A) Cropuscular

1. Enzyme Defect

a) Spherocytic.

b) Non-spherocytic.

c) Drug induced.

2. Haemoglobinopathies.

3. Stroma defect.

B) Extra-corpuscular

1. Immune

a) Auto-immune : Idiopathic and secondary.

b) Iso-immune.

2. Non-immune (haemopthic).

A) Corpuscular

Enzymes Defects : Thes may be spherocytic or non-spherocytic.

a) Spherocytic Hereditary Spherocytosis : This is a haemolytic disorder in which the fundamental abnormality is an intrinsic defect of the red cell which results in the cell being spherocytic in shape. Metabolic abonrmality involving the glycolytic mechanism has been demonstrated in the red cells. It is possiple that their abnormal shape is related to this metabolic abnormality. Because of its shape the spherocyte is selectively trapped and destroyed in the spleen, and thus has a shortened life span.

b) Non-spherocytic : This group of anaemias is congenital, but not hereditary. They have certain characteristics in common.

i. Red cell inclusion bodies e.g. siderocytes are common especially after splenectomy.

ii. Osmotic fragility is not usually increased.

iii. Splenectomy is usually without significant benefit.

iv. No abnormal haemoglobin has been demonstrated within the cell.

This group contains two main types

Type 1 : Here auto-haemolysis is corrected by adding glucose and A.T.P. In some, glucose 6 phosphate is diminished.

Type 2 : Here auto-haemolysis is not corrected by adding glucose and A.T.P. In this group pyruvate-kinase is deficient.

c) Drug Induced : e.g. Primaquine induced haemolytic anaemia. The red cells show the following abnormalities in their enzyme contents.

i. Low, unstable reduced glutathione.

ii. Deficiency of glucose 6 phosphate dehydrogenase.

iii. Increased aldolase.

2. Haemoglobinopathies

a) Thalassaemia "Cooley's anaemia" : Here, there is increased foetal haemoglobin and haemoglobin A 2. Two types are known; the major and mild form.

b) Sickle cell disease; due to haemoglobin S.

c) Other haemoglobinopathies include haemoglobin C,D,E,

G,H,I,J,K,L,N,Q, Norfolk and Barts.

Combinations of these haemoglobinopathies are present.

3) Stroma Defect (Paroxysmal Nocturnal Haemoglobinuria; Marchiafave-Micheli syndrome, P.N.H.)

Here proxysmal attacks of haemolysis occur at night. Haemolysis requires

a) pH 6.7—7.1, this is attained at night due to CO retention.

b) Serum complement.

c) Properdin : This is a normal constituent of serum, distinct from complement. The lytic action of serum parallels the properdin content, but the other factors are essential for the reaction. Recently, it was shown that the content of red cell acetylcholine esterase is often lowered in P.N.H. but the exact relation to haemolysis is not known.

B) Extra corpuscular

1. Immune forms

These are either auto-immune or isoimmune.

a) Auto-immune Haemolytic Anaemias

i. Idiopathic : These are either acute (Lederer's anaemia) or subacute or chronic.

ii. Symptomatic : These occur in malignant lymphomas, Hodgkin's disease leukaemia, virus pneumonitis, and collagen disease.

Coomb's test is used to demonstrate haemolysis in all these auto-immune anaemias.

b) Iso-immune Haemolytic Anaemias : Haemolysis results from the naturally occuring antibodies e.g. anti-A and anti-B. It occurs also as a result of mismatched blood transfusion involving the ABO system, Rh system and other groups.

2. Non-immune forms (Haemopathic)

These include the following types.

a) Paroxysmal Cold Haemoglobinuria (P.C.H.) : Patients may be syphilitic. The attacks are precipitated by exposure to chilling and haemolysis occours during the subsequent warmth of the body. The haemolysin in the patient's serum unites with the patient's erythrocytes in the presence of a complement at a temperature of 15 C and PH of 7.0—8.0. The haemolysin is inactive at body temperature or at room temperature. The P.C.H. antibody (haemolysin) is a globulin.

OTHER CLASSIFICATION OF HAEMOLYTIC DISORDERS

1. Hereditary
   - A. Membrane defects
     - Hereditary spherocytosis
     - Hereditary elliptocytosis
   - B. Cation pump defects
     - ATPase deficiency
   - C. Metabolic defects*
     - Hexokinase (HK)
     - Glucose phosphate isomerase (GPI)
     - Glucose-6-phosphate dehydrogenase (G6PD)
     - 2,3-Diphosphoglycerate mustase (2,3DPGM)
   - D. Hemoglobinopathies and thalassemia
     - Thalassemia
     - Sickle cell anaemia
     - Haemoglobin C and S-C disease
     - Haemoglobin E disease

11. Acquired
   - A. Immunologic
     1. Isosensitization (erythroblastosis fetalis)
     2. Autoimmune hemolytic anemia
        - a. Warm antibody type
        - a. Cold antibody type
     3. Hypersensitivity to complement (paroxysmal nocturnal hemoglobinuria)
     4. Drug-induced

        Hapten type (penicillin)
   - B. "Oxidative stress". Aspirin. Vitamin K. Nitrofurantion. Primaquine. Pamaquine. Sulfonamides. Fava beans. Hepatitis. Ketosis.
   - C. Mechanical stress

     Intracardiac abnormalities
     - a. Valvular prostheses

b. Septal defects
c. Myxomas
Vascular abnormalities
Malignant neoplasms
Thrombotic thrombohaemolytic purpura
Hemolytic-uraemic syndrome
Pre eclampsia
Other disseminated intravascular coagulation
March hemoglobinuria

D. Abnormal erythropoiesis
Pernicious anaemia
Thalassemia
Erythroleukemia

E. Thermal injury

F. Infections
Malaria
Salmonella
Bartonella
Clostridium welchii
Primary atypical pneumonitis
Infectious mononucleosis

G. Liver disease
Severe hepatic decompensation

H. Splenomeglaic haemolysis

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*In addition to the enzymatic abnormalities listed, several other disorders have been attributed to, or seem likely to be due to, erythrocyte enzyme deficiency. These include the high ATP hemolytic anemias, in which the ATP concentration is elevated to a degree disproportionate to the degree of reticulocytosis. In several cases, this was shown to be associated with marked deficiency of erythrocyte pyrimidine 5-nucleotidase.

b) Infective Agents : e.g. in septicaemia due to Clost. welchii, streptococci, cholera, malaria, oroya fever and some viruses.

c) Chemical Agents : e.g. phenyl hydrazine, naphthaline, quinine, sulphonamides, ... etc.

d) Physical Agents : e.g. extensive burns.

e) Vegetable Poisons : e.g. favism. (Vicia faba).

f) Mechanical : e.g. March haemoglobinuria, and cases reported after cardiac operations).

g) Liver Diseases : e.g. acute liver diseases as varus hepatitis.

It should be noted that some authors restrict the term haemopathic haemotytic aneamia" to cases encountered with various disease states as uraemia, lymphomas, carcinoma, leukaemia and infectious diseases in which no antibodies can be demonstrated.

Again, some authors include P.C.H. in the immune forms, because there is a responsible haemolysin.

Characteristic Features of Pre-hepatic (haemolytic) Jaundice

1) Jaundice is mild in intensity and is lemon yellow in colour.

2) Anaemia is always present.

3) The spleen is enlarged from deposition of products of blood destruction.

4) The liver is normal (no liver disease is present).

5) In the urine there is excess of urobilinogen but no bile pigments or bile salts.

6) The stools contain excessive amounts of sterchobilinogen; hence the dark colour.

7) Blood examination reveals

a) Negative direct but positive indirect V.D.B. reaction.

b) Anaemia and signs of bone-marrow activity (reticulocytes may reach 10 perecent).

Features and Causes of Hepatic Jaundice

Hepatic jaundice is due to diffuse parenchymal liver disease.

Causes

1. Acute Inflammation : This leads to diffuse hepatitis. This is either due to

i. Hepatotoxins : Arsenobenzol, chloroform, carbon tetarchloride atophan and gold salts.

ii. Infections : Virus e.g. Virus hepatitis, yellow fever and infectious monoulcleosis. Bacterial e.g. the enteric group. Spirochaetal e. g. Weil's disease, secondary syphilis and relapsing fever. Protozoal e.g. malaria and kala azar.

2. Congestive.

3. Neoplastic.

Mechanisms

1) The capacity of the liver to take up, conjugate and excrete bilirubin (nonconjugated) is diminished. Thus some of it is retained in the blood. The retatined bilirubin may be either non-conjugated or both according to site of defect.

2) Destruction of the liver parenchyma resulting from lesions such as necrosis or inflammation will result in separation of the surviving liver cells from their bile capillaries. Thus bilirubin (conjucated bilirubin) coming out from these cells will pass through lymph back into the blood.

3) Obstruction of bile capillaries by swollen liver cells, bile thrombi,

or cholangiolitis will lead to the diversion of bilirubin (conjugated bilirubin) to the lymph and back to the blood.

Therefore, jaundice in hepatic disease is partly due to retention of non-conjugated bilirubin and partly to regurgitation of conjugated bilirubin.

Characeristic Features of Hepatic Jaundice

1. The jaundice is of moderate intensity and greenish yellow in colour.
2. The spleen is usually not enlarged unless the cause of infective hepatitis causes its enlargement or cirrhosis of the liver is present.
3 Anaemia is absent.
4. The liver shows signs of disease both clinically and functionally.
5. In the urine there is excess of bile pigments and urobilinogen. Bile salts may be present only in the first few days.
6 The stools are pale or normal in colour.
7. The blood gives a biphasic Van den Berg reaction, because of the presence in the blood of both non-conjugated and conjugated bilirubin. It will show also positive tests of liver dysfunction.

Features and Causes of post-Hepatic Jaundice

The obstruction to the flow of conjugated bilirubin into the intestine may be intra-hepatic due to cholangitis or cholestasis or may be extra-hepatic.

causes of Post-hepatic Jaundice

Obstruction of the extra-hepatic bile ducts can be due to the following causes.

1. In the Lumen : Gall-stones. Ascaris worms. Big plug of mucus.

2. In the Wall : Stricture. Tumour of either the bile-duct or the ampulla of Vater. Spasm of Oddi's sphincter.

3. Extra-luminal (pressure) : Caracer of the head of the pancreas. Pancreatitis. Enlarged lymph nodes at the portal fissure due to malignant disease or Hodgkin's disease.

Mechanism of Post Hepatic Jaundice

Jaundice results from regurgiation of bile (conjugated bilirubin and other constituents of bile) from ruptured biliary capillaries, due to increased intra-ductal pressure, back into the blood.

Characteristic Features of Post-hepatic Jaundice

1) The jaundice is of marked intensity and is yellwish-green in colour.

2) Anaemia is absent.

3) The spleen is not enlarged.

4) Liver disease is absent; but occurs later when the jaundice has remained for a long time.

5) In the urine there is excess of bile pigments (conjugated) and bile salts while urobilinogen is absent.

6) The stools are clay coloured (acholic) due to absence of sterchobilinogen and presence of steatorrhea.

7) The blood gives an immediate direct Van den Berg reaction and shows an increased content of some bile constituents such as alkaline phosphatase and cholesterol.

CLASSIFICATION II OF JAUNDICE

This is another classification, not based on anatomical basis but is based on the types of bilirubin present.

PATHOPHYSIOLOGIC CLASSIFICATION OF JAUNDICE

1. Predominantly Unconjugated Hyperbilirubinemia
   - A. Overproduction
     1. Hemolysis (intra-and extravascular)
     2. Ineffective erythropoiesis
   - B. Impaired hepatic uptake
     1. Gilbert's syndrome
     2. Drugs (e.g. cholecystorgaphic agents)
   - C. Impaired Bilirubin Conjugation (decreased glucuronyl transferase activity)
     1. Gilbert's syndrome
     2. Hereditary absence or defiency of UDP glucuronyl transferase—Crigler-Najjar syndrome (Types I and II).
     3. "Immaturity" of UDP glucuronyl transferase
        "Physiologic" jaundice of newborn and premature infants
     4. Inhibition of UDP glucronyl transferase
        a. Transient familial neonatal hyperbilirubinemia
        b. Breast milk jaundice

II. Predominantly conjugated hyperbilirubinemia
   - A. Impaired hepatic excretion (intrahepatic defects)
     1. Familial or hereditary disorders
        a. Dubin-Johson syndrome; Rotor syndrome
        b. Recurrent (benign) intrahepatic cholestasis
        c. Cholestatic jaundice of pregnancy
     2. Acquired disorders
        a. Hepatocellular necrosis (viral or drug related)
        b. Intrahepatic cholestasis (viral or drug)
   - B. Extrahepatic biliary obstruction (stones, stricture, tumour)

Unconjugated Bilirubin Jaundice

In this type of jaundice the hyper-bilirubinaemia is due to increased unconjugated bilirubin in the blood. If the cause of hyperbilirubinaemia is haemolytic anaemia, then the excess bilirubin comes from the haemolysed R B.Cs. If the cause is from the haem precursors, then it is called "shunt hyperbilirubinaemia" (constitutional hyperbilirubinaemia).

Unconjugated biliurbin jaundice can be divided into haemolytic and non-haemolytic.

Features of Haemolytic Jaundice

1. Mild jaundice often diffcult to detect except in day light.
2. The colour of the skin is yellow.
3. Urine : Normal colour. Does not contain bilirubin but contains excessive amounts of urobilinogen.
4. Stools : Dark colour. Contains excessive amounts of sterchobilinogen (urobilinogen).
5. The Van den Berg test is delayed (indirect).
6. Serum bilirubin is of the unconjugated type (original bilirubin).
7. Anaemia is always present (in haemolytic anaemia).
8. Reticulocytosis and other blood tests of haemolytic anaemia are positive

Causes of Unconjugated Bilirubin Type of Jaundice

Hyperbilirubinaemia of the non-conjugated type can be either due to excessive haemolysis or due to failure of the mechanisms inside the liver cells concerned with uptake of bilirubin or its conjugation.

1. Haemolytic Anaemia

The diagnostic features of this type of jaundice have already been discussed in detail.

They can be summarized as follows

i. Anaemia.

i. Reticulocytosis.

iii. Enlarged spleen.

iv. Occurs in attacks.

Occasionally haemolytic jaundice can present with certain unusual features .

a) Phases of compensated haemolysis in which no anaemia is present but the spleen is felt and mild jaundice or sub-icterus is present.

This condition is diagnosed not by the anaemia but by the enlarged spleen and reticulocytosis.

b) Jaundice presenting by biliary colic followed by extrahepatic cholestatic jaundice suggesting a gall-stone as the cause. In these cases there is anaemia, reticulocytosis and enlargement of the spleen.

c) Haemolytic anaemia may present with cholestatic jaundice due to the inspissated bile syndrome. This especially occurs in sickle cell anaemia during a haemolytic crisis.

d) Zieve's Syndrome : This syndrome occurs in alcoholics after alcohol drinking. It presents with haemolytic anaemia but the liver is normal.

2. Shunt Hyper-bilirubinaemia

This type is due to overproduction of this bilirubin. It can only be diagnosed by exclusion of haemolysis and of evidence of defective function of the hepatocyte. It is usually constitutional and very mild as the amount contributed to the formation of bilirubin from non-haemoglobin sources is only 10—15 precent of bilirubin which whatever increases, a normal liver can deal with.

3. Hepatocyte (liver cell) Defect

This defect may be either in the uptake of bilirubin or its conjugation.

a) Defective Uptake of Bilirubin (Gilbert's disease) : This type usually starts since a young age or occurs in virus hepatitis especially those protracted cases.

b) Conjugation Defect (Crigler-Najjar) : In this type there is a defect in the conjuated mechanism catalyzed by the microsomal enzyme glucuronyl transferase. This defect may be

i. Congenital Absence of the Enzyme (Crigler-Najjar) : This situation is similar to the "Gun" rat which does not have this enzyme. The disease occurs in children.

ii. Hepatitis : In virus heptiti and other forms of infective or toxic hepatitis, the intra-cellular structures including the microsomal enzyme glucuronyl transferase are affected, hence failure of conjugation of bilirubin to glucuronic acid.

iii. Competition : The enzyme glucuronly transferase has other conjugation functions in addition to that of bilirubin. If this function is exhausted in them, then not enough enzyme is

available to conjugate bilirubin. Examples of these are pregnancy, in which pregnandiol is present in excess, and breast-fed infants who feed on milk containing pregnandiol of the mother's milk and develop jaundice while those fed on artificial milk will not develop it.

iv. Not enough Enzyme Present : This type of jaundice is due to that the amount of the enzyme glucuronyl transferase is little as occurs in the premature babies. The amount being little it will not be able to conjugate all the bilirubin delivered to it.

v. Inhibition of the Enzyme : This occurs when big doses of vitamin K are administered.

Conjugated Bilirubin Jaundice

In this type of jaundice the hyper-bilirubinaemia is due to the conjugated bilirubin. Bilirubin after being conjugated is either not discharged (excreted) from the liver cell, not propelled along the bile canaliculi or its flow is obstructed in biliary channels. This latter will raise the intra-ductal pressure and regurgitation of bilirubin (conjugated type) will occur.

Features of Conjugated Bilirubin Jaundice

1) The jaundice is deep.

2) The colour of the skin is greenish.

3) Urine : Brown (liquorice) colour. Excess bilirubin. Urobilinogen absent in cholestatic type but excessive in hepatic cell affection.

4) Stools : Pale or clay coloured according to amount of sterchobilinogen ("urobilinogen" in stools). Sterchobilinogen in stools is absent or reduced according to the amount of obstruction.

5) The Van den Berg test is of the immediate (direct) type.

6) The hyperbilirubinaemia is of the conjugated type. By fractionation it can be defined how much of it is of the mono and how much of the di-glucuronide type, a useful test in assessing the extent of liver cell damage as the transfer of mono-glucuronide to di-glucuronide is a function of the hepatocyte.

7) Liver Function Tests : These are disturbed when the cause of hyperbilirubinaemia is hepatocyte affection. In extra hepatic cholestasis (obstructive; surgical jaundice) of long duration liver function tests are affected.

FACTORS AFFECTING SERUM
CONJUGATED HYPERBILIRUBINAEMIA

Increase	Decrease
Drugs :	Cortisol
"Anabolic" steroids	Surgical relief of obstruction
Estrogens	Phenobarbital ?
Oral Contraceptives	
Pregnancy	
Menstruation	
Haemolysis	
Renal faliure	
Shock	
Sepsis ?	
Alcohol ?	

Causes of the Conjugated Bilirubin Type of Jaundice

Hyperbilirubinaemia of the conjugated bilirubin type is either due to a hepatocellular function defect or cholestatic in nature. Cholestasis is statis of bilirubin or whole bile constituents.

1) Causes and Characterisic Features of Hepatocellular Type of Conjugated Bilirubin Type of Jaundice

Causes : This type of jaundice is due to a defect in the excretion or expulsion of the conjugated bilirubin from the liver cell. Its causes are

i. Acute hepatitis (infective or toxic).

i. Chronic active hepatitis.

iii. Cirrhosis of the liver.

iv. Cancer of the liver.

Characteristic Features : This type of jaundice is associated with clinical and laboratory manifestations of liver affection. The liver may be enlarged, tender, irregular surface, sharp border.... etc. The liver function tests are affected.

2) Causes and Characteristic Features of the Cholestatic Type of the Coujngated Bilirubin Type of Jaundice

Cholestasis may be either intra or extra-hepatic.

Causes of Intra-hepatic Cholestasis : This group is due to a canalicular defect, in the cholangioles or intra-hepatic bile ducts.

i. Drugs : Phenothiazene (chloropromazine, largactil, sparine). Methyl testesterone.

ii. Virus hepatitis (the early cholestatic phase).

iii. Dubin-Johnson and Rotor : In these types, which are very similar except in the absence of the brown pigment lipofuscin in Rotor, the defect is in excretion (extrusion) of conjugated bilirubin from the cell. In this type of cholestasis, what is retained in the blood is only bilirubin but not the other bile constituents.

iv. Atresia of bile ducts.

Causes of Extra-hepatic Cholestasis : This group is due to obstruction of the biliary tree outside the liver. This obstruction may be due to

i. Gall stones.
ii. Cancer of the pancreas.
iii. Chronic pancreatitis (of the head).
iv. Cancer of the ampulla of Vater.
v. Stricture of the common bile duct.
vi. Enlarged lymph nodes in the porta hepatis.
vii. Cancer of the liver at beginning of the bile ducts outside the liver.
viii. Intestinal parasites as ascaris worms.

Characteristic Features of Cholestatic Jaundice

The liver in cholestatic jaundice whether intra or extra-hepatic cholestasis is nearly normal, clinically and by laboratory tests.

Differentiation Between Intra and Extra-hepatic Cholestasis

The difficult diagnostic problem is the differentiation between intra-hepatic and extra-hepatic cholestasis. The points that help in differentation are .

a) History : In intra-hepatic cholestasis the jaundice dates from birth in biliary atresia or it has an acute onset related to drug intake or alcoholic intoxication. In the extra-hepatic type there may be history of pain suggesting a biliary or pancreatic cause, a history of dyspepsia points to a duodenal or gastric ulcer penetrating to the pancreas and a history of gastrointestinal troubles may point to cirrhosis of the liver, gastric malignancy or ulceration.

b) Onest : Intra-hepatic cholestasis is of a rapid onest while the onest in extra-hepatic cholestasis is gardual. If the onset is rapid and painful it is due to gall-stones.

c) Course : A fluctuating course is more in favour of intra-hepatic cholestasis. The course of extra-hepatic cholestasis is usually progressive. It may be fluctuating in cancer of the ampulla of Vater, when the tumour sloughs jaundice may regress but will appear again. Jaundice is also fluctuating when due to chronic relapsing pancreatitis.

d) Obstruction : Intra-hepatic cholestasis does not give rise to complete obstruction, a small amount of bile pigment can be found in the stools. Extra-hepatic cholestasis eventually causes complete obstruction, which is to all constituents of bile.

e) Liver : The liver is normal in size in intra-hepatic cholestasis and is always increased in size in extra-hepatic cholestasis and often not tender. This important clinical sign is made use of in the following way, if there is cholestatic jaundice and the liver is not enlarged then the cholestasis is intra hepatic. There is no extra-hepatic cholestatic jaundice of any duration without enlargement of the liver.

f) Spleen : The spleen is usually palpable in intra-hepatic cholestasis, probably because of the original cause. It is not palpable in extra-hepatic cholestasis except in cancer of the pancreas invading the splenic vein.

g) Gall-bladder : The gall-bladder is felt in intra-hepatic cholestasis but may be felt in extra-hepatic cholestasis according to the cause.

h) Liver Function Tests : These are disturbed early in intra-hepatic cholestasis but the disturbance is mild. In extra-hepatic choletasis the disturbance is late in the course of the disease. Serum transaminases

are raised in intra-hepatic cholestasis as a result of the liver affection. As obstruction in intra-hepatic cholestasis is incomplete, traces of urobilinogen may still be found in the urine while this is not the case in the extra-hepatic type.

i) Percutaneous Cholangiography : This technique is of utmost improtance in differentiation of these two types of cholestasis. Extra-hepatic cholestasis shows the distended biliary channels by the dye. In intra-hepatic colestasis no bile is aspirated after insertion of the needle.

j) Liver Biopsy : Liver biopsy reveals the distended bile capillaries and other components of the biliary tree.

k) Sonography and Liver Scanning : These techniques can show the distended bile canals and ducts of extra-hepatic cholestasis in addition to the cause of this extra-hepatic cholestasis

l) A further step after diagnosis of the jaundice as being extra-hepatic is to decide whether the cause is benign or malignant. Malignancy is diagnosd by its local and general manifestations.

DIAGNOSTIC APPROACH TO A CASE OF JAUNDICE

This necessitates the answering of three questions

I IS JAUNDICE PRESENT ?

This is easy if jaundice is frank but if latent or slight its detection in the conjunctiva may be missed in artificial light.It may be mistaken for other yellowish pigmentations, due to drugs as atebrin, karotinaemia or xanthomatosis; in these the conjunctiva is not usually coloured and so their differentiation from jaundice is easy, if not so a high bilirubin content of the blood will prove its presence.

II. WHAT IS THE MECHANISM OF JAUNDICE

The differentiation of the mechanismal types of jaundice is summarised in the following tables according to the two classifications discussed previously.

	PRE-HEPATIC (Haemolytic)	HEPATIC	POST-HEPATIC (Obstructive)
Clinical			
History	Family, drug, fever.	Drug, contact	—
Jaundice	+	+, + +	+ + +
Itching	—	±	+
Pain	—	±, epigastric or right hypochondriac	Biliary colic
Gastro-intest.	—	Nausea at begining	—
Fever	At begining	+	Late
Weight loss	—	—	+
Anaemia	+	—	Late
Bradycardia	—	±	+
Liver	N	Enlarged and tender	Enlarged and tender (late)
Spleen	+	±	Normal
Gall-bladder	Normal	Normal	+ in cancer of head of pancreas.
Course	Remissions	Regressive	Progressive or intermittent.
Laboratory			
Urine	a. Bile pigments absent	Bile pigments +	Bile pigments +
	b. Urobiliongen +	Urobilinogen +	Urobilinogen absent.
	c. Bile salts absent	Bile salts absent except early	Bile salts +
Stools	Dark	Paler than normal	Clay
Itc. Index	+	+ +	+ + +
van den Berg	Indirect	Biphasic	Direct
Blood Bilirubin	Non-conjugated	Non-conjugated and conjugated	Conjugated
Blood Picture	Anaemia and reticulocytosis	± leucocytosis	N
Liver functions	Normal	Disturbed	Normal (disturbed late)
X-rays			
Skull	Hair brush appearance	Normal	Normal
Gall-bladder	± Stones	Normal	Stones

History of contact with a case of jaundice about a few months before may suggest virus hepatitis.

Certain Infections : Parathyphoid, relapsing fever and syphilis may be the cause of jaundice.

Injections and transfusions may transmit the virus of homologus serum serum hepatitis or the malaria parasite.

History of taking any drug that might be a hepatotoxin.

Age and Sex : These are important because infective hepatitis and haemolytic jaundice are more common in the young while cirrhosis of the liver and malignant disease are commoner in older males. Gall-stones are commoner in females.

The Jaundice

a) *Onset :* If acute, it suggests acute hepatitis, acute haemolysis and stones. If insidious, it suggests pressure on or stricture of the bile ducts and cirrhosis of the liver.

b) *Duration :* If more than one month suggests obstruction. If more than one year this excludes malignancy and suggests the presence of a stricture of the common bile duct or haemolytic jaundice.

c) *Course :* It may be regressive suggesting hepatitis, progressive suggesting malignant disease or fluctuating suggesting the presence of a stone in the common bile duct.

Associated Manifestations

1. *Pain :* Pain may be either in the form of a sense of discomfort in the right hypochondrium due to hepatitis or boaring and constant due to malignant disease or colicy due to gallstones.

2. *Fever :* The presence of fever suggests either acute haemolysis as Lederer's anaemia, malaria and black water fever or acute infective hepatitis or Hodgkin's disease.

3. *Dyspepsia :* If present for a few days only before the jaundice is detected it suggests virus hepatitis. If it is prominent it may be due also to virus hepatitis, cirrhosis of the liver or cancer of the stomach. If prolonged it may suggest that the jaundice is due either to gall-stones or malignant disease. If recent bowel disturbances has occured in the form of either constipation or diarrhea, this may suggest cancer of the head of the pancreas or of the colon.

4. *Wasting :* If present suggests the presence of malignancy, cirrhosis of the liver or Hodgkin's disease.

5. *Skin may show*

a) Rashes : Rashes occur in certain infections or due to certain drugs or allergy or secondary syphilis. If the rash is haemorrhagic it may suggest the presence of acute hepatitis, obstructive jaundice or hypersplenisn.

b) Nodules : Xanthomata occur in obstructive jaundice and in Hodgk n's disease.

c) Spider Angiomata : These occur in cirrhosis of the liver.

6. *Enlarged Lymph Nodes* : These occur in infectious mononucleosis secondary syphilis, Hodgkin's disease, virus hepatitis (in the right side of the neck early in some) and in abdominal malignancy which gives rise to enlarged nodes in the left side of the root of the neck (Wichow's).

7. *The Liver :* The river may show signs of disease as enlargement, tenderness and change of consistency. It may be enlarged suggesting hepatitis or malignancy. It may be atrophied suggesting acute yellow atrophy

and cirrhosis. It may be tender due to hepatitis, malignancy or congestive heart failure. It may be nodular due to post-necrotic cirrhosis, malignancy or syphilis.

8. *The Spleen :* If enlarged only slightly it may suggest Addisonian (pernicious) anaemia or infective hepatitis. It is markedly enlarged in familial acholuric jaundice, Cooley's anaemia, chronic malaria, cirrhosis of the liver and in Hodgkin's disease.

9. *Ascites :* Ascites occurs with cirrhosis of the liver, malignant disease, a mass in the portal fissure or may be cardiac.

10. *Edema :* Edema may be either cardiac (congestive heart failure) or due to cirrhosis of the liver.

11. *Nervous System :* We may get signs of sub-acute combined sclerosis of the spinal cord denoting the presence of pernicious (addissonian) anaemia. There may be signs of neurosyphilis or signs of peripheral neuritis due to hepatotoxin as arsenobenzol.

Laboratory Findings

Urine

Examination of the urine may reveal the following abnormal findings

i. Bile Pigments : Its presence in the urine excludes haemolytic jaundice.

ii. Bile salts : Its presence excludes haemolytic jaundice and suggests either obstructive jaundice if permanent or hepatic jaundice if only transient.

iii. Urobilinogen : Urobilinogen is present in the urine in excassive amounts in both haemolytic and hepatic jaundice and absent in complete obstruction.

iv. Sugar and Amylase : These if present suggest a pancreatic lesion.

v. Findings of Nephritis : These occur in Weil's disease.

vi. Leusin and Tyrosine Crystals : Their presence suggests acute liver necrosis.

vii. Haemoglobinuria : Haemoglobinuria suggests severe haemolysis and occurs in proxysmal haemoglobinurias and black water fever.

Stools

The stools in cases of jaundice must be examined for the following.

i. Colour : The colour is blackish in haemolytic jaundice, normal or pale in hepatic, acholic in obstructive

ii. Fat Content : Fat content and the type of fat present separate between obstruction due to panceatic disease and that due to other causes. In pancreatic disease there is steatorrhea with the fat mainly of the neutral type.

iii. Occult Blood : The presence of occult blood in the stools is of value in suggesting cancer of the ampulla of Vater as a cause of neoplastic obstructive jaundice.

iv. Parasites : The presence of ascaris ova may suggest that the cause is ascaris worms obstructing the bile duct.

Blood

Examination of the blood by various tests is very important to arrive at a diagnosis in cases of jaundice.

i Complete Blood Picture : This is important in detecting haemolytic anaemia, Addissonian anaemia, malaria parasites or bartonella.

ii. Wasserman Reaction : This test is done to prove or exclude the presence of syphilis.

iii. Van den Berg, Icterus Index and Serum Bilirubin : The Van den

Berg test will indicate the type of bilirubin pigment present, whether conjugated or not. The icterus index will give an indication of the depth of jaundice. However, the proper way is to estimate the concentration of bilirubin in plasma, further, fractionation of bilirubin into the three types can be done.

iv. Serological Tests : Agglutination tests and Paul-Bunnel for haemolytic jaundice should be performed when indicated.

v. Estimation of serum amylase and lipase.

Liver Function Tests

These are essentilal to diagnose hepatic affection. Those of value in the differentiation of the type of jaundice are the glacatose tolerance test, the flocculation tests, serum alkaline phosphatase, prothrombin activity and serum glutamic pyruvic transaminase, to reveal the presence of any parenchymal liver disease.

Liver Biopsy

This is indicated only in cases of hepatic jaundice when the nature of the hepatic lesion is obscure.

Laparotomy

Surgery in the form of laparatomy may be helpful in the diagnosis of any obstructive jaundice of more than 6—8 weeks duration.

Duodenal Intubation

This procedure is of value in neoplatic obstructive jaundice to differentiate between its three sites namely pancreatic, ampulla of Vater or common bile duct. See table.

	Pancreatic Cancer	*Cancer of ampulla of Vater*	*Cancer of bile duct*
Pancreatic enzymes	—	—	+
Blood in duodenal secretion	—	+	—

X-ray

Radiology is often resorted to in the diagnosis of the cause of jaundice,

i. A direct plain X-ray will reveal the presence of gall-stones and calcification in the pancreas.

ii. A barium meal will show any duodenal deformity due to either cancer of the head of the pancreas or cancer of the ampulla of Vater or cancer of the stomach with secondaries in the liver.

iii. Percutaneous cholangiography is done to differentiate intra hepatic from extra-hepatic cholestasis.

Ultrasonography

Computarized axial tomography

These techniques are useful to detect intra-hepatic lesions, the biliary ducts, both intra and extra-hepatic and the condition of the gall bladder and pancreas.

SOME PRESENTATIONS OF JAUNDICE

A great help in the diagnosis of joundice and its causation is to keep in mind some particular presentations. Among these the following ones may be kept in mind.

Rapidly Developing Jaundice

This may be painless (without colic) or associated with pain.

a) *Rapidly Developing Painless Jaundice :* This can be due to

i. Acute hepatitis (infective or toxic).
ii. Some acute forms of fatty liver in the late months of pregnancy.
iii. Reye's syndrome with decerebrate rigidity.
iv. Zeiv's syndrome (alcohol).
v. Gall-stones may be painless (not producing colic).

b) *Rabidly Developing Jaundice with Pain* : The pain may be upper or lower abdominal.

i) Rapidly developing jaundice following upper abdominal pain

i. Gall stone.
ii. Acute pancreatitis.
iii. A penetrating peptic ulcer into bile duct.

ii. Rapidly Developing Jaundice following Lower Abdominal Pain : This jaundice may be due to pylephlebtitis.

Jaundice of Long Duration (chronic)

This may be progressive or non-progressive (fluctuating or regressive)

a) *Chronic Progressive Jaundice* : This jaundice can be due to

i. Cancer of the liver.
ii. Infiltrations of the liver.
iii. Pressure on the porta hepatis.

b) *Chronic Non-progressive Jaundice* : The jaundice may be flucating or regressive. This type of jaundice can be due to :

i. Some forms of chronic hepatitis.
ii. Post-hepatitis syndrome.
iii. Stricture of the common bile duct.
iv. Fibrosing papilloma.
v. Choledocus cyst.

Jaundice with Ascites

Jaundice with ascites occurs in liver diseases.

i. Cirrhosis of the liver.
ii. Malignancy of the liver.

iii. Infiltrations of the liver.

iv. Congestion of the Liver in Congestive Hear Failure : Jaundice in this condition may be of the non-conjugated (haemolytic) type due to pulmonary infarction. It may be of the conjugated type due to the hypoxic liver.

Jaundice with Bleeding

Jaundice associated with bleeding may be due to one of the following conditions.

i. Duodenal ulcer (ulcer penetrating the pancreas).

ii. Esophageal varices (associated with cirrosis of the liver).

iii. Carcinoma of the ampulla of Vater.

iv. Pancreatic carcinoma (eroding the duodenum).

v. Hypoprothrombinaemia or other coagulation defects (as a result of jaundice).

Post - operative Jaundice

Jaundice may occur a short period (early) after the operation or after some time (late).

a) *Jaundice Occuring Early after Operation :* This can be due to

i. Mismatched blood transfusion.

ii. From the aneasthetics used in the operation.

iii. Hypoxic liver from haemorrhage and hypotension.

b) *Jaundice Occuring Late after Operation* : This can be due to

i. Stricture of the common bile duct.

ii. Adhesions.

Recurrent Jaundice

Recurrent jaundice can be due to one of the following causes :

i. Gall-stones.

ii. Stricture of the common bile duct.

iii. Plugs of debris or mucus or both.

iv. Chronic or acute relapsing pancreatitis.

v. Carcinoma of ampulla of Vater or hepatic duct (sloughing is the cause of recurrence and flucuation).

vi. Haemolytic jaundice.

vii. Gilbert's and Dubin-Johnson disease (jaundice appears on stress and during intercurrent infections).

viii. Idiopathic intra-hepatic cholestasis.

Jaundice with Splenomegaly

i. Haemolytic Anaemia : This is the commonest cause and must be excluded in all cases of jaundice with a big spleen.

ii. Biliary cirrhosis.

iii. Lymphoma : Lympoma causes intra-heptic cholestasis.

iv. Carcinoma of the pancreas invading the splenic vein.

Jaundice with Coma

i. Coma present may be metabolic due to severe liver failure or portosystemic encephelopathy (hepatic coma).

ii. The cause of jaundice may be responsible for the coma, virus hepatitis may be associaed with encephalitis.

iii. Coma may be due to narcotics (jaundiced patients do not tolerate narcotics or sedatives).

iv. Coma may be due to hypoglycaemia in patients with hepatoma. A hepatoma secretes insulin.

CHAPTER SIX

MALABSORPTION

MALABSORPTION

PATHOLOGIC PHYSIOLOGY

Fat Metabolism

Protein Metabolism

Calcium Metabolism

Magnesium Metabolism

Tryptophan Metabolism

Folic Acid Metabolism

Vitamin B_{12} Metabolism

CLASSIFICATION

Maldigestion

Inadequate Digestive Ferments

Inadequate Mixing with Food

Incativation of Digestive Enzymes

Malabsorption

Biochemical (enzymatic) Defect in the Intestinal

Mucosal Cell (primary malabsorption).

Idiopathic Steatorrhea

Reduced Absorbing Surface

Resection of Small Intestine

Disease of Small Intestine

Stagnant Loop Syndrome

Miscellaneous

DIAGNOSTIC CLINICAL APPROACH

Possibility of presence of malabsorption

History

Clinical Examination

Laboratory Investigations

Maldigestion or malabsorption

Determination of cause and effect of maldigestion or malabsroption

Radiology

Intestinal Biopsy

Endoscopy

Other tests

MALABSORPTION

Malabsorption is the term applied to a group of diseases characterized by defective digestion and/or defective absorption. Most of these diseases givig rise to malabsorption present with steatorrhea (increased amount of fat in the stools), so much so that in the first edition of this book malabsorption was discussed under the heading of steatorrhea.

Malabsorption was first described by Aretaeus 200 years, a.c., who described a patient with steatorrhea and emaciation. In 1888, Gee described the first case of caeliac disease in an infant. Later, in 1932, Thaysen described the adult type of caeliac disease.

PATHOLOGIC PHYSIOLOGY

The reader will find great difficulty in understading the subject of malabsorption unless he is very familiar with the mechanisms involved in digestion of food and intestinal absorption. The reader is advised to revise both his general physiology and the applied physiology of the stomach, pancreas, small intestine and liver in their respective chapters.

Malabsorption is really a manifestation of many diseases or disturbances of function of the small intestine. Diseases may affect the small inestine only or may be general with their effects manifest on disturbace in intestinal absorption.

The pathologic physiology of this disease is related mainly to fat, protein, calcium and other minerals and vitamin metabolism.

Fat Metabolism

The defect in fat metabolism studied by carbon labelled fat, is a failure to absorb ingested fat in addition to increased endogenous fat loss probably coming from desquamated mucosal cells and digestive secretions. In this disease, there is a high content of saturated fats in the stools arising from

increased endogenous secretion, the transformation of unsaturated fats to saturated fats by bacteria in the lumen of the intestine and a relative increase of saturated fats over unsaturated fats because of better assimilation of the latter.

Protein Metabolism

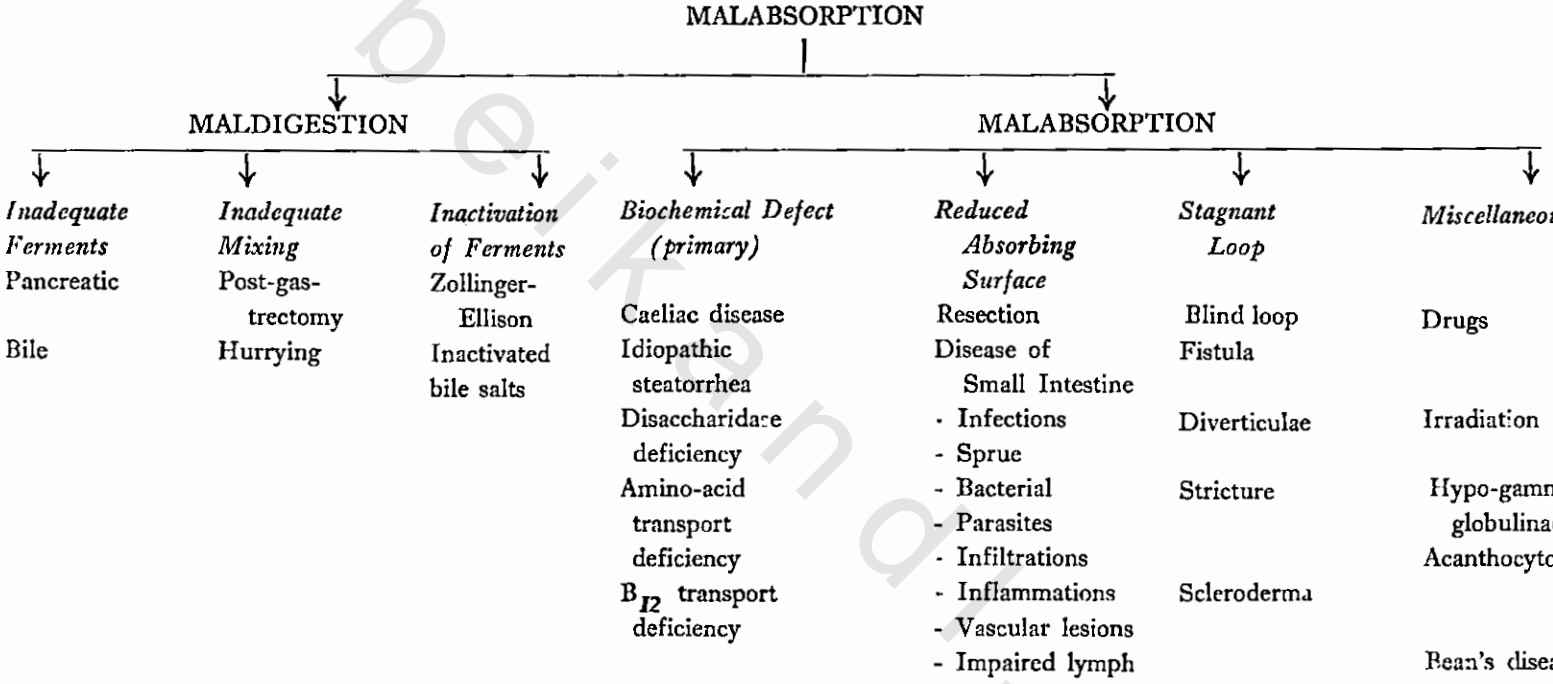
The defect in protein metabolism; giving rise to hypoproteinaemia, is due partly to failure of absorption of protein from the lumen but probably due to actual protein leakage into the intestine; protein-losing gastroenteropathy, as has been tested by I-131 polyvinyl pyrollidone or I-131 human serum albumin which when injected intravenously can be recovered from the stools of these patients.

Calcium Metabolism

The defect in calcium is the result of poor reabsorption of calcium secreted in the digestive enzymes (endogenous) and the poor absorbtion of dietary calcium (exogenous). This is due to a defect in the active transport of the calcium ion by the intestinal mucosa, vitamin D deficiency which is a fat soluble vitamin and the fact that calcium is attached to the unabsorbed fatty acids to form soaps. This deficiency may be so much that less than 1/5 of the ingested calcium is absorbed in active phases of malabsorption plus the endogenous calcium lost.

Magnesium Metabolism

Magnesium deficiency also occurs as a results of excessive foecal loss. Magnesium is related to calcium in its metabolism, with the difference that magnesium is intracellular.


MALABSORPTION
MALDIGESTION
MALABSORPTION
Inadequate Ferments
Pancreatic
Bile
Inadequate Mixing
Post-gastrectomy
Hurrying
Inactivation of Ferments
Zollinger-Ellison
Inactivated bile salts
Biochemical Defect (primary)
Caeliac disease
Idiopathic steatorrhea
Disaccharidase deficiency
Amino-acid transport deficiency
B_{12} transport deficiency
Reduced Absorbing Surface
Resection
Disease of Small Intestine
- Infections
- Sprue
- Bacterial
- Parasites
- Infiltrations
- Inflammations
- Vascular lesions
- Impaired lymph drainage
Stagnant Loop
Blind loop
Fistula
Diverticulae
Stricture
Scleroderma
Miscellaneous
Drugs
Irradiation
Hypo-gamma globulinaemia
Acanthocytosis
Bean's disease

Tryptophan Metabolism

In the majority of these patients there is increased serotonin (5-hydroxytryptamine) in their stools and serum. The significance of this, however, is not quite clear.

Folic Acid Metabolism

Folic acid deficiency is a manifestation of many forms of malabsorption, the best example is tropical sprue. Its deficiency leads to megaloblastic anaemia. Deficiency of folic acid denotes extensive involvement of the jejunum and ileum.

Vitamin B_{12} Metabolism

Vitamin B_{12} is absorbed only in the lower ileum. Thus, its deficiency occurs in disease of this part of the small intestine as resections, blind loops, regional enteritis (Crohn's), tuberculous enteritis and ulcerative colitis.

CLASSIFICATION

Malabsorption can be divided into "maldigestion" and "malabsorption". This classification has a mechanismal basis and at the same time has a clinical and diagnostic value.

MALDIGESTION

Maldigestion means that the defect is in the digestive mechanisms of the body. These in turn, can be classified into

1. Inadequate Digestive Substances or Ferments

a) *Deficient Pancreatic Enzymes*

Deficient pancreatic enzymes can be due to

i. Chronic pancreatitis (relapsing or not relapsing)

ii. Carcinoma of the pancreas, especially head and body.
iii. Mucoviscidosis in children (Cystic disease; Cystic disease of the pancreas).
iv. Kwashiorkor in children (pancreatic acinar atrophy plus protein-caloric deficiency).

b) Deficient or Absent Bile Salts

Bile salts are essential for fat digestion as by their emulsifying action they immensely increase the surface available for action of activated lipase. Bile salts in addition, make complexes with fatty acids which make the latter easier to digest and easier to absorb. Deficient or absent bile salts in the intestines occurs in obstructive (cholestatic) jaundice (post-hepatic; Conjugated bilirubin type).

The causes of this type of jaundice are

i. Extra-hepatic cholestasis (stone, stricture, malignancy, parasites ... etc.)
ii. Intra-hepatic cholestasis (infections, drugs, auto-immune, atresia, ... etc.).

Deficient bile salts or inactivation of their function occurs in conditions characterised by bacterial contamination as stagnant loops, bile salts may be present but inactive because of the acidic medium as occurs in the Zollinger-Ellison syndrome.,

2. Inadequate Mixing of Digestive Enzymes with Food

This inadequate mixing will not allow the suitable situation nor enough time for the action of digestive enzymes to act on the food.

Inadequate mixing can occur in the following conditions

i. Postgastrectomy (due to loss of gastric reservoir).
ii. Postvagotomy (due to loss of vagal tone and associated pyloroplasty).

3. Inactivation of Digestive Enzymes

Pancreatic enzymes are the main digestive ferments of the digestive system. For their action they need an alkaline medium, pH 8.0—8.5. In the Zollinger-Ellison syndrome there is excessive secretion of hydrochloric acid by the stomach stimulated by the gastrin — like hormone produced by the alpha cells of the pancreas in this syndrome. This excessive acid secrtion will keep the medium of the duodenum and even the upper jejunum acidic, a medium usuitable for the action of the pancreatic enzymes, which in turn will not be active causing maldigestion. In addition a lowered jejunal pH of 2 will not allow bile salts to act as they need a pH 6—8. This low activity of bile salts will interfere with both digestion of fat (activation of pancreatic lipase) and its absorption, a micellar level below 5 m/moles per litre will cause steatorrhea.

MALABSORPTION

In the same way in which maldigestion was dealt with i.e. mechanismically, malabsoption is best dealt with in the following classification

I. Biochemical (enzymatic) Defect in the Intestinal Mucosal Cell (primary malabsorption)

This group includes the diseases presenting by malabsorption due to a defect in one or more of the intra-cellular enzymes concerned with the absorption process of one or more of the articles of food, minerals or vitamins.

This group which was previously known by the name primary malabsorption before the deficiency of the respective enzymes was recognised now includes the following

1. Caeliac disease.

2. Gluten-induced enteropathy (adult caeliac disease, idiopathic steatorrhea, non-tropical sprue).

3. Idiopathic steatorrhea (non gluten-induced).

4 Disaccharidase Deficiency (dissaccharide malabsorption) : Splitting of disaccharides into mono-saccharides occurs at the brush border of the intestinal mucosal cell through the activity of a variety of disaccharidases. Deficiency of these enzymes, one or more of them, leads to malabsorption of disaccharides.

5 Glucose transport defect (single defect in the absorption of glucose).

6. Amino-acid Transport Defect : In this condition there is a defect of transport of neutral or dibasic amino-acids. An example of defective dibasic amino-acid transport (absorption) is cystinuria, in which there is loss of the ability of intestinal mucosal cells to concentrate cystine (and other dibasic amino-acids as lysine, arginine and ornithine).

7 Lipid Defect (acanthocytosis) : In acanthocytosis there is failure of normal mucosal metabolism of lipid involving a defect in the synthesis intestinal absorption).

8. Vitamin B_{12} Transport Defect : Megaloblastic anemia can be due to specific faliure of vitamin B_{12} transport in the ileum. Vitamin B_{12} deficiency will result in megaloblastic anaemia and subacute combined sclerosis of the spinal cord (the reader is referred to the chapter dealing with absorption).

Idiopathic Steatorrhea

This disease has been given several names, all given to the same condition : Non-tropical Sprue; Idiopathic Sprue; Idiopatic Steatorrhea; Adult Caeliac Disease and Gluten-Induced Enteropathy. This group is believed now to be due to an inborn and hereditary error of metabolism. Many cases of this disease (about one third) have shown a more or less caeliac disease in their childhood. The defect is a deficiency in the intestinal mucosal cells of an enzyme peptidase which hydrolyses the peptides of gliadin, so much so that it is considered in this sense a primary protein metabolism defect with secondary impairement of fat metabolism. The relation of gluten to this disease is based on the observation that gluten containing wheat induces a relapse in patients with caeliac disease. Gluten is the extract of wheat flower containing its protein, it contains a soluble fraction gliadin and an insoluble fraction glutenin. The toxic substance is gliadin. This gliadin is normally digested or hydrolysed by an intestinal endyme peptidase into peptides and amino acids. Thus, deficiency of this enzyme will lead to the toxic effects of gliadin. This however, is not all the story, it seems mucosal cells have an inherent sensitivity to this gliadin i.e. and auto-immune basis of this disease is suggested in addition.

Non-gluten Induced Enteropathy : A group of patients of this disease do not respond however to a prolonged gluten-free diet. Other causes have to be blamed and cannot be diagnosed as true members of this disease; primary malabsorption. Some of them may turn to be of the protein-losing gastroenteropathy, acquired agammaglobulinaemia or other new diseases.

Clinical Manifestations : These patients complain of gastrointestinal complaints in the form of diarrhea (steatorrhea), flatulence, anorexia and glossitis. General complaints are in the form of weakness, loss of weight tetany, bone pains, parasthaesias and even mental symptoms.

On examination, the presentating feature of the disease is wasting. There is edema, abdominal distension due to loops of intestines filled with liquid and gas (meteorism) and ascites. Both edema and ascites are of hypo-proteinaemic origin. There is enlargement of the liver and spleen, clubbing of the fingers and toes. The skin is is dry and pigmented, the nervous system shows signs of peripheral neuropathy and sometimes sub-acute combined sclerosis of the spinal cord.

Laboratory Investigations : These show anaemia of the megaloblastic type, hypo-proteinaemia including both albumin and globulin, low serum calcium, phosphorus, sodium and potassium. The blood lipids, and phospholipids are also low. There is also hypo-prothrombinaemia due to deficient vitamin K absorption. Achlorhydria, increased alkaline phosphatase and impairement of liver functions are present in some patients.

Radiology : Radiological examination of the small intestine by a barium meal will reveal the typical picture of this diease, 15 minutes after taking the barium it will show dilatation, fragmentation and evidence of hypersecretion. One hour after barium will show in addition the segmentation, flocculation and thickening of the mucosal folds. The "Moulage" sign is a loop of the intestine which is rigid and shows no mucosal folds and is occasionally seen in this disease on radiology. Bone radiology may show fractures, osteoprosis or ostemalacia.

Intestinal Biopsy : Recently small intestine biopsy has been widely used in the diagnosis of this disease. The mucosa is flat and devoid of normal villi. The villi change from the normal fine, needle-like shape and become short and thickened; with clubbing up to flattening in severe cases. These changes are not manifestations of the pathological state present, but will result in a marked reduction in the absorbing surface. These changes are termed "partial villous atrophy" the villi have a height of 150—300 microns as compared to the normal of 300—500 microns.

Treatment : Treatment consists of a strict gluten free diet, the correction of deficiencies by a high caloric diet rich in protcins and fats. Calcium and vitamins must be supplemented, especially those showing manifestations of their deficiency such as the B complex group, K and D. The anaemia (and the steatorrhea itself) is corrected by folic acid given intramuscularly in a dose of 10—30 mg daily as oral folic acid was found eneffective. The same good results can be obtained by folinic acid 3 mg or vitamin B_{12}100mcg daily. The duration of therapy including dietary measures is 4—6 weeks after which the patient should show signs of great improvement. A maintenance therapy and careful dietary observation are neeced after that. In some patients with severe forms of the disease corticosteroids and ACTH are of help to tide them over this phase.

II. Reduced Absorbing Surface

Absorption from the intestine is related to the extent of the absorbing surface. This aborbing surface can be reduced by resection or by disease.

a) Resection of Small Intestine

Although cases of malabsorption due to small intestine resection are not frequent, yet they provide excellent material to verify the selective absorption areas of the small intestine. The effects of resection depend upon both its site and extent. As resection of the distal part of the ileum is more common than that of the jejunum, it is common to come across the "distal bowel malabsorption syndrome" . There are three types of this distal bowel malabsorption dependant on the extent of resection.

i. Type One : Resection of the lower ileum only with malabsorption of vitamin B_{12} only.

ii. Type Two : Resection is more extensive with steatorrhea and protein loss in addition to B_{12} malabsorption.

iii. Type Three : Resection is so massive that there is malabsorption of all the substances that are absorbed from the small intestine (ileum and jejunum).

b) Disease of Small Intestine

Diseases of the small intestine should logically cause malabsorption. However, for the manifestations of malabsorption to occur the disease must be both of a long-standing duration and extensive.

i. Infections of the Small Intestine : These include tropical sprue, acute jejunitis, chronic non-specific enteritis and tuberculous enteritis. Acute jejunitis, a condition of unknown, etiology and of a localised extent is associated with folic acid deficiency.

ii. Inflammatory Conditions of the Small Intestine : These include regional enteritis (Crohn's disease) and ulcerative colitis. Malabsorption depends upon the extent and site of affection, associated factors as blind loops, fistulae, strictures and surgical resection complicate the malabsorption. Malabsorption in ulcerative colitis is rare and can be due to involvement of the ileum or amyloid infiltration.

Tropical Sprue

Malabsorption occurring in certain tropical areas of the world is described as tropical sprue. It differs from non-tropical sprue (idiopathic steatorrhea) in the following aspects.

i. Different geographical distribution (Far East but not in Africa).

ii. Recovery in tropical sprue is not related to gluten-free wheat but to oral broad-spectrum antibiotics and folic acid.

iii. Different pattern of intestinal mucosal changes.

Cause : The response of tropical sprue to oral broad-spectrum antibiotics including the return of mucosal changes has cleared the etiology of this disease and is now recognised to be due to an infection.

Pathology : In the early stages no changes are seen only a small inflammatory exudate. In the late stages there s the appearance of the "convoluted" jejunal mucosa and histological sections show partial villous atrophy. The involvement affects both jejunum and ileum. The completely flat jejunal mucosa of caeliac disease and idiopathic steatorrhea are not present.

Clinical Picture : The clinical picture of tropical sprue passes through three phases.

i. Early Phase : This phase is manifested by asthaenia, fatigue and variable degrees of diarrhea. Malabsorption starts in this early phase although slight, it is mainly of folic acid.

ii. Deficiency Phase : The malabsorption manifestations appear when the condition has remained for some months, there is weight loss, glossitis stomatitis and anaemia. Steatorrhea is apparent.

iii. Third (chronic) Phase : This is the phase of marked deficiencies. There is severe megaloblastic anaemia plus other vitamin deficiencies. Tetany and bone disease are rare

Intestinal Functions : There is impaired intestinal absorption functions of the whole intestine as the disease affects all of it. Vitamin B_{12} deficiency is always present, producing megaloblastic anaemia and subacute combined sclerosis of the spinal cord.

Treatment : The salient change in both etiology and management of tropical sprue is the dramatic response to oral broad-spectrum antibiotics. They can cause complete reversal of the mucosal changes and clinical recovery

in 50 percent of patients. Folic acid, even in small doses causes complete correction of the mucosal changes, the anaemia and malabsorption.

Infiltrations of the Small Intestine

Infiltration of the wall of the small intestine logically interferes with absorption.

Lymphoma : This infiltration may be lymphomatous by lymphoma, Hodgkin's disease, lymphosarcoma, leukaemia or lymphogranuloma. These patients present with the clinical picture of steatorrhea, loss of weight, enlarged lymph nodes and splenomegaly. The diagnosis is by the blood picture, gland and intestinal biopsy. Difficulty arises in its differentiation from protein-losing gastroenteropathy (proteinorrhea) and intestinal lymphangiectasia.

Amyloid : Another type of infiltration is by amyloid, which occurs in both the primary and secondary types. The patients devlop steatorrhea and loss of weight. The urine shows heavy albuminuria, and the radiological picture of the small intestine shows coarse thickened mucosal folds. Diagnosis is settled by intestinal biopsy.

Scleroderma : Scleroderma can also produce steatorrhea. The patients usually show the skin manifestations of the disease, X-ary shows atony and dilatation of the small intestine with a slow transit time; up to 24 hours, for the barium to reach the caecum. The malabsorption which occurs in scleroderma appears to be due to interference with the motility of the small intestine. There is stasis and proliferation of abnormal bacterial flora with interference in absorption.

Carcinoid : Carcinoid tumours of the small intestine can also present with steatorrhea. There is also diarrhea, both are believed to be attributed to nicotinic acid deficiency resulting from a disturbed tryptophan metabolism.

Whipple's Disease (intestinal lipodystrophy) : These patients present with diarrhea, arthritis and pigmentation of the skin associated with enlargement of the lymph nodes which are infiltrated with large macrophages whose large frothy cytoplasm contains a characteristic glycoprotein which on staining gives a positive periodic acid-Shiff (PAS) stain. The diagnosis is by lymph node and jejunal biopsy. The malabsorption of the disease is not due only to infiltration but to bacterial contamination also.

Pneumatosis cystoides intestinalis

Mast cell disease.

Abnormalities of Lymphatic Drainge

Malabsorption occurs in intestinal lymphangiectasia where the submucosal lymphatics in the small intestine are grossly dilated. The hy-proteinaemia and edema are due mainly to protein-losing enteropathy.

Vascular Lesions of the Small Intertine

These may be either arterial or venous, occurring in the superior mesenteric vessels.

Arterial : These present as abdominal angina due to chronic partial superior mesenteric artery obstruction. These patients may present with malabsorption only. Total occlusion with exacerbation of the malabsorption may occur as a result of embolisation. The mechanism is ischaemia of intestinal mucosal cells.

Venous : Venous congestion of the intestinal mucosa with impairment of its absorptive function may occur in chronic congestive heart failure, constrictive pericarditis and mesenteric venous occlusion. Malabsorption has been also demonstrated in cirrhosis of the liver and schistosomal hepatic fibrosis, attributed also to portal bed congestion.

III. Stagnant Loop Syndrome

In this group of malabsorption diseases there is no significant loss of absorbing surface. The mechanism is bacterial, the bacteria flourish as a result of stasis or entry from the colon. These bacteria act mainly by lowering the concentration of bils salts. If this concentration falls to below 5m/moles per litre which is the critical level, micelles (small emulsified fat particles suitable for absorption) are not formed and steatorrhea results.

The conditions giving the stagnant loop syndrome are

a) Strictures.
b) Blind loops.
c) Jejunal diverticulae.
d) Fistulae (gastro-colic or ileo-colic).

The mechanism of bacterial growth in strictures, blind loops and diverticulae is stasis and in fistulae it is the entry of the bacterial growth of the colon into the small intestine.

Patients with the blind loop syndrome involving the distal intestine invariably fail to absorb vitamin B_{12} and present with megalobastic anaemia. The appearance of anaemia is when the stores of vitamin B_{12} in the body are depleted, same as for megaloblastic anaemia occurring after gastrectomy.

IV. Miscellaneous

Malabsorption can occur in a variety diseases with various mechanisms. These are included under this heading.

a) Hypo-gammaglobulinaemia.

b) Drugs : These include neomycin, phenolphthalein, colchicine, phenindione and antibiotics.

c) Parasites : These include iardia lamblia, strongylcidis, dibothriocephalus latus and occasionally ankylostomiasis.

d) Irradiation : Irradiation of the abdomen for any malignant disease leads to malabsorption.

e) Hurrying : Rapid transit of intestinal contents will not allow for enough time for absorption. Diseases giving rise to hurrying are diabetes mellitus, hyperthyroidism, Addisson's disease and hypoparathyroidism.

f) Occhronosis and acanthocytosis.

g) Addissonian pernicious anaemia.

e) Bean's syndrome (malabsorption and multiple osteomata).

DIAGNOSTIC CLINICAL APPROACH

Malabsorption is not a disease that comes easily into the mind of the practitioner. However, if he fails to put it as a possibility in certain presentations, he is liable to miss a diagnosis. Proper diagnosis of the presence of malabsorption and its causative disease are really the job of an experienced physician. The help of laboratory investigations, radiology, intestinal biopsy and special tests is often needed.

When to think of the Possibility of the Presence of Malabsorption?

Malabsorption is thought of when the patient presents with one of the following.

1. Retardation of growth.
2. Loss of weight.
3. Muscular weakness.
4. Hypoproteinaemic edema where no nutritional, hepatic or renal causes are present.
5. Mineral and/or vitamin deficiency not attributed to deficient intake.
6. Steatorrhea.

MALABSORPTION

Once malabsorbtion is suspected as the cause of the patient's aliments, he should be subjected to a complete clinical examination including through history and clinical examination. This clinical examination will not only confirm the effects of malabsorption but may also reveal its cause.

Maldigestion or Malabsorption ?

Malabsrption being favoured on clinical grounds, the doctor should turn to the second step of defining whether it is maldigestion or true malabsorbtion. This can be done by certain relatively simple laboratory tests.

Once maldigestion or malabsorption has been confirmed to be present, the next step is to find out the cause and the effects of such a condition. Both have a great bearing on deciding the line of treatment.

As can be gathered from this introduction, the diagnosis of malabsorption, is causes and effects are not an every day job and are rather beyond the scope of the ordinary practitioner and is in the domain of the internist.

a) *Family History* : A positive family history may be elicited in the primary malabsorption syndrome as gluten sensitivity or deficiency of the peptidase enzyme runs in families. A family history of diabetes mellitus may point to diabetic steatorrhea.

b) *Past history* : A past history of biliary colic suggests obstructive jaundice, or chronic pancreatitis as the cause.

A history of steatorrhea in childhood or previous episodes of steatorrhea may point to primary malabsorption.

History of repeated attacks of upper abdominal pain may point to relapsing acute pancreatitis with pancreatic deficiency as the cause of steatorrhea, or attacks of mesenteric artery insufficinecy resulting in secondary malabsorption.

c) *History of Abdominal Operation* : This may be small intestine resection, occurrence of blind loops or gastrectomy giving rise to malabsorption or maldigestion syndrome respectively.

d) *History of Previous Glandular Enlargement which might or might not have been Treated* : This suggests secondary malabsorption due to lymphomatous infiltrations.

e) *History of Exposure to X-ray* : Irradiation can be the cause of malabsorption through denaturing the intestinal mucosa.

f) *History of a Chronic Septic Condition* : Chronic sepsis may result in amyloid infiltration of the intestine.

h) *History of Chronic Congestive Heart Failur* : Chronic congestive heart failure can result in a malabsorption syndrome by intestinal congestion.

i) *History of Prolonged Broad Spectrum Antibiotics* : Antibiotics or other drugs may result in the malabsorption syndrome.

j) *History of Diabetes Mellitus* : This may point to chronic pancreatitis or diabetic steatorrhea.

Clinical Examination

a) *General* : The patient is usually emaciated. There may be edema of the hypoproteinaemic type. These denote an advanced degree of malabsorption or a prolonged course.

Clubbing of the fingers occurs in primary malabsorption and in biliary cirrhosis.

Pallor due to anaemia may occur with primary malabsroption (megaloblastic anaemia) or associated with lymphomatous infiltrtion of the small intestine, or with ankylostoma or iron deficiency.

Jaundice may be present suggesting the cause of steatorrhea to be obstructive jaundice or chronic pancreatitis.

The skin may show manifestations of scleroderma with affection of the intestines.

b) *Head and Neck* : Yellow colouration of the sclera due to jaundice suggests the cause as obstructive jaundice.

Vitamin deficiency in the form of pellagra (glazed tongue and pigmentation of the face), ribofalvin deficiency (magenta tongue, angular stomatitis, cheilosis of lips, sulphur granules of the face and vascularization of the cornea), thiamin deficiency (beafy red tongue), vitamin-A deficiency (night blindness, xerosis and xerophthalmia of the eyes and ascorbic acid insufficiency (bleeding swollen gums).

Swelling of the face may be part of a generalised hypoproteinaemic edema or amyloid proteinuria.

Macroglossia may indicate the presence of primary amyloid disease.

The face may show also the characteristic changes of scleroderma.

Engorged veins of the neck may point to a chronic congestive heart failure as a cause of the malabsorption.

Enlarged lymph nodes in the neck may suggest the cause as lymphomatous infiltration of the intetines.

c) *Heart and Chest* : The presence of heart failure or valvular disease may point to the cause of malabsorption being secondary to chronic intestinal congestion.

There may be hydrothorax as a part of generalised edema or lymphomatous infiltrations of the lung and pleura.

The presence of bronchiectasis, or lung abscess may suggest amyloid disease as the cause of the malabsorption.

d) *Abdomen* : Examination of the abdomen in a case of steatorrhea is of prime importance although it should not make the physician overlook examination of other parts of the body, in foct the patient must be carefully examined from the top of his head down to his tees, every elicited clinical sign is of value in the diagnosis.

The presence of cirrhosis of the liver may be secondary to kwashiorkor and pancreatitis or may be biliary with obstructive jaundice. The liver may be fatty due to deficiencies.

An enlarged spleen may occur in primary malabsorption, in cirrhosis of the liver and in lymphomatous infiltrations.

Ascites, if present, may be hypoproteinaemic in origin as in primary malabsorption or amyloid disease or mesenteric lymphadenopathy.

An abdominal mass may be enlarged mesenteric lymph nodes.

A scar on the abdominal wall may be the indication of massive small intestine resection,blind loop or gastrectomy.

In patients with steatorrhea in general there is meteorism.

e) *Lower Limbs* : The presence of peripheral neuropathy with or without sub-acute compined sclerosis of the spinal cord may point to the neurological complication of primary malabsorption or to diabetes mellitus. Bone pains may be the result of osteoporosis and ostemalacia. Peripheral vascular ischaemic manifestations mayipoint to a similar condition in the mesenteric artery with a vascular insuffciency effect on the small intestines.

The skin may show the scleroderma changes

Laboratory Investigations

These should be directed into two directions. The first is the determination of the type of malabsorption whether belonging to the maldigestion

or the malabsorption type. The second is to determine the cause of the maldigestion or malabsorption, and the results of either on the body.

A. Determination whether the Malabsorption is Maldigestion or Malabsorption.

This is done primarily by examination of the stools. The presence of excess foecal fat of the neutral unsplit type is indicative of pancreatic deficiency. The presence of excess fat of the split, fatty acid type in the absence of bile in the stools is indicative of obstructive jaundice. Care, however, should be experienced as spliting of neutral fat can occur in the intestines by the action of bacteria. The laboratory tests needed for a case of malabsorption aim at the detection of what element is affected by malabsorption and what organ is the cause in addition to determining the level or the site in the small intestine responsible for this malabsorption.

a) Fats : Absorption of fat can be studied by the following methods:

1. Foccal Fat Estimation : The technique of fat balance is now abandoned on the basis that foecal fat is normally constant on a diet containing between 50 to 150 grams daily. Also the method of drying the stools and then measuring their fat content has been replaced by estimating the fat in the wet stools by extraction by ether or petroleum. The normal daily fat excreted in the stools ranges between 5 and 7 grams. The daily foecal fat can be tested daily for 3 to 6 days or the total of 3 to 6 days stools collected and tested, then the content divided on the days of collection.

2. Radioactive Iodine Tagged Fats : In this respect two types of fats are used either neutral fat, I-131 triolein to test for the presence of steatorrhea itself and I-131 oleic acid to test for intestinal malabsorption Either of them is given by mouth and the blood levels of them, in the form or radioactivity, is tested after 3, 4, and 9 hours to test the integrity of its absorption. Estimation of the radioactivity of the 3 days collected stools

is also done to estimate the loss in stools. Urinary estimations of radioactivity can also be done but they are not accurate.

3. Measurement of the Optical Density of the Serum : Normally an optical density of 0.1 occurs 2 to 4 hours after a fatty meal due to chylomicrons present in the serum. If this does not occur, then it is an indication of failure of absorption. This test can be applied separately to neutral fat and fatty acids to differentiate maldigestion from malabsorption.

b) Carbohydrates : Absorption of carbohydrates can be tested by the following tests.

1. Glucose Tolerance Test : The occurrence of a low curve indicates malabsorption. A high curve points to diabetes either diabetes mellitus or secondary to chronic pancreatitis or pancreatic carcinoma.

2. D-xylose Absorption-Excretion Test : Xylose is a pentose sugar most probably passively absorbed through the intestinal mucosa, or if it needs energy for its phosphorylation it is very slight. Its main absorption is in the proximal part; the jejunum. It is not to a great extent, metabolised in the body. This test because of its simplicity, accuracy and availability of normal figures for comparison is a useful test both for diagnosis of malabsorption and for research purposes. It has a 90 persent accuracy. The standard test includes ingestion of 25 grams xylose in the fasting state, the urine of 5 hours duration is collected and tested for its xylose content. Because of possible renal disturbances in function, an additional hourly blood xylose estimation for 4 hours is done. Low urinary xylose levels and low blood xylose levels are indicative of malabsorption. The normal urinary xylose excretion is 4—6 grams. The normal level of blood xylose after one and two hours is around 40 mg/100 ml.

3. Strach Tolerance Test : This test is really a test for pancreatic insufficiency., as strach is digested and hydrolysed by the pancreatic enzyme

amylase. The test is performed by the patient receiving 100 g of starch and the blood sugar estimated after ½, 1, 2 and 3 hours. On the next day the test is repeated but starch is replaced with 100 g glucose. If the rise in blood sugar after glucose is double its rise after starch then the test is positive and pancreatic insufficiency is present.

e) Vitamins Absorption Tests : Malabsorption affects the absorption of many vitamins and according to the site of the lesion is the vitamin affected.

1. Vitamin B_{12} : This is done by the oral administration of vitamin B_{12} tagged with radio-active cobalt. The radioactivity of stools or the liver surface is a guide to its absorption. As mentioned before, vitamin B_{12} is absorbed wholly in the lower part of ileum.

2. Vitamin A : Impairement of vitamin A absorption occurs in both maldigestion and malabsorption and in liver disease. A standard dose is given by mouth and the blood levels are estimated after 3, 5, 7 and 9 hours.

3. Serum Carotene Levels : This test is of limited value and the results are variable.

4. Folic Acid Absorption : This test is also not practical as it needs bacteriological assay. A test dose is given orally and intramuscularly the next day. The oral dose should give results about 70% of the urinary excretion of the intramuscular dose.

d) Sweat Electrolytes : Recently sweat electrolyte changes have been reported in cystic fibrosis of the pancreas. The sweat shows markedly elevated sodium and chloride content. A simplified method using the finger-print has been recently introduced, making use of silver nitrate.

B) Determination of the Cause and Effects of Maldigestion or Malabsorption

1. Urine : Examination of the urine may show the albuminuria of amyloid disease. It may contain the bile pigments of obstructive (post-hepatic; conjugated bilirubin type) jaundice. There may be glucosuria due to diabetes mellitus or chronic pancreatitis.

2. Stools : The presence of fat and its type and the various tests for it has been discussed before. Also the calcium content, of the stools must be measured. The uresence of giardia lamblia or ankylostoma ova may suggest malabsorption due to then. The absence of urobilinogen (sterchobilinogen) points to obstructive jaundice. The presence of excess of muscle fibres and strach points to chronic pancreatitis. The bulky amount of stools, its pale colour and excessive amounts of froth are characteristic of steatorrhea.

3. Blood : The presence of anaemia of the megaloblastic type is an indication of B_{12} malabsorption. Hypoplastic anaemia may result from lymphomatous infiltration of the bone marrow. The white cell blood count can show the presence of one of the lymphoma groups. The blood proteins are low in all types of malabsorption especially the primary type. Blood elecrophoresis show in this disease low blood proteins in all the components especially the albumin. Hypo-gammaglobulinaemia may also be revealed by this method. Low blood calcium and phosporous occur in the primary malabsorption syndrome. Low calcium and high phosphorus occur with hypoparathyroidism.

4. X-ray : Radiology is utilised as a tool for the diagnosis of primary malabsorption. A great deal of time and effort can be saved by using the Scott Harden technique of two special tubes and dilute barium sulpate pumped with iced water or saline through the intestine. Radiology will reveal also chronic pancreatitis and carcinoma of the pancreas as areas of calcification in the pancreas (head and body). Radiology of the small intestine may also reveal the intestinal resection.

5. Endoscopy : Endosopy of the jejunum can reveal the disease affecting it and the state of mucous membrane.

6. Biopsy of Small Intestine : This can be accomplished by the biopsy capsule or through the endoscope. Specimens should be examined hispopathologically and histochemically for intracellular enzymatic activities. Caeliac and mesenteric angiography will help reveal a vascular cause for the malabsorption.

CHAPTER SEVEN

ACITES

ASCITES

DEFINITION

HISTORY

ETIOLOGY, PATHOLOGY and PATHOGENESIS

Hydroperitoneum

Causes : Portal Hypertension

Heart Disease

Liver Disease

Kidney Disease

Seroperitoneum

Causes : Tuberculous Peritonitis

Carcinoma of Peritoneum

Polyserositis

Abdominal Hydatid Cyst

Ovarian Tumours

Haemoperitenum

Chyloperitoneum

CLINICAL MANIFESTATION OF ASCITES

Abdominal distension. Transmitted thrill. Umbilicus. Shifting dullness Divarication of abdominal recti muscles. Dilated abdominal veins. edema Edema of legs.

DIAGNOSTIC APPROACH

History

Onset

Clinical Examination

General. Neck. Chest. Heart. Liver. Spleen. Abdominal mass. Abdominal collaterals. Umbilicus. Lower limbs.

Ascitic fluid : Colour. Clarity. Specific gravity. Protein content. Cells.

Investigations

- Blood Tests
- Lymph Node Biopsy
- Abdominal Ultrasonography
- Liver Biopsy and Scanning
- Kidney Biopsy
- Radiology
- Laparotomy
- Peritoneal Biopsy

ASCITES

The recognition of the presence of fluid in the peritoneal cavity dates back to the old Alexandria University and the old Greek Civilization. Not only this, but the physicians of that time advised against repeated tapping of the ascitic fluid and recognised a relation between ascites and the liver.

Definition

Ascites is the collection of non-purulent fluid in the peritoneal cavity.

Ascites is not a disease in itself, but is a manifestation of many diseases of various organs of the body.

Ascites can be divided according to the nature of the ascitic fluid into 4 types; hydroperitoneum, seroperitoneum, haemoperitoneum and chylope-ritoneum.

HYDROPERITONEUM
(transudative ascites)

Here the fluid is clear, of low specific gravity and low protein content. It is a "transudate". Hydroperitoneum can be caused by portal hypertension, heart disease, chronic active liver disease and kidney disease.

Portal Hypertension

Portal hypertension may be due to cirrhosis or fibrosis of the liver, portal vein thrombosis, carcinoma of the liver or enlarged lymph nodes in the porta hepatis.

Mechanism of Ascites in Cirrhosis of the Liver

The mechanism of ascitic formation in cirrhosis is complex, portal hypertension alone cannot cause ascites as has been proved experimentally in animals and in man. On the other hand, cirrhosis of the liver without portal hypertension can be considered as an additional, helping or localizing factor.

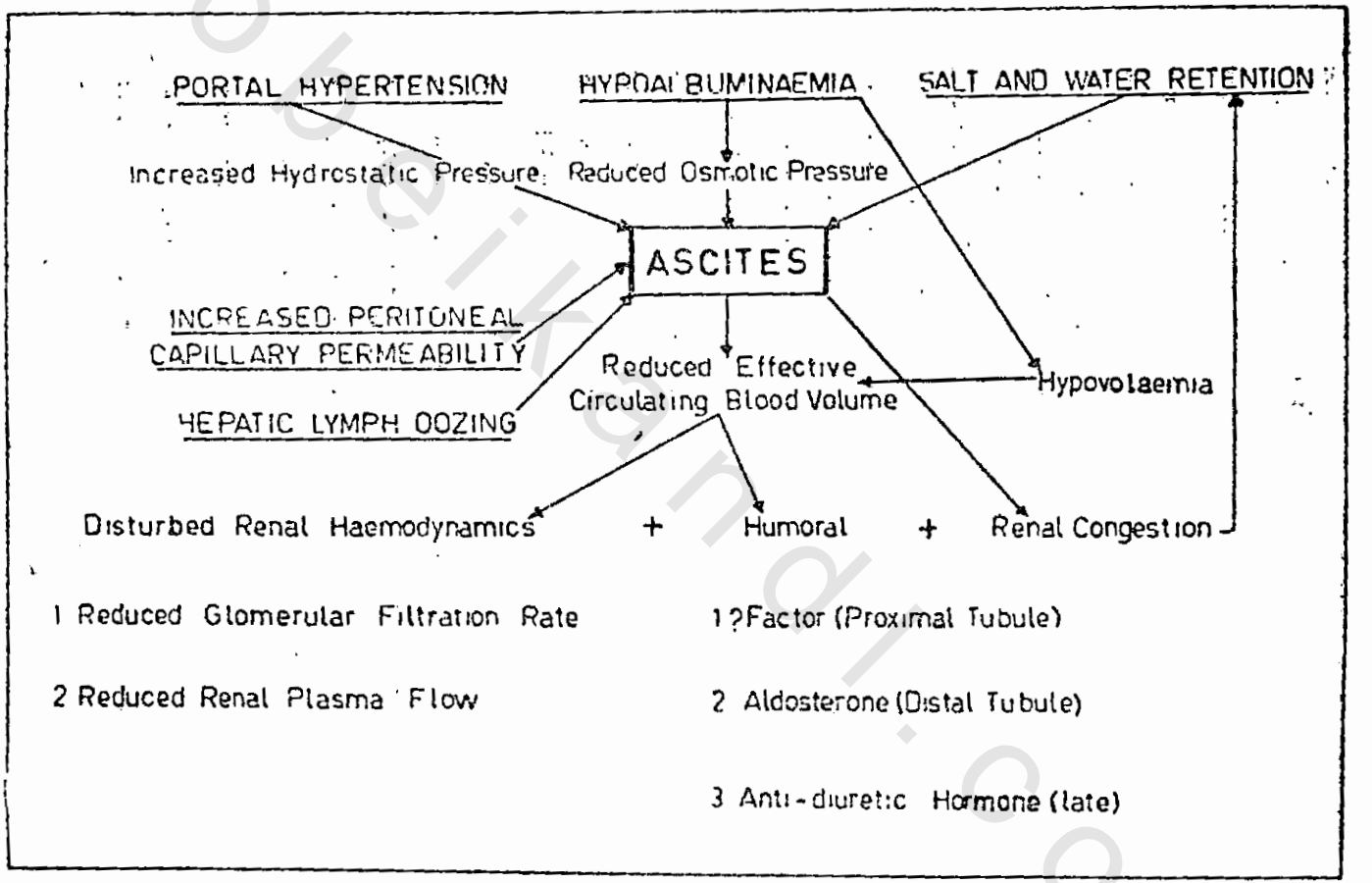
ASCITES

The mechanism of formation of ascites starts with hypoalbuminaemia due to failure of albumin synthesis by the diseased cirrhotic liver, nutritional deficiency, protein-losing gastroenteropathy or by an additional factor of bleeding or diarrhea which causes, as can be observed clinically, the rapid accumulation of ascites.

In addition there is, in cases of cirrhosis of the liver, a tendency to salt and water retention. These two factors will result in the formation of ascites.

Once ascites is formed, it can perpetuate and keep itself, by the same mechanisms of its formation. The hypo-albuminaemia increases due to sequestration of albumin in the peritoneal cavity. The ascites will tend to cause hypovolaemit. This, through stimulation of the volume receptors will cause salt and water retention, partly by a direct glomerular and tubular action partly by hyperaldosteronism, and the antidiuretic hormone. Other factors such as increased inferior caval pressure, increased renal vein pressure resulting in renal congestion, hypoxia of the capillaries of the peritoneal cavity and possible hyperestrogenaemia will further favour ascitic accumulation.

The factor of lymph oozing from the surface of the liver in contributing to ascites occurs in case of cirrhosis of the liver not in schistosomal(bilharzial) fibrosis of the liver, the latter being mainly a pre-sinusoidal, fibrosis, with minimal congestion of the sinusoids. In cirrhosis there is impediment to lymph drainage because of this sinusoidal congestion and an additional factor in the formation of ascites is oozing of lymph from the surface of the congested liver itself. In addition, in cases of cirrhosis, where there is an additional parenchymal insuficiency, the liver is unbale to conjugate aldosterone with resultant hyper-aldosteronism leding to salt and water retention, there is also failure of conjugation of estrogens or excess estrogen formation



The five essential factors in the production of "ASCITES"

with resultant hyper-estrogenaemia. Estrogens have a capillary dilator effect on the peritoneal capillaries, this will help in transudation of fluid into the peritoneal cavity.

Heart Disease

Heart disease can cause ascites by the following mechanisms.

a) Salt and water retention.

b) Increased vena caval pressure.

c) Hypoxaemia of the peritoneal capillaries

d) Portal hypertention.

Heart diseases that can cause ascites are congestive heart failure, right-sided heart failure, constrictive pericarditis, venous occlusion as the Budd-Chiari syndrome (hepatic vein occlusion due to thrombosis, tumour or venous web) and supradiaphragmatic occlusion of the inferior vena caua.

Liver Disease

In chronic liver disease with parenchymal failure, there is deficient albumin synthesis and possible deficient intake of proteins. This negative protein balance will result in hypoproteinaemia (hypoalbuminaemia) and a reduction of the blood volume. The hypoalbuminaemia will give rise to increased capillary filtration and increased interstitial fluid formation resulting in edema and ascites. The resultant hypovolaemia will cause adrenal stimulation and hyper-aldosteronism which will cause increased renal tubular reabsorption of salt. These two factors will result in the formation of ascites. Ascites in its turn, by sequestration of fluid will reduce the effective circulating blood volume, perpetuating the ascites.

Kidney Disease

In kideny disease with albuminuria as in the nephrotic stage of glomerulonephritis and in the various forms of the nephrotic syndrome, the albuminuria

will give rise to a negative protein balance which will in its turn give rise to hypoproteinaemia and reduced blood volume. These, as in the case of chronic prenchymal hepatic disease will give rise to increased capillary filtration and increased aldosterone producion with salt and water retention. Ascites when formed is usually associated with generalized edema.

SEROPERITONEUM

Here the fluid is usually slightly darker than hydroporitoneum. It contains a higher protein content and consequently has higher specific gravity. It can be due to tuberculous peritonitis, as part of polyserositis, abdominal hydatid cyst and ovarian or any peritoneal tumours.

Endometriosis can also cause exudative ascites, sometimes haemorrhagic. Pseudomyxoma peritonii can often cause a clinical picture very similar to ascites but it is usually localized to one side of the abdomen and is not shifting.

Carcinoma

Carcinoma of the peritoneum, or carcinoma of any of the abdominal organs with involvement of the serous coat of that organ can cause seroperitoneum. The irritation of the peritoneum will give rise to this exudation which invariably contains blood.

Polyserositis

In this condition the peritoneal cavity is involved in exudation as well as other serous cavities of the body. Examples of this are Pick's disease where there is pleural and pericardial exudation as well as ascites. Another example is Concato's disease, where there is, in addition to ascites, thickening of the peritoneum, the omentum is rolled up and there is hydrohorax and hydropericardium.

Abdominal Hydatid Cyst

In this condition the presence of the hydatid cyst will cause peritoneal irritation and exudation will occur which contains a high percentage of eosinophils.

Ovarian Tumours

These may be simple benign tumours or malignant tumours or an ovarian fibroma. All of them are capable of giving rise to seroperitoneum.

HAEMOPERITONEUM
(haemorrhagic ascites)

Haemoperitoneum is the presence of blood in the asitic fluid. This type can really be considered as a varient of seroperitoneum. It is caused by tuberculous peritonitis or malignancy either of the peritoneum or one of the abdominal organs.

CHYLOPERITIONEUM
(chylous ascites)

In this condition the ascitic fluid contains fat due to obstruction of the lacteals or thoracic duct or rupture of the cysterna chylii.

Causes

a) Trauma to the cysterna chylii.

b) Tuberculosis of the peritoneum and intestines.

c) Carcinoma of the peritoneum or one of the abdominal organs involving the major intestinal lymphatics.

d) Filariasis

e) Chronic inflammation, fibrosis (retroperitonal fibrosis) or hyperplasia of the major intestinal lymphatics.

f) Long standing portal hypertension with entestinal lymphangiectasia.

Choloperitoneum must be differentiated from similar conditions which will also give rise to a turbid ascitic fluid. In some cases of ascites due to liver disease or some cases of the nephrotic syndrome, the ascitic fluid may contain lipoglobulin, which may give the ascitic fluid the appearance of chyloperitoneum.

CLINICAL MANIFESTATIONS

Clinical manifestations of ascites are mainly in the abdomen.

1. Abdominal Distension

This distension is diffuse, generalised with more bulging in the flanks when the patient is lying on his back.

2. Transmitted Thrill

The thrill produced by tapping one side of the abdomen with the finger is felt, because of the vibrations on the surface of the fluid, on the other side of the abdomen.

3. Shifting Dullness

This test utilises the physical property of fluid being heavier than air, hence it gravitates below. This test to be positive needs the presence of fluid in the abdomen; the fluid must be freely movable and not encysted and there must be air in the abdominal cavity, this is provided by the air present in the loops of intestine.

If the amount of fliud in the peritoneal cavity is less than 350-500 ml it is difficult to detect by the ordinary shifting dullness test. It can however be detected by the knee elbow position or by the modified (Fikry) shifting dullness test. In this test after percussion of the right flank as usual and on finding it resonant the patient should be moved to lie on the same side (right) with the percusers hand in its place on the abdomen and the right flank percussed, if there is any fluid in the abdominal cavity, percussion will give a dull note. This procedure avoids the unhuman position the patient has to acquire in the knee-elbow position and allows the detection of ascites of a quantity of 300-350 ml.

4. Umbilicus

The umbilicus because of abdominal distensiont due to the presence of fluid, will become either flattened or everted.

5. Divarication of the Abdominal Recti Muscles

This divarication is also a result of increased abdominal pressure, which will cause separation of the two abdominal rectl muscles. If the patient tries to sit up, there will be a bulge in the middle line where the abdominal wall will be supported only by fascia.

6. Dilated Abdominal Veins

Dilated abdominal veins due to abdominal collaterals and a venous hum heard over the umbilicus occur in conditions of ascites due to cirrhosis of the liver.

7. Edema of the Legs

This edema may be the result of pressure of the fluid, especially when tense, on the inferior vena cava, raising the hydrostatic pressure in it resulting in edema. The edema also may be the result of the original cause of ascites, causing both ascites and edema at the same time as occurs in most cases of ascites due to cardiac, renal and hepatic diseases.

CLINICAL DIAGNOSTIC APPROACH

History

a) Schistosomiasis (bilharzia), alocholism, virus hepatitis suggest the cause of ascites to be cirrhosis of the liver.

b) Drug intake may point to the nephrotic syndrome as the cause of ascites. The intake of tratar emetic injections may point to schistosomal hepatic fibrosis as the cause of ascites. A history of anti-syphilitic treament may suggest a syphilitic liver as the cause of ascites.

c) Haemoptysis may point to tuberculosis of the kidney and albuminuria as the cause of ascites. The ascites may be an exudate resulting from tuberculous peritonitis with or without tuberculous enteritis or tabes mesenterica.

d) Rheumatic fever or rheumatic arthritis may suggest the cause of ascites as secondary to congestive heart failure resulting from valvular heart disease.

e) Syphilis may point to a syphilitic liver.

f) Filariasis may suggest the presence of chyloperitoneum.

Onset

a) *Relation of Onset of Ascites to Edema* : If ascites has started before the edema, this suggests a local abdominal condition as the cause of ascites, such as portal hypertension or seroperitoneum with its various causes. If the edema has started before the ascites, then a general cause is suspected for the ascites, such as the heart or kidney.

b) *Gradual Onset of Ascites* : This suggests portal hypertension due to cirrhosis of the liver as the cause of ascites.

c) *Acute Onset with a Rapid Progression* : This may be due to seroperitoneum due to tuberculous peritonitis or abdominal malignancy. It may also suggest thrombosis of the portal vein as the cause of ascites. Also patients with cirrhosis of the liver and portal hypertension may have little or no ascites, but with the occurrence of an attack of haematemesis or diarrhea, ascites occurs and progesses rapidly.

d) *Dyspnea with the Onset of Ascites* : This suggests a cardiac condition as the cause of ascites. Ascites which rapidly accumulates or ascites with excessive accumulation of fluid in the abdomen will also cause dyspnea by its displacement of the diaphragm and limpediment of its movements.

Clinical Examination

1. *General Examination* : This should be done for the following clinical signs.

a) Fever : This suggests the cause as pulmonary tuberculosis giving rise to tuberculous peritonitis. Hodgkin's disease causing lymph node enlargement at the porta hepatis with portal hypertension. Malignancy of the peritoneum or an abdominal organ can also cause a low grade fever. Low grade fever, with a temperature ranging between 37.5 and 38° c also occurs in cirrhosis of the liver.

b) Loss of Weight : Loss of weight points to malignancy or tuberculous peritonitis as the possible cause of the ascites.

c) Edema : Edema if present is also of great diagnostic importance.

i. If generalized and soft will point to edema of negative protein balance due to kidney disease with albuminuria or parenchymal liver disease resulting in diminished protein (albumin) synthesis.

ii. Edema occurring in the lower limbs only points to heart disease. Ascites, which is huge, tense and rapidly accumulating may itself, by pressure on the inferior vena cava cause edema of the lower limbs.

iii. Edema of one limb which is hard or firm on pitting may suggest filaria as a cause, with the presence of chyloperitoneum.

d) Jaundice : Jaundice when present points to chronic parenchymal liver disease as the cause of ascites.

e) Spider Angiomata : These are small dilated capillaries on the face or chest. They direct the attention to cirrhosis of the liver as the cause of ascites.

f) Dehydration: Dehydration occurs in patients with schistosomal hepatic fibrosis. One often finds these patients with hugely distended abdomen, while the rest of the body is both emaciated and dehydrated due to sequestration of a good deal of the body fluid in the peritoneal cavity with deprivation of the rest of the body from it.

2. *Neck* : The neck should be examined for enlarged lymph nodes or distended cervical veins.

a) Enlarged lymph nodes point to the cause of ascites as Hodgkin's disease causing portal hypertension through pressure on the porta hepatis. The enlarged lymph nodes may be tuberculous with tuberculous peritonitis. They may be due to malignancy of the stomach or the liver with malignant haemoperitoneum.

b) Distended cervical veins may point to the heart as the cause of ascites. If they are pulsating then they are due to congestive heart failure, if slightly pulsating they sugest the cause of ascites to be constrictive pericarditis.

3. *Chest* : Examination of the chest may reveal the presence of pulmonary tuberculosis or hydrothorax.

a) Pulmonary tuberculosis may point to tuberculous seroperitoneum as the cause of ascites.

b) Hydrothorax may suggest a generalised cause for the ascites as a negative protein balance due to chronic parenchymal liver disease, or kidney disease with albuminuria. Hydrothorax also points to the possibilty of Pick's disease or Concato's disease.

4. *Heart* : Heart failure or pericardial effusion can occur with ascites.

a) Heart failure when present points to ascites secondary to salt and water retention or cardiac cirrhosis of the liver when long standing.

b) Pericardial effusion may be part of Pick's disease or Concato's disease.

5. *Liver* : Examination of this organ is of great importance. In fact in more than 90 percent of patients presenting with ascites, the ascites is the result of cirrhosis of the liver, giving rise to portal hypertension.

a) Cirrhosis of the Liver : This can be diagnosed by the firm feeling of the liver which is usually smaller in size than normal, with a sharp irregular border. The surface may be felt irregular or smooth according to the cause of cirrhosis.

b) Malignancy of the Liver : This is shown by the hard feeling and nodularity of the surface. If the liver is enlarged it is more in one lobe than the other. A malignant liver may be associtaed with malignant ascites and heamoperitoneum.

c) Cardiac Liver : The cardiac liver which is tender and pulsating points to congestive heart failure as the cause of ascites.

6. Spleen : An enlarged spleen points to cirrhosis of the liver and portal hypertnestion or Hodgkin's disease with lymph node enlargement pressing on the porta hepatis as causes of ascites. The spleen may sometimes be enlarged in patints with tuberculous peritonitis.

7. *An Abdominal Mass* : This mass may be tabes mesenterica associated with tuberculous peritonitis. It may be enlarged lymph nodes of Hodgkin's disease, or it may be due to malignancy in an abdominal organ.

Pseuomyxoma peritonii presents as an abdominal swelling showing the same surface signs of ascites. However, the feeling gives more resistance then that of fluid, there is no shiffting dullness and on attempting aspiration no fluid comes out.

8. *Collaterals on the Abdominal Wall* : These suggest portal hypertension due to cirrhosis of the liver or inferior vena cava obstruction. In

the former they usually radiate from the umbilicus upwards and downwards, are central and the flow of the blood in them is from the umbilicus upwards and from the umbilicus downwards. Collaterals due to inferior caval obstruction are located laterally and the flow of the blood in them is from below upwards along their whole course. In this country, because of prevalence of schistosomiasis, any abdominal collaterals are considered portal in origin as the inncidence of caval collateras is extremely rare.

9. *Umbilicus* : Examination of the umbilicus may reveal the presence of a thrill or a venous hum suggesting the presence of portal hypertension as a cause of ascites.

Pigmentation in and around the umbilicus is due to tuberculous peritonitis or abdominal malignancy. The umbilicus may reveal, on palpation, small nodules which are hard suggesting abdominal malignancy as the cause of ascites.

10. *Lower Limbs* : Edema of the lower limbs or peripheral neuropathy may be present in patients with ascites.

a) Edema : This suggests the cause of ascites as cardiac, renal or hepatic (parenchymal) or it may be simply due to pressure on the inferior vena cava and renal veins. The edema may be unilateral and hard suggesting filariasis as the cause of ascites and the condition a chyloperitoneum.

b) Peripheral Neuropathy : This when present, may point to alcoholic cirrhosis of the liver or beri-beri with associated protein deficiency.

Laboratory Investigations

1. *Urine* : Examination of the urine is a valuable means in the diagnosis of the cause of ascites.

a) Albuminuria : Albuminuria if massive points to the ascites to be due to a negative protein balance.

b) Microscopic Examination : This may reveal the presence of

i. Schistosoma ova denoting the cause of ascites as schistosomal fibrosis of the liver.

ii. Hyaline casts may suggest nephrotic syndrome as the cause of ascites.

iii. Pus cells suggesting the presence of chronic pyelonephritis and tuberculous pyelonephritis.

iv. Fat globules may suggest filariasis giving rise to chyluria associated with chylous ascites.

2. *Ascitic Fluid* : Examination of the ascitic fluid for its physical properties, chemical constituents and microscopically is extremely important in every case of ascites to reach a diagnosis.

Ascitic fluid with a specific gravity greater than 1.017 or 1.020 is an exudate, specific gravity less than 1.012 is a transudate. Ascitic fluid with a protein content greater than 3.0 gm/100 ml is an exudate, below 2.0 is a transudate. If the protein content is greater than 4.0 gm/100 ml this is indicative of tuberculous peritonitis.

The white cell count of the ascitic fluid is of great diagnostic value. Although they are variable, yet a predominance of lymphocytes indicates tuberculous ascites.

Cytologic study may be done to detect the presence of malignant cells.

The ascitic fluid may be haemorrhagic by naked eye examitoin. This suggests the cause of ascites to be malignancy of the peritoneum or one of the abdominal organs.

The ascitic fluid may be turbid or chylous. This turbidity or chylous appearance may be due to fat droplets as occurring in chyloperitoneum due to obstruction of the lacteals or thoracic duct. The droplets may be lipoglobulin as occurs in some liver diseases or some cases of nephrosis and must

be differentiated from chylous ascites. This is achieved by the appropriate fat stains and the demonstration of sudan III given by mouth and its appearance in the ascitic fluid.

3. Blood Examinations

i. Complete Blood Picture : This may demonstrate the presence of lymphoma (Hodgkin's and non-Hodgkin's) pressing on the portal vein causing ascites.

ii. Liver Function Tests : These are useful to help in the diagnosis of chronic parenchynal liver disease as the cause of hypoproteinaemia and ascites. These include serum albumin, serum bilirubin, alkaline phosphatase, SGPT (gamma glutamyl transpeptidase) prothrombin activity and Australia (Au) antigen.

iii. Estimation of Blood Proteins : Seum electrophoresis should be done to detect the presence and extent of hypoalbuminaemia and the amount of serum globulins.

4. Bacteriological Examination : Culture and Guinea pig inoculation are useful to diagnose tuberculous peritonitis.

5. *Lymph Node Biopsy* : This may help in diagnosing Hodgkin's disease or a lymph node draining malignancy in an abdominal organ.

6. *Radiology*: Radiology of the gastrointestinal tract is useful to detect malignancy. A barium swallow is essential for the diagnosis of esophageal varices. Splenoporatography is used to detect esophageal varices and portal vein obstruction. Retrograde venous catheterization may be useful in the diagnosis of cardiac and pericardial disease. Abdominal lymphograply is needed to diagnose enlarged abdominal lymph nodes.

7. *Liver Scanning*: This is done either by isotopes or ultrasonography It is useful to diagnose a space occupying lesion in the liver.

8. *Abdominal Ultrasonography* : This procedure is useful in detecting a mass in the abdomen which may be obscured by the ascitic fluid. It is also useful to detect a small amount of fluid (100-300) and whether this fluid is free or encysted.

9. *Liver Biopsy* : This also is a useful diagnostic tool and has to be resorted to in the diagnosis of the liver condition present. It may be cirrhosis which includes parenchymal affection or a simple fibrosis as in schistosomal fibrosis where the parenchyma is largely preserved until late and consequently the liver functions; including protein (albumin) synthesis are not appreciably affected except by the hypoxia resulting from the reduced hepatic blood flow. Liver biopsy is also useful in the diagnosis of chronic parenchymal liver disease.

10. *Kidney Biopsy* : This may be useful in diagnosis of the type of kidney disease responsble for the hypoprotienaemic edema and ascites when present.

11. *Peritoneal Biopsy and Peritonoscopy* : These procedures give accurate information about the condition of the peritoneum and the outside appearance of the abdominal organs.

12. *Laparotomy* : Sometimes, even with thorough clinical examination including proper and careful history taking and careful clinical examination in addition to all the above-mentioned laboratory and other methods of investigation, the diagnosis of the cause of ascites is still vague. In these cases laparotomy may have to be resorted to, to visualize, feel properly and take a biopsy from the abdominal organs, abdominal swelling or small lymph node enlargement pressing on the porta hepatis.

CHAPTER EIGHT

ABDOMINAL PAIN

ABDOMINAL PAIN

PATHWAYS

CHARACTERISTICS OF ABDOMINAL PAIN

- Referred Pain
- Radiating Pain
- Hyperalgesia

PAIN PRODUCING STIMULI IN INTRA-ABDOMINAL ORGANS

PROJECTION AND LOCALIZATION

TYPES OF ABDOMINAL PAIN

SEVERITY OF THE PAIN

RELATION TO CERTAIN FACTORS

CLINICAL CLASSIFICATION

- Acute Surgical Abdomen
- Acute Medical Abdomen
- Acute Abdomen Due to System Disease
  - Disease of Intra-abdominal Organs
  - Disease of Abdominal Wall
  - Disease of Extra-abdominal Structures
  - System Diseases.

DIAGNOSTIC APPROACH

- Acute or chronic
- Medical or Surgical
  - Acute Abdominal Pain
  - Onset. Previous history. Associated manifestations.
  - Abdominal examination

Chronic Abdominal Pain

Onset. Character. Intensity . Relation to certain factors.

Precipitating or relieving factors.

Associated symptoms and signs.

Clinical examination of other organs.

Rectal Examination.

Investigations.

ABDOMINAL PAIN

Abdominal pain is a very frequent complaint. It is an improtant tool which should lead us to the diagnosis of mainy diseases of abdominal and extra-abdominal organs.

Careful interrogation of the patient and interpretation of this pain is necessary to reach the diagnosis because in many patients clinical examination will not add to our information.

Characteristic Features of Abdominal Pain

For any pain to be produced there must be

1. An adcpquate stimulus.
2. Adequate local receptors.
3. An intact pathway from these receptors to the respective cerebral centres.

Unless all these 3 are present no pain is appreciated.

Pain nerve endings in the abdomen are 3 types. As regards the pathway, the painful sensation reaches the posterior root ganglion and the afferent impulses reach the cord by the splanchnic nerve (sympathetic). Then the pain is perceived by passing up through the spino-thalamic tract up to the thalamus and then to the cortex.

Referred Pain : One of the characteristics of abdominal pain is what we call referred pain. This means pain not felt at the place of the diseased organ responsible for this pain out in another area. The mechanism of this referred pain is that the deep organ responsible for this pain is mapped on the cortex in the same area where some part of the skin is mapped, both charge in a common spinal segment. Usually, the brain should be able to differentiate between the different types of pain and to localise its origin but sometimes as in the case of referred pain, the brain is not able to do

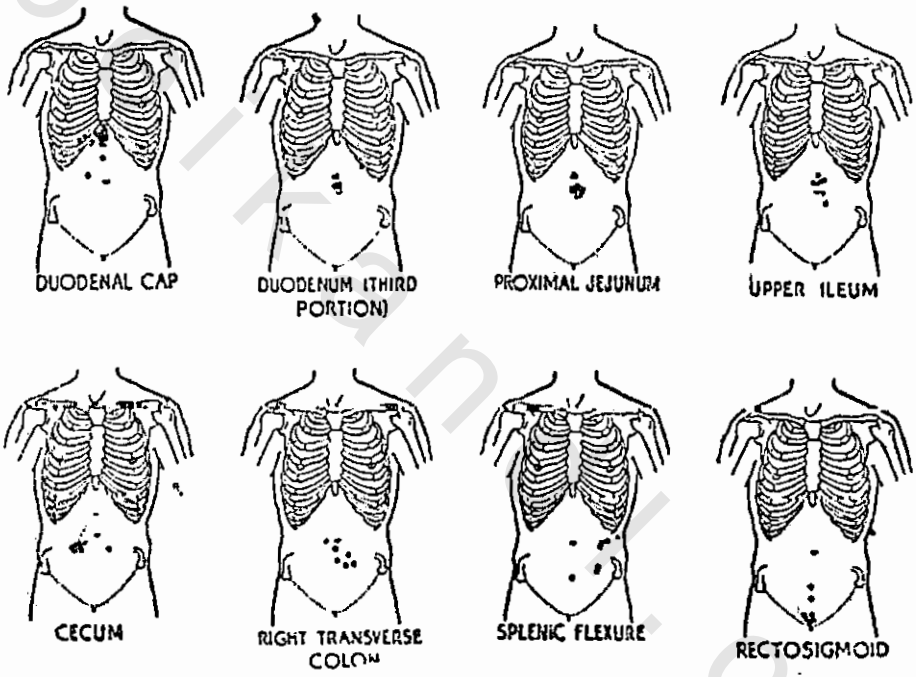


Fig. : Projection of pain on the abdominal wall in disease of some abdominal organs.

this differentiation, when it receives painful impulses from the deep organ. The result will be that a paniful stimulus coming from the visceral organ, the brain will reflect and perceive it as coming from the skin, mapped in the brain by the same area or supplied by the same spinal segment.

Radiating Pain : Another characteristic of abdominal pain is radiating pain. This is pain felt in the area of the diseased organ and in other areas as well. The explanation is similar to that of the referred pain but the brain reflects the pain as coming from both deep organ and the skin, at the same time.

Hyperalgesia : Another characteristic of abdominal pain is hyperalgesia. This is excessive pain felt in the skin of an area near or covering the diseased deep organ. In these parts of the skin if we pass a piece of cotton on the skin or apply light touch, this will give rise to severe pain. The explation of that, is if a deep organ is inflamed, a certain chemical substance is liberated at the nerve endings which supply both the skin and muscles, taking from the same nerve. This chemical substance lowers so much the threshold of the pain nerve endings so that a slight touch gives rise to severe pain due to the excessive sensitization of the nerve supplying the skin. The same explanation applies to the rigidity of the muscles and their tenderness over the diseased organ.

Pain Producing Stimuli in the Abdomen

Adequate pain producing stimuli in intra abdominal organs include the following.

1. Strong contraction of muscles as in intestinal, biliary, ureteric and uterine contractions.

2. Irritation and inflammation of peritoneum. e.g. appendicitis when the peritoneal wall shares in the process.

3. Stretching of the capsule of abdominal organs, as the liver and spleen.

Some parts are insensitive to pain as the gastric and intestinal mucosa, parenchyma of the liver, spleen and kidney. Wher the capsule participates, pain is produced.

Projection and Localization

Abdominal organs when inflamed or diseased they represent themselves by pain in certain localities of the abdominal wall and the patient should be able to point to the diseased organ from the representation of the pain on the abdominal wall. Examples of this are useful.

1. Pain occuring in the right hypochondrium is the result of disease of the liver, gall-bladder, or hepatic flexure of the colon.

2 Pain in the epigastrium is the result of diseases of the stomach, duodenum, transverse colon, or head of the pancreas.

3. Pain in the left hypochondrium is the result of diseases of the stomach the splenic flexure, tail and body of the pancreas, or the spleen.

4. Pain around the umbilicus is characteristic of small intestine disease. It is in the middle line and related to the umbilicus. In diseases of the upper part of the small intestine (duodenum and jejunum) it occurs above the umbilicus and in diseases of the lower intestine (ileum) it occurs below the umbilicus.

5. Pain in the right iliac fossa is due to diseases of the appendix or right ovary or its adnexa.

6. Pain in the hypogastric area is due to colonic disease, disease of the urinary bladder, or the uterus.

7. Pain in the left iliac fossa arises from diseases of the sigmoid colon, left ovary and left ureter.

Silent Organs

Difficulty can arise in diagnosis because some of the abdominal organs when they are diseased do not give rise to pain i.e. silent organs. Disease may start and become extensive in these organs without giving rise to pain. Examples of these are

a) The caecum, as cancer of the caecum.

b)) Diseases of the pelvis and pelvic organs up to malignancy may not give rise to pain until the malignancy infiltrates the nerve roots.

c) Diseases of the body and tail of the pancreas as malignancy.

Types of Abdominal Pain

Certain organs give rise to certain types of pain.

1. *Pain of a Hollow Viscus* : These include the stomach down to the rectum, the biliary system, the urinary system and the reproductive system. All give rise to colicky pain. This colic is a certain type of pain resulting from increased tension occuring in the muscle coat of the wall of these hollow organs. This increased tone or tension of the muscle may result either from excessive contraction of these muscles or excessive stretch of them.

2. *Pain as a result of Inflammation and Irration of the Peritoneum Covering the Abdominal Organs* : The best example is the pain of acute appendicitis. At first the pain is colicy in the obstructive phase, then when the inflammation spreads to the peritoneal covering of the appendix, it becomes dull and diffuse.

3. *Pain as a result of Stretching of the Capsule of some Organs* : Examples of these are the liver and the kidney. This type of pain due to stretching of the capsule of the liver and other organs is not accepted by all people. Against this type of pain is hydatid disease of the liver, where there it stretching of the capsule of the liver but there is no pain.

4. *Pain resulting from Manual Pressure* : In some organs, manual pressure of the organs may give rise to pain. This occurs only with a movable kidney. If we press a normal kidney no pain will be felt but if we press a movable kidney pain will be felt.

Severity of the Pain

Severity of the pain depends on

1. *Amount of the Stimulus* : The stronger the stimulus or the disease causing the pain, the greater the pain should be.
2. *Threshold of this Particular Patient to Pain* : Some people cannot tolerate pain. The result will be that a small stimulus will cause severe pain. The reverse will occur in others who have a high threshold to pain. The elderly are not less sensitive to pain but they lack the power of localisation.

Duration of the Pain

1. Abdominal pain remaining for more than 4 to 6 hours, usually denotes a serious condition.
2. Pain remaining for weeks or months may suggest either a malignant disease or a functional condition. The differentiation is by clinical examination, associated manifestations and proper laboratory and radiological examination.

Relation of Pain to Certain Factors

Relation of Pain to Meals

a) Pain occurring immediately after taking a meal is most probably due to a gastric or a pancreatic condition.

b) Pain occurring a short time after meals may be due to gall-bladder disease, especially if this pain is related to fatty meals.

e) Pain occurring 2—3 hours afqter meals and occurs before the next meal suggests disease of the duodenum.

d) Pain occurring about 3—4 hours after meals suggests colonic pain. One must always keep in mind that a sensitive gastrocolic reflex, can give rise to pain of colonic origin a short time after meals, not necessarily some hours after it.

e) *Abdominal Angina* : This is a certain type of pain occurring .n the abdomen after meals. This pain is the result of narrowing and sclerosis of a mesenteric artery. The mechanism of pain is the same as that occurring in intermittent claudication and anginal pain of effort. During digestion more blood is needed in the splanchnic area, and because of the narrowing of the mesenteric vessels, this need cannot be accomplished. Pain is felt due to vascular insufficiency of that particular segment of the intestine.

The Relation of Blood Vesscls to Abdominal Pain

(vascular type of abdominal pain)

Vascular pain may be in the following forms.

a) Abdominal angina.

b) Occlusion of the Mesenteric Artery : The mesenterie artery may be occluded or thrombosed. This is one of the types of abdominal pain, upon which light has been focussed recently, especially in elderly patients. The pain is sudden and agonizing. This type of pain if not discovered early, gangrene of a loop of the intestine may occur.

c) Mesentreic Vein Thrombosis : Here the patient presents with abdominal pain, colic and melaena. This condition is usually not recognised until it leads to gangrene of the intestines.

d) Abdominal Pain Associated with Shook : The presence of shock will interfere with the ability of the patient to describe details of the pain, thus we should not depend only and completely on his description of pain to reach at a diagnosis.

CLINICAL CLASSIFICATION OF CAUSES OF ABDOMINAL PAIN

Abdominal pain can be classified on a clinical basis into "acute" and "chronic". It is very important to know whether an acute abdomen is surgical or medical, in the sense whether it needs urgent surgical intervention or can be treated medically and conservatively.

Acute Surgical Abdomen

It is better to start with discussion of these causes as their clear and quick recognition and consequent management is extremely important.

1. Acute appendicitis.
2. Acute intestinal obstruction, due to hernia, intussusception, adhesions or neoplasms.
3. Perforation of a peptic ulcer or a typhoid ulcer.
4. Acute cholecystitis with peritonitis.
5. Ruptured diverticulum of intestine, ectopic prognancy and corpus luteum. Torsion of an ovarian cyst, fibroid, omentum, tumour or Mickel's diverticulum.
7. Vascular conditions including mesenteric artery or vein occlusion, ruptured aneurysm or embolisation of the abdominal aorta.
8. Acute conditions of the abdominal wall such as abscess or haemorrhage.

Acute Medical Abdomen due to Intra-abdominal Organs

The conditions discussed here give rise to an acute abdomen, but their management is medical and conservative. The conditions metioned here are those arising from disease of inta-abdominal organs.

1. Acute gastritis.
2. Acute gastro-enteritis. (food poisoning)
3. Acute pancreatitis.
4. Acute cholecystitis.
5. Acute hepatitis and peri-hepatitis.
6. Acute pelvic inflammations and painful ovulation.
7. Rheumatic peritonitis and primary peritonitis of young girls.
8. Retroperitoneal lymphadenitis.
9. Mesenteric lymphadenitis.
10. Acute renal conditions, such as Deitel's crisis and renal colic.

Acute Abdomen due to Systemic Disease

These include general or systemic diseases which may present themselves with acute abdominal pain, solely or in combination with other symptoms.

1. *Cardiovascular System* : Abdominal pain can arise from cardiac infarction, acute pericarditis, cardiac congestion of the liver, dissecting aneurysm of the abdominal aorta, polyarteritis nodosa and embolisation of the mesenteric and pulmonary artery. Abdominal migraine can also be included in this group.
2. *Lungs, Pleura and Diaphragm* : Pulmonary infarction, pneumonitis (especially in children), spontaneous pneumothorax, diaphragmatic pleurisy or acute mediastinitis can cause abdominal pain. Acute esophageal conditions can also occur such as strangulation of a diaphragmatic hiatal hernia or rupture of the esophagus.
3. *Metabolic Conditions* : Diabetic ketosis, prophyria and hyperlipaemia can cause abdominal pain.
4. *Allergy* : This may give rise to acute gastro-enteritis, allergic peritonitis and Henoch-Schonlein purpura.

5. *Nervous System* : Herpes zoster, tabetic crisis and abdominal epilepsy may present with abdominal pain.
6. Intoxication with lead (acute plumbism).
7. *Endocrinal Diseases* : Addissonian crisis is associated with abdominal pain.

Chronic Abdominal Pain

Disase of Intra-abdominal Organs

a) Diaphragmatic esophageal hiatal hernia.

b) Diseases of the Stomach : Chronic gastritis, duodenitis, peptic ulceration and malignancy.

c) Diseases of the Pancreas : Acute relapsing pancreatitis, chronic pancreatitis, calculus of the pancreas, pancreatic cysts and cancer of the pancreas.

d) Diseases of the Small and Large Intestine : Crohn's disease (regional enteritis), tuberculous enteritis, intestinal parasites, chronic amoebic dysentry, diverticulosis and diverticulitis, ulcerative colitis and malignancy.

e) Diseases of the Liver : Hepatitis, cancer of the liver and chronic passive congestion due to heart failure, constrictive pericarditis and Chiari's disease.

f) Diseases of the Gall-Bladder : Chronic cholecystitis with or without gall stones.

g) Diseases of the Kidney : Chronic pyelonephritis polycystic kidney, tumours of the kidney and recurrent renal colics.

h) Diseases of the Ovaries and Adnexae : Inflammations, painful ovulation, dysmenorrhea and malignancy of the genital and reproductive female organs.

i) Retroperitoneal sarcoma.

Disease of the Abdominal Wall

It is important to remember this because a hasty examination of the abdomen in an attempt at finding the cause of the chronic pain inside the abdomen may overlook a hernia of the abdominal wall or xyphoidaliga. The pain may be muscular due to chronic cough.

Diseases of Extra-abdominal Structures

The pain can be referred from

a) Chest : These include angina of effort, pericarditis and basal pleurisy.

b) Spine : As in spondylitis and spondylosis, Pott's disease, fracture or malignancy.

c) Testicles : Testicular pain pay be referred to the para-umbilical region.

Systemic Diseases

These diseases can give rise to chronic pain which may either be continuous or occurs in attacks. The attacks may cause severe pain which when occurs for the first time or infrequently, can give rise to an acute abdominal condition.

a) Allergy : Gastro-intestinal allergic peritonitis and Henoch-Schonlein purpura.

b) Vascular : Abdominal migraine, and abdominal angina.

c) Nervous : Abdominal epilepsy and tabetic crisis.

d) Metabolic : Porphyria, hypocalcaemia and essential hyperl'pacmia.

e) Intoxication : Chronic lead poisoning.

f) Palendromic serositis.

DIAGNOSTIC APPROACH TO ABDOMINAL PAIN

Few diseases produce abdomial pain with pathognomonic features.

The clinical history usually provides only enough information to suggest some possibilites. A thorough and complete clinical examination may help to clarlfy the dagnosis. Often laboratory and investigative techniques are needed to get at the accurate diagnosis of the cause whether of the acute or chronic and recurrent abdominal pain.

Acute Abdominal Pain

The Onset

a) With gastro-inestinal manifestaions such as vomiting, diarrhea, haematemseis or colic.

b) With Fever : The presence of fever suggests an inflammatory condition; whether local in the abdomen or systemic or in an extra-abdominal organ.

c) Dyspnea : This may suggest spontaneous pneumothorax or cardiac infarction with acute heart failure.

d) Shock : The presence of shock may suggest perforation of a peptic ulcer, acute pancreatitis or cardiac infarction as the cause of the abdominal pain.

Previous History

a) Peptic ulcer suggests perforation as the cause of acute abdominal pain.

b) Renal colic or biliary colic, point to the present condition as a possible recurrence of them.

c) Acute appendicitis, which was not operated upon, suggests its recurrence as a cause of the acute abdominal pain which necessitates the transference of the patient to the surgeon.

d) Migraine, suggests the cause to be abdominal migraine.

e) Epilepsy or syphilis, suggest abdominal epilepsy or tabetic crisis.

f) Allergy points to an acute allergic abdomen.

Associated Manifestations

Such manifesations as vomiting, diarrhea, jaundice, allergy and headache may help to point to the cause of the pain.

Abdominal Examination

Examination of the abdomen, may reveal the presence of localised tendrness, an abdominal mass, guarding or rigidity, areas of pigmentation or haemorrhage, peristalsis or a silent abdomen.

From these symptoms and clinical signs in the abdomen, in cases of acute abdominal pain, one should decide on the line of management, whether surgical or medical.

Chronic Abdominal Pain

1. *Onset, duration and recurrence.*

2. *Character* : The pain may be colicky suggesting a hollow viscus as the diseased organ. It may be dull aching if there is parietal peritoneal affection with muscle spasm. The pain may be neuralgic if nerve roots are infiltrated or pressed upon.

3. *Intensity* : The severity of the pain usually, but not always, goes hand in hand with the seriousness of the disease. However, there are silent organs in the abdomen, such as the caecom, body and tail of pancreas and the pelvic organs which may be infiltrated even with malignancy and do not give rise to pain and even if they do, the pain is slight. On the other hand, pain of functional origin may be severe, prolonged, recurrent and quite troublesome to the patient, his family and treating doctor.

4. Relation of Pain to Certain Factors

a) Pain related to meals may be a diaphragmatic hernia, gastric or duodenal peptic ulcer, gastritis, gastric carcinoma, gall-bladder disease, intestine or colon disease.

b) Pain related to defaecation, whether it occurs with defaecation or is relieved by defoecation or the passage of flaturs, is colonic in nature.

c) Diaphragmatic Hernia : The pain occurs after meals if the patient acquires the recumbant position, if the patient sits in the upright position the pain will not occur.

d) Pain referred from the spine is induced by movements of the spine.

e) Abdominal angina may also occur after meals, especially heavy meals.

f) Pain occuring after effort may be angina of effort referred to the epigastrium.

g) Pain may be related to emotion. Emotion can precipitate pain by causing increased tension and spasms of the viscera in itself causing pain or by interference with their functions and consequent pain, thus the pain is the result of functional disturbance and not due to an organic disease. Emotion can also modify the presentation of pain of an organic nature. Thus, it is a wise motto not to diagnose pain as of functional origin except after fully exhausting all possible means of diagnosing organic pain which may be hidden and sometimes quite difficult to uncover.

h) Pain may be related to the intake of certain drugs, which can either produce, aggravate or relieve the pain.

i) Certain jobs may point to the cause of pain as those workers dealing with lead.

5. Factors Precipitating or Relieving Abdominal Pain

a) Pain relieved by alkalies suggests peptic ulcer or duodenitis.

b) Pain relieved by light food suggests also a duodenal ulcer.

c) Pain relieved by defoecation or passage of flatus suggests the colon as the site pain.

d) Pain occuring 2 or 3 hours after meals; postprondial, suggests hypoglycaemia as the cause of pain.

6 *Associated Symptoms and Signs*

a) Vomiting : Vomiting suggests the cause of pain to be disease of the stomach, duodenum or gall-bladder.

b) Diarrhea suggests the cause of abdominal pain to be disease of the small intestines or colon.

c) Constipation : This points to colonic disease. Constipation may alternate with diarrhea also in colonic disease.

d) Cough : Cough points to basal pleuritis as the cause of pain referred to the abdomen. Chronic cough or emphysema itself may be the cause of chronic abdominal pain of muscular nature.

e) Headache : Headache associated with abdominal pain may point to abdominal migraine as the cause of abdominal pain. If associated with fever it may point to typhoid fever in which the patient complains of severe headache.

f) Generalized Muscle and Bone Pain : These suggest the cause to be rheumatic fever with rheumatic peritonitis. Porphyria, sickle-cell anaemia and hypocalcaemia may also give ri.e to generalised bone pains.

g) Allergic Manifestations : Urticaria, rhinitis, eczema or bronchial asthma point to the cause of abdominal pain as allergic.

h) Excessive Sweating : This suggests hypoglycaemia as the cause of abdominal pain.

i) Fever : This suggests an inflammatory process as the cause of abdominal pain.

j) Palpitations : This suggests the pain to be functional in origin or due to referred pain of angina of effort.

7. *Clinical Examination of the Abdomen*

a) Vigorous Peristalsis : The presence of vigorous peristalsis suggests the cause of abdominal pain to be intestinal obstruction. The peristaltic wave may take the form of a ladder in the middle of the abdomen is small intestinal obstruction. It may be localized to one part of the abdomen associated with distension, suggesting colonic obstruction.

b) Tenderness, whether localised to one organ, an area, or generalised is also very important. It may point to the diseased organ which is the cause of the pain. If generalized it is due to peritoneal involvement or diffuse abdominal wall muscle pain.

c) Rigidity : Rigidity denotes involvement of the parietal peritoneum with reflex muscle spasm.

d) Abdominal Mass : The palpation of an abdominal mass may reveal the cause of abdominal pain to be a retroperitoneal sarcoma. An enlarged liver, gall-bladder, terminal ileum, caecom or sigmoid colon may point to these organs as the cause of the chronic abdominal pain.

8. *Examination of Other Organs of the Body*

a) Nervous System : This may reveal the presence of tabes dorsalis as the cause of pain. Peripheral neuropathy may occur with diabetes mellitus, hypoglycaemia and porphyria. Epilepsy and migraine may be diagnosed on carefull interrogation and examination of the patient.

b) Heart : Cardiac infarction and pericarditis may give rise to referred abdominal pain. Hydropericardium, constrictive pericarditis and congestive heart failure cause congestion of the liver with chronic abdominal pain.

c) Chest : The condition of the diaphragm, the bases of the lungs and the mediastinum are important as their diseases give rise to referred abdominal pain.

d) Spine : Diseases of the spine may give rise to referred pain in the abdomen.

e) Testicles : Disease of the testes may give rise to abdominal pain near the umbilicus.

9 *Rectal Examination*

This method of examination must never be neglected in any patient complaining of abdominal pain whether acute or chronic. It gives to the examining physician tremendous and valuable information, and can be considered as an access into a closed container. The examining finger can feel masses, cysts, tender organs and the female and male genital and reproductive organs.

Investigations

Urine

Examination of the urine must be done in every patient with abdominal pain, in fact it is a very important tool towards reaching at the cause of the pain.

i. Urine which turns brown after staying in the air for some minutes suggests porphyria as the cause of pain.

ii. Glucose in the urine suggests hypoglycaemia due to insulin in a diabetic pateient, or diabetic ketosis if acetone is present in addition.

iii. Excess urobilin suggests sickle-cell anaemia as the cause of the abdominal pain.

iv. Albumin and pus cells suggest chronic pyelonephritis.

v. Excessive urate or oxalate crystals suggest the cause of pain to be repeated renal colics.

vi. The absence of calcium by the Sulkowitsh test or its presence in small amounts suggests hypocalcaemia as the cause of pain.

Stools

The stools must be carefully examined in every case of abdominal pain; both by the naked eye and microscopically.

i. Diarrhea (loose stools), blood, pus or mucus, suggest colonic disease as the cause of abdominal pain.

ii. Intestinal parasites revealed by stools examination may be the explanation of many cases of chronic abdominal pain and their treatment may be the end of the patient's troubles.

Radiology

This is done according to the organ that is needed to be examined.

i. Barium meal is needed for the stomach duodenum, small intestine and barium enema for the colon.

ii. Plain film (after preparation) can show calcification of the pancreas, the size of the liver and spleen, renal and gall stones.

iii. Radio-opaque material is needed to visualise the biliary and urinary tracts.

iv. Radiology of the heart, lungs, spine and skull may be also needed.

Blood Examination

This will include : Blood picture which is useful in the diagnosis of inflammatory conditions, allergy, purpura and sickle cell anaemia.

i. Blood sugar estimation is useful for the diagnosis of diabetic Ketosis and hypoglycaemia.

ii. Blood calcium estimation may reveal hypocalcaemia as the cause of chronic abdominal pain.

iii. Blood Wasserman or Kahn (and the same for the cerebrospinal fluid) are useful for diagnosis of tabes drosalis.

iv. Prophyria can also be diagnosed by blood examination for porphobilinogen.

Endoscopy

Sigmoidossopy is needed to visualise and take biopsies from the colon up to a level of 25 cms. Higher levels can be visualized by the coloscope. Upper gastro-intestinal endoscpy is needed for stomach and small intestine disease.

Peritonoscopy and Exploratory Laparotomy

These sometimes may be needed to reach a diagnosis in difficult cases.

Scanning and Ultrasonography

These are frequently needed to diagnose cases of abdominal pain due to abdominal organ diseases or an abdominal mass.

CHAPTER NINE

EPISODIC ABDOMINAL PAIN

EPISOIC ABDOMINAL PAIN

CHARACTERISTICS

CAUSES

- Gastro-Intestinal Allergy
- Neurogenic
  - Migraine
  - Epilepsy
- Metabolic Conditions
  - Intermittent Abdominal Prophyria
  - Essential Hyperlipidaemia
- Palindromic Serositis (Related to Periodic Peritonitis).
- Redundent Loop Syndrome

EPISODIC ABDOMINAL PAIN

This chapter includes the underlying causes of episodic abdominal pain occurring over many years. It especially throws light on that group of diseases which leaves the patient free in between the attacks, and does not affect his general health, nor shorten his life. The necessity of detailed clinical and laboratory studies to exclude organic causes of recurrent abdominal pain is stressed. The functional nature of such attacks should only be an exclusion diagnosis when such conditions as found in this series are satisfactorily ruled out.

Episodic abdominal pain occurring over long durations has always been a source of preplexion to both physicians and surgeons interested in the field of gastro-enterological diagnosis. This type of pain occurs in episodes, sometimes indistinguishable from an acute abdominal emergency. Thus, the sufferers are commonly submitted to unnecessary laparotomly if its nature and recurrent features with asymptomatic intervals are not appreciated. Its causes are not usually apparent and special efforts should be exercised to keep them in mind particularly when the routime investigations fail to reveal any of the many organic structural lesions known to produce chronic recurrent abdominal pain and before the clinical examiner commits mimself to the common diagnosis of functional pain.

Although one should always attempt to assess the role of anxiety and nervous tension in complaints related to the gastrointestinal tract, the diagnosis of functional pain may lead to many erroneous conclusions. The presence of a psychogenic background is no excuse to overlook on organic disease as emotion can accompany and accentuate or modify the clinical picture of any organic disease. Accordingly the diagnosis of a functional cause for periodic abdominal pain should be an exclusion diagnosis made only after thorough investigations, and if necessary, a sufficient period of observation to uncover hidden and undiscovered lesions.

Mechanismically, recurrent abdominal pain may be spasmodic, dyspeptic, inflammatory, mechanical, vascular or neurological. These conditions are usually due to structural lesions which produce some sort of abdominal or systemic complaints in the intervals between the attacks of abdominal pain. Clinical procedures and ordinary methods of investigation usually succeed in detecting them. Also these organic causes of recurrent abdominal pain commonly affect the general health of the patient, although rarely deleterious effects may not be apparent. Some of these causes however require detailed systematic examination including thorough history - taking and more than the ordinary laboratory and radiological examinations. Clinical acumen is needed for the proper interpretation and analysis of the data obtained. The following conditions are not uncommonly misdiagnosed in busy practice : relapsing pancreatitis, regional enteritis (Crohn's disease), recurrent intussusception due to intestinal polyposis (Peutz-Jegher's syndrome), biliary pain due to unvisualised stones, cholesteatosis, adenomyomatosis of the gall-bladder, stenosis of the ampulla of Vater or the post-cholecystectomy syndrome, dyskinesia of the gall-bladder, mucocele and malignancy of gall bladder, polyarteritis nodosa giving rise to recurrent intra-agdominal vascular episodes, disseminated lupus erythematosus producing ulceration of the bowel and serositis, abdominal angina due to atherosclerosis of the mesenteric arteries, ... etc.

When evidence of intra-abdominal disease is satisfactorily excluded, clinicians should always remember that abdominal pain may be of abdominal wall origin, e.g. epigastric fatty hernia, abdominal wall scar, xiphoidalgia,... etc. It may also be referred from the chest or the spine or due to systemic disease, e.g. lead poisoning, diabetes mellitus, haemochromatosis, porphyria, sickle cell anaemia,... etc.

The subject of this chapter is to describe the underlying causes of episodes of abdominal pain occurring over long periods of time, usually extending over years and separated by free intervals with no affection of general health.

CAUSES

The conditions responsible for such episodic abdominal pain fall under the following headings.

1. Gastro-intestinal Allergy.
2. Neurogenic : a. Migraine, b. Epilepsy.
3. Metabolic Conditions : a. Porphyria, b. Essential hyperlipidaemia.
4. Palindromic Serositis (a new terminology of a variant related to periodic peritonitis).
5. Redundent loop Syndrome a (new syndrome to be described).

GASTRO-INTESTINAL ALLERGY

Any part of the gastro-intestinal tract may be a target organ for allergic reactions which may manifest themeselves as spasms or edema. The patients complian of attacks of sudden pain in the abdomen which may be severe and accompanied by vomiting, abdominal distension and ileus, or there may be diarrhea with mucus and blood in the stools or even haemorrhage. Such patients are occasionally submitted to abdominal operations, unless gastro-intestinal allergy is thought of and looked for.

Diagnosis

The following points should be suggestive

a) Familial incidence of allergy.

b) Relation to particular articles of food or certain drugs.

c) Association or alternation with allergic manifestations in other organs of the body, such as urticaria, rhinitis or bronchial spasms.

The diagnosis can be further confirmed by the therapeutic response to adrenalin or anti-histamine drugs and by the precipitation of the attacks by the suspected allergin.

Skin tests are useless in abdominal allergy. Eosinophilia and Charcot Leyden crystals in the stools are of no diagnostic value as they are found also in intestinal parasitism.

Differential Diagnosis

Cases presenting with gastro-intestinal and bronchial allergy can be confused with carcinoid disease. Examination of the urine for 5-hydroxy-tryptamine helps to exclude this condition.

ABDOMINAL MIGRAINE

Some people who suffer from migraine have attacks of abdominal pain not associated with headache, and the name abdominal migraine is given to them.

Diagnosis

a) Careful inquiry will usually elicit an associated but ignored throbbing discomfort in the head.

b) History of migraine or cyclical vomiting in childhood.

c) The occurrence of visual or other aura preceding the attack of abdominal pain.

d) Alternation of these abdominal episodes with typical attacks of migraine.

ABDOMINAL (VISCERAL) EPILEPSY

Genuine epileptic attacks, manifested chiefly or solely by episodic abdominal pain, do occur.

The manifestations of visceral epilepsy can be divided into motor (belching and borborygmi) and sensory (abdominal discomfort and pain). Epileptics may describe visceral aura. E.E.G. abnormalities in the temporal lobe can be found. There are two principal locations of visceral presentation in the cerebral cortex; the fronotemporal and the mid-frontal parasagittal regions.

Diagnosis

When abdominal pain is part of the aura the diagnosis is usually clear. Sometimes, however, the patient experiences moderate or severe abdominal pain. Often there is nausea, excessive salivation or hunger in addition to vasomotor disturbances, e.g. pallor, sweating and even hyper-ventilation with slight or no cerebral manifestations.

A positive history of epilepsy, suggestion of an aura, e.g. yawning,... etc., such accompanying features as bizarre behaviours, twitches, automatism or sleep, should direct the attention to this possibility which can be further confirmed by demonstrating abnormal E.E.G. changes during the attack and disappearance upon institution of adequate anticonvulsive therapy. Moreover, such attacks can occasionally be precipitated by such procedures as hyper-ventilation.

It is important to remember that hypoglycaemia can produce a similar clinical combination and should be excluded.

INTERMITTENT ABDOMINAL PORPHYRIA

Prophyria is a hereditary disorder of porphyrin metabolism. Attacks of abdominal pain characterise the acute intermittent type while they are rare in the others (hepatocutaneus and congenital erythropeitic).

Clinical Features

The attacks of abdominal pain are usually severe. The pain is steady or crampy and may appear anywhere in the abdomen. It is usually associated with vomiting and constipation, but no muscle guarding or tenderness. Paroxysmal hypertension, slight fever and leucocytosis are not uncommon. Mental as well as neurological manifestations in the form of flaccid paralysis and polyneuropathy can usually be elicited.

The attacks are usually precipitated or aggravated by barbiturates.

These patients frequently show scars of laparotomy which were reported as negative with the exception of areas of spasm in the bowel.

It is probable that the mechanism of the abdominal episodes in porphyria in man results from disturbance or damage to the autonomic nervous system. Porphyria should be considered in every patient with episodic abdominal pain especially when the attacks are associated with changes in the colour of the urine and neurologic manifestations.

Associated paroxysmal hypertesion, although occasionally present, is not diagnostic as it may also accompary abdominal episodes due to tabetic crises, autonomic elpilepsy and pheochromocytoma. A history of relation to barbiturates is also suggestive.

Diagnosis

The diagnosis should be confirmed by demonstrating porphobilinogen in the urine passed during the attack.

Treatment

Correct diagnosis is an advantage to the patient, as he can be protected from barbiturates to prevent relapses and from unnecessary surgery. The attacks can be alleviated by tetraethyl ammonium or pethidine. Paraldehyde can be used as a sedative.

ESSENTIAL HYPERLIPIDAEMIA

Hyperlipidaemia is an inborn error of metabolism which should be remembered when confronted with a patient complaining of episodes of violent abdominal pain, accompanied by fever, leucoytosis, and manifestations of acute pancreatitis with high serum amylase.

A family history of similar attacks, hepatosplenomegaly and cutaneous xanthomatosis should direct the attention to this condition which can be further diagnosed by demonstrating milky serum. The pain may be due to increased sludging, favoured by the hyper-lipaemia. In an occasional attack acute pancreatitis may be the mechanism.

PALINDROMIC SEROSITIS

Synonyms : Benign paroxysmal peritonitis; Periodic disease; Familial Mediterranean Fever.

Benign Paroxysmal Peritonitis

This is the name given by Siegal to a condition characterised by episodic abdominal pain occurring over long periods of time with free intervals and found to be due to a sterile peritoneal reaction as seen in patients wrongly submitted to laparotomy. Because the attacks were completely reversible without leaving any residual lesions and because of the similarity of the peritoneal changes to urticaria and angioneurotic edema, he claimed without any additional proof, its allergic basis.

Periodic Disease

Reiman described a group of conditions including abdominalgia, arthralgia, fever, edema, neutropenia and purpura, all characterised by recurrent episodes over long periods of time and gave them the name "Periodic Disease". This is an ambiguous term including heterogenous manifestations grouped together only because of their common recurrence, which characterises also many other diseases. According to our recent concept of disease states, we believe that grouping should be etiological, pathological or mechanismal.

Familial Mediterranean Fever

This is a term given to more or less similar cases in Armenians and Jews. It is inadequate because the familial incidence could not be obtained in many cases and fever is inaccurately projected by this term. Moreover, the disease is not limited to the Mediterranean area; it has been described in other parts of the world.

Palindromic Serositis

The patients present with episodes of abdominal pain occurring over years With free intervals. The pain soon becomes generalised. It is usually associated with fever, rebound tenderness, muscle guarding and absent bowel sounds, the wholemarks of acute peritoneal reaction. Vomiting is frequent, but bowel function usually remains normal. In most of the cases the pain radiates to the shoulder, chest and back. In some patients, however, the chest pain is prominent and even the sole feature; it is stabbing, knife-like in character, Its pleuritic nature can be confirmed by the presence of a pleural rub and of small accumulations of fluid in the pleural cavity.

Because this picture suggested a serositis affecting the peritoneum, the pleura or both, and because of its complete reversibility (similar to palindromic rheumatism), we have called this condition "Palindromic Serositis".

Although the condition is benign as it does not affect the general health over years, yet some of these patients develop amyloidosis and may die of renal failure.

Etiology

Palindromic serositis is not of an allergic nature (no allergic history or manifestations, no relation to experimental or special allergins, leucocytosis but no eosinophilia during the attack, and no response to adrenalin or antihistamine drugs). Extensive laboratory invetigations during these attacks as well as biopsies have failed to demonstrate any abnormality. In a few patients histidinuria and in some others etiochonalone (a steroid hormone known to be pyrogenic) have been demonstrated. This last finding, if confirmed, together with the amelioration or complete disappearance of the attacks during pregnancy and after cortisone therapy, and the relation of stress to the occurrence of these attacks, would tempt us to suggest that this syndrome may be a form of benign dyscollagenosis due to disturbed steroid metabolism resulting in the intermittent liberation of abnormal metabolites.

The lymphocytic infiltration of the mesenteric plexus described in some cases studied pathologically may suggest a neuro-muscular and/or a neuro-vascular mechanism for the clinical manifestations of the attacks.

Analgesics may be of help to alleviate pain. Narcotics are contra-indicated for obvious reasons (addiction). Cortisone shortens the duration, severity and frequency of the attacks. Recently reduction in the frequency and severity of these attacks on a low fat diet, and by colchicine was reported.

REDUNDENT LOOP SYNDROME

A redundent loop of the colon occurs in 20 present of normal subjects. It is usually symptomless but may occasionally cause constipation. with or without some abdominal discomfort. Some patients with episodic abdominal pain occurring over periods of years with free intervals, in whom detailed studies and long observation have excluded any organic lesion as well as all the conditions previously mentioned; the only abnormality found was a redundent loop of the colon.

Relation between Redundent Loop and Abdominal Pain

The relation between this redundent loop and the episodic abdominal pain is based on the following findings.

1) The pain starts always at the site of the redundent loop, has a fixed course, lasts one to two days and the patient is completely free inbetween the attacks. This pain occurs most commonly in the sigmoid in more than half the cases. The remaining cases are equally distributed between the splenic flexure, transverse colon and hepatic flexure.

2) The attacks of abdominal pain have the picture of obstructive bowel manifestations in the form of marked abdominal distension, vomiting, absolute constipation and inability to pass flatus.

3) More marked localized distension, localized exaggerated sounds at the site of the loop could always be demonstrated in these patients.

4) Barium enema, done in some patients, during the attacks of pain, demonstrated twisting of the redundant loop, producing partial volvulus. Occasionally after a barium enema, the abdominal pain and distension are relieved with passage of stools and flatus. This occurs also after induction of anaesthesia. When these patients are re-rayed, the twisting of the redundent loop is found to have disappeared.

5) Fixation of the redundent loop surgically is followed by complete diappearance of the attacks of pain.

Precipitating Factors

As the redundant loop is a common finding in subjects without symptoms or only with slight abdominal complaints, it is suggested that in patients with these recurrent episodes of obstructive abdominal pain there occurs an additional factor which precipitates the frequent and recurrent twisting of the redundent loop. This is a storm of colonic dyskinesia which is capable of disturbing the position of the loop and causing its twisting. Thus, those patients with redundant colonic loops who happen to suffer from the syndrome of irritable colon, constitue this group of patients with recurrent episodic abdominal pain (after exclusion of other causes).

As these attacks are usually associated with some fever and are related to stress situations, it is argued that they are of a psychosomatic nature initiated by an autonomic storm of centrogenic origin probably hypothalamic. This is supported by the reduction of the frequency and severity of the attacks in some patients under centrally acting drugs as reserpin, prominal,... etc.

Differential Diagnosis

The clinical features of the attacks as well as the absence of associated chest pain and other clinical signs, differentiate this group from the syndrome of palindromic serositis.

CHAPTER TEN

GASTROENTEROLOGY OF THE AGED

GASTROENTEROLOGY OF THE AGED

ANATOMIC AND PHYSIOLOGIC CHANGES OF NORMAL SENSCENCE

Effects of Age on Body Organs

Anatomy

Physiology : Salivary Glands

Stomach

Small Intestine

Colon

Liver and Gall Bladder

Pancreas

ESOPHAGUS

STOMACH

Gastritis

Peptic Ulceration

GALL BLADDER

COLON

RECTUM

MALIGNANCY OF THE GASTROINTESTINAL TRACT

Carcinoma of Esophagus

Carcinoma of Stomach

Carcinoma of Colon

Carcinoma of Gall Bladder

Carcinoma of Pancreas

CONSTIPATION

DIARRHEA

VASCULAR GASTROINTESTINAL MANIFESTATIONS

Abdominal Angina

Ischaemic Enterocolitis

GASTROENTEROLOGY OR THE AGED

GROWING OLD

Nobody grows old by merely living a number of years. People grow old only by deserting their ideals ... You are young as your self-confidence, old as your despair.

In the central place of every heart, there is a recording chamber, so long as it receives massages of beauty, hope, cheer and courage, so long are you young. When the wires are all down and your heart is covered with the snows of pessimism and the ice of cynicism, then and then only are you grown old.

As the years pass by and the individual gets older and older, the processes of repair cannot go hand in hand with the wear and tear of the usual and normal activities of daily work and existence. Although it has become not uncommon to come across individuals who have passed 100 years, it is getting more frequent to come across individuals who have passed the age of 80 or 90 years.

Old people seem to be more concerned over their gastrointestinal tract and their digestive and excretion activities than the young. Distension, flatulence, belching, constipation and diarrhea in addition to the presence of abdominal sounds and vague sensations of abdominal discomfort are common complaints of these old individuals.

Causes other than gastrointestinal disease or even disturbance of function may be the origin of these complaints. Examples of these are inadequate mastication due to hasty eating, faulty dentures or absent teeth which will allow large particles of food to pass into the intestine. These will stimulate rapid passage because of their bulk, digestive enzymes will not have sufficient time to penetarte these food particles to complete their digestion, consequantly absorption is impaired and food only partly digested and greater in amount than normal will pass into the caecum, and give rise in its turn to colonic and bowel evacuation disturbances.

Allergy, whether recognised by the patient or not, may also contribute to bowel changes and abdominal symptoms in these old people and must always be remembered by the physician dealing with them.

In fact, more than half these old people who present with complaints related to their gastrointestinal tract do not have, after careful medical examination, clinical and otherwise, any organic disease of this system. Their symptoms can be attributed to "functional bowel disturbance". This term includes such diagnoses as, irirtable colon, spastic colitis, mucous colitis, heart burn, belching and nausea.

These old people are particularly prone to cancerphobia.

Another difficulty in them arises in patients with senile depression, a state which will modify the presentation of any disease.

ANATOMIC AND PHYSIOLOGIC CHANGES OF NORMAL SENSCENCE

Age progress itself, without disease affecs the organs of the body in the following way.

1) Gradual tisuse dessication.

2) Gardual retardation of cell division, cell growth and tissue repair.

3) Gradual retardation in the rate of tissue oxidation (basal metabolic rate).

4) Cell atrophy, degeneration and increased cell pigmentation.

5) Gradual impairement of the factors which maintain a fairly constant internal environment for the cells and the tissus, "homeotasis". It is evident that disturbance in any one, or more, of these factors maintaining normal homeostasis will result in deterioration of organs, both anatomically and physiologically.

Anatomy

It is well recognised that up to a certain age, in the absence of disease, the organs of the body tend to increase in weight, then usually comes a period where their weight becomes stationary and then the weight tends to decline. Application of this to all the oragans of the gastrointestinal tract is difficult, as only solid organs, not hollow viscusses can be traced in respect to their changes along the advancing years.

The weight of the pancreas, rises until the age of 20 years to 65 or 70 grams, remains nearly at that level until the age of 40 years when it starts to decline slowly until its weight is around 20 grams only at the age of 80 years.

The liver increases in weight in childhood until it reaches 1500 to 1600 grams at the age of 20 years, it retains at this weight util the age of 40 years, when it starts a slow decline in weight to reach 1000 to 1100 grams at the age of 70 years, after which a rapid decline occurs to reach 800 grams at the age of 85 or 90 years.

Physiology

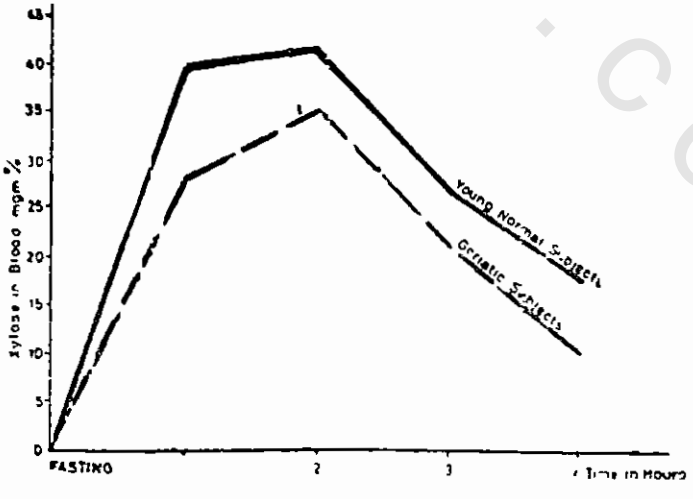
Disturbances in function of the gastrointestinal tract due to the process of ageing are partial. In fact, they do not alone give rise to disease. However, there is reduction in function, this may give rise to sub-clinical manifestations of disease, or predispose the patient easier, to the effects of any super-added disease.

Teeth : It is a common observation that the teeth of old people fall. Falling of teeth in the elderly is suspected to be of an auto-immune nature.

Salivary Glands : There is reduction in the salivary volume,and this saliva is poorer in is ptyalin content. This may help the growth of an aci-duric flora of the mouth which may enhance degeneration of gums and teeth in the old.

Stomach : Until recently the only knowledge of relation of age to stomach functions was the greater incidence of achlorhydria and the gradual diminution of hydrochloric acid with advancement of the years. Going hand in hand with this is the greater incidence of pernicious (Addissonian) anaemia in old age.

Recently, in the Research Centre of Gastroenterology in the Department of Medicine in Alexandria, a thorough study of the gastric secretory activities was carried out. The results showed that in the old, the basal or interdigestive gastric secretion is slightly reduced as regards is volume and slightly weaker as regards its hydrochoric acid concentration. The secretory power of the stomach, reflecting the parietal cell mass, showed a definite reduction, this reduction may be in the parietal cell mass itself or reduction in the maxinal secretory power of each parietal cell due to the process of ageing, with the possibility of associated asyptomatic atrophic gastritis, adding to the reduction in the number of parietal cells. The pepsin also shares in this reduction in the secretory power of the stomach and it is reduced to 2/3 of the normaladults.



Regarding the motor function of the stomach, some disturbance occurs with age, there is reduction in hunger pains which become less frequent and weaker in intenesity and associated with slight delay in emptying.

Small Intestine : Intestinal biopsy points to some atrophy of the mucous membrane. A study of small intestinal absorptive functions in the old was performed in the Geriatric Research Centre of the Department of Medicine in Alexandria, utilizing the xylose absorption-excretion test. This study showed significant reduction in the blood xylose test. The urine xylose test, is much more reduced, down to half the normal. The explanation of the reduced blood xylose levels is by reduced enzymatic cellular activity of the cells of intestinal mucosa in addition to a reduction in the number of absorbing cells as has been demonstrated by histological and histo-chemical studies. A vascular factor may be working due to atheroma of the mesenteric vessels. See figure

Colon : Motility and absorption from the colon remain more or less normal in the old. However, the greater incidence of diverticulosis in them, denote atrophy or decreased tone of the musculature of the colon or diminished elasticity of the connective tissue of the layers of the wall of the colon.

Liver : The liver weight and size steadily fall to even half its normal weight and size. However, liver functions are maintained and are not affected. The changes reported in the livers of the old are reduction of its vitamin C content and the glycogen content of the liver cells with an increase in its fat content.

Electron microscopy studies of the liver cells done in the Geriatric Recearch Centre in Alexandria have shown distended and distroted mitochondria, distended nucleus with the nucleolus shifted to one side. The nucleus contains also some inclusion bodies. Age pigment lipofuscin is also present.

Intra-cellular enzymes are shown to be more active, possibly in an attempt to overcome the reduction in size of the liver with accompanying reduction in number of hepatocytes. This compensation may be the explanation of maintaining more or less normal liver functions in old age taking into consideration its big reserve power.

Gall Bladder : The gall-bladder if not inflamed nor contain stones. It will maintain its normal function in the aged. This is contrary to reports on the gall bladder in non - Egyption elderly.

Pancreas : The functions of the pancreas are exocrine and endocrine. The functions concerned with digestion, as tested by the secretin intravenous test, in the Gastroenterology Research Centre of the Department of Medicine in Alexandria show a reduction in the volume to one third of the normal. The enzyme reduction is selective: amylase and trypsin acivities are reduced to two thirds the normal, while lipase activity remains normal. This reduced pancreatic exocrine functions can be attributed to the age process itself, impairement of vascular supply due to atheroma in addition to the greater incidence of chronic fibrosing pancreatitis favoured by the greater incidence of gall stones in the old. Concerning the endocrine function of the pancreas, the incidence of diabtes mellitus, manifest or chemical, increases with age, up to 80 years and more. This is attributed to deficiency of insulin liberation because of the effect of age on the pancreas in the form of scarring and a chronic fibrosing process in these old people plus the senescent effect itself.

DISEASES OF THE ESOPHAGUS

Caricnoma of the esophagus is the commonest esophageal disease in the aged. It will be discussed later with malignancies of the gastrointestinal tract in the old.

Esophageal Hiatus Hernia

Hiatal hernia in the agd deserves special mention. The type occurring is the esophago-gastric type. The patient pressents with epigastric pain, heart-burn, acid regurgitation and occasional vomiting. Some pateints present with dysphagia or a clinical picture very similar to angina pectoris, from which it can be differentiated by the relation of pain to meals in the case of hernia and to effort in the case of angina. Radiological examination will reveal the hernia. The treatment is medical, small frequent meals of bland non-irritant food to avoid distension of the stomach, alkalies in the form of gel to protect the hernia and anti-cholinrgic drugs to reduce gastric secretion. The patient must also be instructed to sit upright after a meal and to reduce is weight if he is obese.

DISEASES OF THE STOMACH

As mentioned before there is, in the normal old non-dyspeptic, indivdiual some reduction in the gastric secretory power, associated with slight reduction in motility.

Gastritis

The incidence of gastritis in the old is higher than in adults. Although superficial gastritis is equal in all ages, atrophic gastritis is more common in the old than in the young. Surprisingly, however, half of these atrophic gastritic individuals are asymptomatic. The importance of recognition of this lies in the need to supplement these old persons with acid and especially

pepsin to help digestion. If there is suspicion of vitamin B12 deficiency due to intrinsic factor deficiency, it must be administered parenterally every one or two weeks to avoid the occurrence of Addissonian (pernicious) anaemia and sub-acute combined sclerosis of the spinal cord.

Peptic Ulceration

Peptic ulceration of the stomach and duodenum has some important aspects which differ in the old than those of the young. Peptic ulcer, healed or active is found in 12 percent of all autopsies of the old. It accounts for death of more than one third of fatalities due to non-malignant conditions in them.

Another important aspect of peptic ulceration in the old is the high frequency of gastric ulcer in them. In the adult and younger ages the incidence of gastric to duodenal ulcer ranges between 1 to 10 or 15, while in the old an equal incidence has been frequently reported.

Not only do these differences occur between the old and the young as regards peptic ulcer, but the presentation also differs. Often they do not present themselves with the typical ulcer pain, they complain of vague abdominal pain, vomiting, loss of weight and loss of appetite. Some of the patients who have at autopsy large ulcers may not have complained at all of any dyspeptic symptoms. Occasionally the first presentation may be bleeding. The patient suffers first from mental confusion, spills of fainting and anaemia, and until either haematesis or melaena occurs the diagnosis may remain obscure.

The complications of peptic ulcer namely perforation and massive haemorhage are more serious and more dreaded in the old than in the young, as they are often fatal. Massive haemorrhaige accounts for 70 percent of deaths from peptic ulcer above the age of 50 years, and its occurence is 3 times more frequent in patients above 50 years than patients below that age. This is responsible for peak mortality from peptic ulcer in the age group 65 to 96 years. The hazards of peptic ulceration in the old, in addition to massive haemorrhage and perforation lie in the failure of healing due to lowered vitality in these old patients.

The diagnosis of peptic ulcer in the stomach, because of the scarcity and vagueness of clinical manifestations depends a great deal upon radiological and gastroscopic examination, which may have to be repeated. Stools examination for occult blood is also of value provided other sources of blood in the stools are excluded.

Treatment: The treatment of peptic ulceration in the old does not differ from that in the young and good results can be attained by medical treament. The principles of treatment are the same in both, depression of acid gastric secretion by anti-cholinergic drugs, alkalies to neutralise gastric acid, diet and sedation. Constipation, must be avoided and carefull outlook in the complications of medicaton must be carried out. Careful and frequent observation of these old peptic ulcer patients must be done as they rapidly deteriorate and in order to detect the early occurrence of haemorrhage, perforation or pyloric obstruction, as they need urgent management. It must be mentioned here that resortion to sugery in haemorrhage due to peptic ulcer, must be earlier than the young as a delay can be fatal.

In cases of gastric ulcer there is always the fear of the possibility of the ulcer being malignant, thus careful radiological, gastroscopic and exfoliative cytology must be done, in addition medical treatment if tried, should be for 3 to 10 weeks at most, after that, if clinical and radiological improvement are not satisfactory, surgery must be attempted to avoid delay in management of the malignancy before it becomes inoperable.

GALL BLADDER

It seems that age has no effect on the functions of the gall bladder, namely concentration of bile and evacuation as they remain normal. Age, contrary to many beliefs does not cause atrophy of the gall bladder, on the contrary is causes hypertrophy of its musculature. In old age, there is a tendency to sagging of the gall bladder possibly due to loss of its elasticity and loss of fat of the anterior abdominal wall.

Cholecystitis and Cholelethiasis

Gall stones seem to occur more frequently in the old than the young, their occurrence is consequently associated with symptoms of gall baldder dyspepsia, chronic cholecystitis and bouts of acute exacerbations. Between the ages of 60 and 74 years the incidence of gall stones in males is between 6.5 and 11.0 percent, while in females it is higher, as expected; it is between 20-30 percent. The formation of gall stones is primarily due to disturbed cholesterol metabolism with deposition of cholesterol crystals in the gall bladder and, secondarily due to infection resulting from disturbance of function of the gall bladder due to the presence of the stones themselves. Studies on the aged Egyptians show much lower incidences.

Clinical Features : Manifestations of disease of the gall bladder can differ considerably from it in the young. It has been shown that many people who have by radiological examination or on autopsy, gall stones, to have lived their long life without any symptoms ascribed to gall bladder disease. In fact 75 percent of patients with abnormal cholecystograms, have no symptoms related to their gall bladder. In addition manifestations of the disease in the elderly differ from it in the young, namely in its vagueness, the patients complain of upper abdominal discomfort or pain, loss of appetite, eructation, nausea and a feeling of fullness especially after meals. Occasionally however, these elderly patients may present with the typical gall bladder pain

in the right hypochondrium referred to the back, right shoulder or sternum, where in the latter it may be confused with anginal pain. In acute cholecystitis or empyema of the gall bladder, there is rigidity of the right upper abdomen, fever and leucocytosis. These acute attacks usually respond to treatment, but tend to recurr again, with the development of adhesions between the gall bladder and the duodenum.

Treatment : The treament of gall bladder disease should not be based on radiological appearances and restriced only to those pateints presenting with symptoms related to their gall bladders. Medical treatment is the best line of treatment and surgery should only be resorted to in a minority of cases who fail to respond or are liable to repeated attacks of biliary colic with or without jaundice or to attacks of acute cholecystitis or empyema of the gall bladder where cholecystectomy has to be resorted to.

COLON

The incidence of bowel disturbances in the form of constipation or diarrhea in the old will be discussed separately. Besides this disturbance of function in the old there is respectable incidence of diverticulosis which can be considered a frequent condition.

Diverticulosis and Diverticulitis

As much as 20 percent to 33 percent of old people can be proved to have diverticulosis by radiological examination. However, the majority of them; 80 to 90 percent are symptomless and only about 5 to 10 percent develop acute diverticulitis which needs surgical treatment in the form of colostomy. Inflammation of these diverticulae; diverticulitis, presents as pain, tendreness and rigidity of the left iliac fossa. There may be associated diarrhea or constipation. This acute attack may either subsdide, with or without treatment or may proceed to abscess formation, and pelvic peritonitis. The inflammatory process may take a chronic course with the development

of pericolonic fibrosis, which will cause thickening of the wall of the colon and constipation with a palpable mass, a situation very much resembling carcinoma of the colon. The treament of choice is medical by intestinal chemotherepy and anti-biotics in the form phthalylsulphathiazole, oral streptomycin and a bland low-residue diet. If this medical treatment fails, after a period of observation, then colostomy has to be resorted to. The results of colostomy, however are not satisfactory and recurence of inflammation; abscess formation and non-function of the bowel often develop.

RECTUM

Piles

The development of piles in an old individual is very suspicious of malignancy of the colon and must be tackled with great care.

Polyps

A common disease of the rectum in the elderly is the development of rectal polyps. These can be visualised radiologically and confirmed by proctoscopy when a biopsy can be taken. The treatment of this condition is prompt surgical removal for they are considered to be pre-malignant. In addition they are liable to bleed, the bleeding may be profuce and quite distressing to an old individual.

MALIGNANCY OF THE GASTROINTESTINAL TRACT

Malignancy of the gastrointestinal tract is more common in old age than in adults. It accounts for more than one tenth to one sixth of total autopsies and more than 60 percent of malignancies of all organs of the body, thus malignany of the gastrointestinal tract singly represent nearly two thirds of new growth deaths in the old; ages ranging between 65 and over 80 years. Moreover, it is reported that 6 percent of all deaths of old people are due to malignancy of the gastrointestinal tract.

Carcinoma of the Esophagus

This growth is not unusual in old age, and its incidence ranges between 7 and 16 percent of malignancies of the gastrointestinal tract. It is most common in the lower third of the esophagus, less in the middle and rare in the low third. The presentation in the old does not differ than the usual presentation. The patient complains of dysphagia at first to solid foods, this is associated with marked loss of weight. Clinical signs are not common unless there are secondaries in the liver or enlargement of lymph nodes. Cancer of the middle of the esophagus may lead to bronchial irriation with cough, later, pressure on a bronchus may simulate bronchogenic carcinoma or a mediastinal mass with lung collapse and other pressure symptoms. Diagnosis is by radiology and gastroscopy which will also allow taking a biopsy from the swelling. The treatment is surgical after building up the general condition of the patient. Gastrostomy is not recommended as it only adds to the discomfort of the patient.

Carcinoma of the Stomach

Carcinoma of the stomach is common between the ages of 65 and 75 years. It is the commonest type of gastrointestinal carcinoma; it represents nearly one third of them. Its incidence in old females is must higher than in young females. It is situated on the lesser curvature near the pylorus and it may present with symptoms of pyloric obstruction. When situated in the body of the stomach it will take the form of a fungating, ulcerating mass, presenting usually with haematemesis. A third type is the infiltrating type; leather bottel type. This disease presents with vague dyspepsia for some time, but the symptom which should draw the attention of the pyhsician to this disease is the marked and prominant loss of appetite, and the patient is very resistant and obstinate to the intake of any type of food. Later, vomiting, reguritation and haematemesis may occur. Hypochromic anaemia is present in addition to the loss of weight. Pain of carcinoma of the stomach is usually in the epigastrium, but may radiate to the back, one must be careful, because often the pain occurs after meals and there is no loss of appetite

yet, a condition easily confused with peptic ulceration. The confusion between a peptic ulcer and a malignant ulcer in the old is a frequent and dreaded problem and must be carefully cleared by all means including gastriscopy, exfoliative cytology and biopsy. Later when secondaries develop, jaundice (posthepatic conjugated bilirubin type), an abdominal mass, enlargement of lymph nodes and ascites will develop. Management of this disease is surgical, by total gastrectomy, which may be either curative or palliative. The prognosis is poor in these old patients, because the diagnosis is done usually late and because of their bad general condition. Medical treament is only symptomatic, correction of anaemia by oral or parenteral iron, correction of the nausea and vomiting by chlorpromazine, later the pain may need morphia or pethidine for its alleviation. Chemotherapy with the use of 5 — Flouro - uracil has opened some hope for prolongation of the life of these patients.

Carcinoma of the Colon

Carcinoma of the colon is also very common it is as frequent as carcinoma of the stomach and represents more than one fourth up to half of all gastrointestinal malignancies. The commonest sites are the rectum, the sigmoid, the caecum and the ascending colon, in this rate of frequency. Carcinoma of the rectum, usually gives rise to structure and manifestations of obstruction, and is associated with piles, one must be very suspicuous about piles in old indiveduals and a carefull rectal examination including proctoscopy, sigmoidoscopy, barium enema and biopsy must be done. Carcinoma of the sigmoid, descending colon and rectum are characterised by bowel disturbances, there is constipation with bouts of diarrhea. Constipation which is resistant to treatment and associated with abdominal distension and borborygmi is a late occurrence and is very suggestive of this condition. The stools if they conatin pus, mucus or blood, denote ulceration of the growth. Carcinoma of the rectum, in addition to causing obstructive manifestations, will give rise to piles, in fact this is a very important indication of malignancy occurring in this organ. Carcinoma of the

caecum may remain symptomless for a fairly long time, as it is one of the silent areas of the abdomen. These patients have a hypochromic anaemia and present with manifestations of toxaemia due to ulceration. Thus, carcinoma of this part of the colon, and the ascending colon, in fact present with general symptoms; anaemia, toxaemia and loos of weight, before any local manifestations occur, which may be a palpable mass in the right side of the abdomen which persists after an enema. The treatment of carcinoma of the colon is surgical resection. One must not be afraid, on the contrary an aggressive attitude towards these growths, by complete resection may be of great benefit to the patient. A colostomy may sometimes be needed before this resection. It the malignancy is inoperable, the best drug to be given is opium as it will control both the pain and diarrhea. Strong purgation must be avoided from fear of rupture of the bowel.

Carcinoma of the Gall Bladder

This also is a not uncommon carcinoma occuring in the old, it accounts for about 16 percent of all malignancies of the gastrointestinal tract in the aged. It is probable that chronic cholecystitis with calculi predispose to this disease. The patients complain of epigastric and right hypochondriac pain which gradually increases in severity and becomes constant, and is associated with obstructive jaundice and fever. If the condition is discovered early, which is not the usual case, surgical treatment may be of benefit, however, as most of them are diagnosed late, only symptomatic treatment can be done.

Carcinoma of the Pancreas

This accounts for about 10 percent of all malignancies of the gastrointestinal tract in the aged. It is also one of the conditions which unfortunately connot be diagnosed except late and when operative treatment cannot be attempted. These patients present with obstructive jaundice, there may be epigastric pain, continuous and dull aching in character and sometimes radiating to the back.

CONTIPATION

This complaint can become a source of worry to many old people, so much so, that their concentration on their bowel movements becomes an obsession, unless they pass at least one loose motion, they are not happy. This will make many an old individual resort to purgation.

Causes

The cause of constipation, in the old was thought to be atony of the colon, due to degeneration of the posterior columns of the spinal cord which conduct afferent impulses to the defoecation centre in the brain. This factor although working is now not considered to have a main role in the production of constipation. Other factors such as reduced intake of food and fluids, defective mastication as a result of loss of teeth or badly fitting dentures, reduced physical activity, irregular bowel habits and the prolonged and uncontrolled use of laxatives, all these share in the development of constipation.

Constipation perse may give rise to no symptoms at all but it may cause headache, abdominal discomfort and distension, nausea and loss of appetite. In these old people, especially when weak or bed-ridden constipation may remain for many days, the result will be the accumulation of a big bulk of dry stools which is impacted in the rectum and causes great difficulty in its removal. This obstructing impacted mass of dry stools will give rise to manifestations of intestinal obstruction, and its removal is necessary before any accurate diagnosis of an abdominal lesion can be made.

Treatment

Treatment of constipation must aim at restoration of normal bowel action. This can be done by non-confinement to bed, physical activity and increasing the amount of vegetables, fruits and fluid in the diet. Regular bowel habbits is also of great importance. Sometimes these patients may be receiving drugs for other conditions which may inhibit bowel movements.

such as codiene, reserpine, a ganglion blocker. or a belladonna derivative or equivalent. Thus, it is a good routine to look into other medicines the patient may be receiving A useful drug to help these patients is a senna preparation.

DIARRHEA

Occasionally bouts of diarrhea occur in old people.

Causes

The cause of diarrhea may be excessive laxation or due to an organic disease. Diarrhea may result from bacterial infection due to salmonella or dysentry. It may be due to malignancy of the colon or stomach, diverticulitis and during cerebral vascular accidents.

Careful clinical, laboratory, sigmoidoscopic and radiological examination must be done to reach a diagnosis of the cause.

Treatment

In some instances no disease could be diagnosed and the treatment must be symptomatic, in the form of tincture opii (10 drops) or codeine. It is sometimes of benefit to give them a course of succinylsulphathiazole for three or four days, to be repeated every two or three weeks, the addition of oral streptomycin to it may raise its benefit. Yougort is also of benefit to these old diarrheoic patients, it beneficially affects the bacterial flora and is of a high nutritious value at the same time.

VASCULAR GASTROINTESTINAL MANIFESTATIONS

Old people are liable to develop atheroma of their vascular tree. This as it affects many vessels of the body, affects also the mesenteric vessels, resulting in their narrowing. This narrowing may give rise to either "abdominal anigna" or "mesenteric occlusion" with infarction of segments of the intestines.

Abdominal Angina

The patient with abdominal angina complains of abdominal pain usually around the umbilicus which is either cramping or constricting in nature and occurring a short time after meals. The mechanism of this pain is ichaemic and occurs after meals when there is more demand for blood on the part of the intestines, the vessels are unable to dilate, this will result in ischaemia of the intestines. The treatment of this condition is to avoid heavy meals and feed the patient on small frequent meals which are easily digested thus avoiding throwing an additional load on the arleady ischaemic intestines.

Mesenteric Occlusion

The second vascular condition is occlusion of one of the branches of the mesenteric arteries the condition is termed "ischaemic enterocolitis" . This will give rise to infarction of a segment of the small intestine. The patient will complain of severe abdominal pain, usually around the umbilicus, the pain increases in severity over hours. If the condition proceeds to gangrene, there will be all the manifestations of peritonitis. The treatment of this condition, once gangrene has set in, is surgical by resection of this segment. Mild forms especially when there is no infection, recover on treatment,.

Diagnosis

The diagnosis of narrowing and atherema of the mesenteric arsteries of the coeliac axis itself can be done by angiography. Radiology of the colon by barium meal reveal a typical appearance. For details of this condition, the reader is referred to "ischaemic entero-colitis" in the chapter on "Diseases of the Colon"

MALABSORPTION

Causes

Malabsorption in the elderly can be caused by the following causes.

1. Complication of Partial Gastrectomy : This will present as iron deficiency anaemia, pernicious (vitamin B_{12} deficincy or megaloblastic) anaemia. Postgastrectomy osteomalacia also occurs. The treatment is parenteral Vitamin B_{12} and calcium administration.

2. The Blind Loop Syndrome : In this condition there is consumption of substances essential for the elderly by an abnormal intestinal flora. This usually occurs after some operative procedures, gastrojejunocolic fistulae or jejunal diverticulosis. The abnormal flora may be colonic bacteria. The treatment is giving the proper antibiotic.

3. Radiation induced malabsarption.

4. After operations Removing Large Parts of the Intestines : The type and extent of malabsorption depend upon the length of the removed part and its site. Resections of the lower ileum will lead to vitamin B_{12} deficiency while jejunal resection will lead to folic acid, iron and protein deficiency. The treament is parenteral supplementation.

5. Idiopathic Steatorrhea : This type of malabsorption is due to the ageing process, possibly more accentuated than normal, leading to attenuation, shortening and broadening of the villi with associated diminished function of intracellular enzymes. This will result in deficiency of minerels as iron, calcuim, phosphorus and potassium, also vitamins as folic acid, vitamin B_{12} pyridoxin and thiamine. Deficiency of proteins may result in loss of weight, loss of energy and edema due to hypoproteinaemia. The treatment is parenteral supplementation. Gluten free diet should be tried.

CHAPTER ELEVEN

GASTROINTESTINAL ENDOCRINE INTER-RELATIONS

GASTROINTESTINAL ENDOCRINE INTER-RELATIONS

THE PITUITARY BODY

- Anterior Lobe
  - Hypopituitarism
    - Similarty to Anorexia Nervosa
  - Hyperpituitarism
- Posterior Lobe
  - Diabetes Insipidus

THE THYROID GLAND

- Hyperthyroidism
- Hypothyroidism

THE PARATHYROID GLANDS

- Hypoparathyroidism

THE ADRENAL CORTEX

- Hypocorticalism
- Conn's Syndrome (hyperaldosteronism)
- Cushing's Syndrome

THE ADRENAL MEDULIA

- Pheochromocytoma

THE GONADS

- Relation to Cirrhosis of Liver
- Methyl Testerone and Cholestatic Jaundice

THE PANCREATIC ISLETS

Haemochromatosis

Diabetes Mellitus

Hyperinsulinism

Hypoglycaemia

Zollinger-Ellison Syndrome

GASTROINTESTINAL ENDOCRINE INTER-RELATIONS

By definition, a hormone is a substance secreted by a gland to influence the functions of distant parts of the body. It is not surprising, therefore, that the endocrine system has got far reaching effects in the body. Its main domain of action is on the developmental and metabolic functions of the organism as a whole causing their initiation, integration and control; but, next to this influence comes its effects on, and relation to, two major systems of the organism, viz : the cardiovacular system and the gastrointestinal (digestive) system. It should not be forgotten that there is also an embryological relation between the gastrointestinal tract and the endocrines in as much as the anterior pitutary lobe and the thyroid gland actually develop from the primitive foregut.

These are the reasons why a separate discussion of the relations between the endocrine system and gastrointestinal tract is needed.

1. The relation between these two systems can appear in various forms. Thus, diseases and disorders of endocrine glands invariably produce definite structural or functional changes in gastrointestinal organs.

2. Similarly, but less commonly, we can find endocrine disorders resulting from gastrointestinal disease.

3. Thridly. it is very common for endocrine disorders to manifest themselves by gastrointestinal symptoms among their other symptoms. This may even be a cardinal presenting feature and it is important to remember, as it may lead to erroneous diagnosis and at least unecessarily delay the treatment. To illustrate that, one can mention the relentless diarrhea of some hyperthyroid patients, that may go on for a long time, with the patient receiving various remedies, only to respond promptly on institution of the correct antithyroid therapy.

The relations of the digestive system to each of the endocrine glands will now be discussed separately.

THE PITUITARY BODY

Among the endocrine glands the one most, intimately and clearly related to the gastrointestinal tract is the pituitary, because of its widespread and varied activities in the body and on its metabolism.

The Anterior Lobe and its Relation to the Function of the Gastrointestinal Tract

The anterior lobe of the pituitary is related, through its various hormones, to : a) The development of the gastrointestinal organs, b) Secretions particularly that of pepsin, and c) The metabolism especially of fat and carbohydrate.

Starvation and inanition diminish the capacity of the pituitatry to produce its hormones and the traget organs controlled by these can thus be affected. The pituitary trophic hormones are particularly susceptible to this inhibitory influence. The pituitary hormones are composed of protein and it is reasonable to expect nutritional defects to interfere with their formation. This adequately explains the instances of infantilism encountered in patients with severe and prolonged nutritional and gastrointestinal disease in certain endemic areas, for example in schistosomiasis, intestinal parasitic infestations, hepatic cirrhosis, steatorrhea and other intestinal and liver diseases, especially if they occur during childhood.

Similarly, a state of severe collapse or toxaemia especially if associated with haemorrhage, as occurs in severe acute gastroenteritis and in profuse gastrointestinal bleedings, can affect the pituitary by necrotic or atrophic changes leading to the picture of panhypopituitarism.

Anorexia Nervosa

Anorexia nervosa presents by a symptomatology closely simulating pituitary and gonadal disease. The starvation consequent on marked loss of appetite, and possibly also the emotional disturbance (acting via the hypo-

thalamus) result in widespread endocrine and metabolic dysfunction. The resulting picture superficially resembles panhypopituitarism. Thus, the patients present with amenorrhea (or impotence), wasting, atrophy of breasts, lassitude, sensitivity to cold, anaemia and lack of interest and energy. However, in panhypopituitarism, marked endocrine and metabolic abnormalities can always be demonstrated such as loss of hair, marked breast atrophy, myxedmatous skin changes, hypoglycaemia, absent gonadotrophins in blood and urine, low ketosteroids and electrolyte disturbances. The prompt response of these cases to substitution therapy is also characteristic.

Hyperpituitarism, Acromegaly and Gigantism

Hyperfunction of the pituitary on the other hand produces splanchnomegaly, proportionate to the body in gigantism and disproportionate in acromegaly. There is increase in liver size and fat deposition, increased length and thickness of the intestine, palpable spleen and hypertrophy of the tongue which leads to thick speech and difficulty in mastication and deglutition. The excessive secretion of ACTH stimulates the secretion of pepsin and acid by the stomach and may lead to appearance or activation of a peptic ulcer. This may be analogous to the "Cushing's ulcers" of burns and the alarm reaction.

The Posterior Lobe and its Relation to the Function of the Gastrointestinal Tract

The posterior lobe of the pituitary is related to the secretion, motility and vasomotor tone of the gastrointestinal tract. Hypothalamic. stalk and posterior pituitary leisons experimentally, produce disturbances of intestinal motility and ulcerations of the esophagus, stomach and duodenum, Pitressin injections produces abdominal cramps, and posterior lobe extract produces increased peristalsis in the ileum and colon, hence it is used in ileus and for preparation for radiodiagnostic abdominal procuderes. Large doses can

produce contraction of bile ducts. Yet, we have nc definite evidence of clinical posterior hyperpituitarism or of any clinical state produced by it. Posterior lobe insufficiency (with diabetes insipidus) leads to thirst, dehydration and constipation.

The relation between the posterior pituitary and gastroduodenal ulceration has long been debated with contradicting evidence. Posterior pituitary extracts inhibit gastric secretion, but repeated pitressin injections leads to erosions or ulcers in the stomach and duodenum and even perforation. This is possibly due to its vasoconstricting influence. In diabetes insipidus there is increased volume and acidity of gastric secretion.

To sum up this relation

a) Excessive function of the posterior pituitary leads to inhibition of secretion but increased vasopressor action results in eresions, ulcers or perforation.

b) Hypofunction produces increase in volume and acidity of gastric secretion and may lead to ulceration of gastriduodenal mucosa in this way.

THE THYROID GLAND

Among the many actions of the thyroid hormone, it controls the rate of cellular metabolism and the response of the organs to the autonomic system. It can, therefore, affect the gastrointestinal function profoundly. Thyroidectomy results in diminished secretory and contractile functions and v.v. Also the metabolic liver functions are affected by increase or decrease of thyroid hormone.

The salivary glands and to some extent the gastric mucosa have an iodide-concentrating mechanism similar to that of the thyroid gland, without formation of thyroid hormone. This salivary iodide concentration and secretion is utilised in thyroid function tests.

The thyroid gland embryonically develops from the foregut along the thyroglossal duct, and the persistance of "ectopic" thyroid tissue along that course, anywhere between the site of the normal gland and the base of the tongue, should not be overlooked, nor the fact that it may share with the thyroid gland its specific diseases.

An important aspect of the diagnosis of gastrointestinal disease in relation to the thyroid is encountered when methods utilising organic iodides have to be used, e. g. cholecystography. These interfere for a long time with some thyroid function tests. Therefore the thyroid function must be settled first to avoid later confusion.

Hyperthyroidism

Here, catabolism predominates over anabolic processes, leading to an increased appetite and food intake, yet with loss of weight. This is a typical and often presenting symptom but not invariably, as many cases of hyperthyroidism have anorexia, either perisitently or in bouts. This is particularly true in severe cases and in approaching or actual crsis. Other gastrointestinal symptoms may be encountered such as dryness of the mouth due to diminished salivary volume, hypo or achlorhydria with indigestion (responding to antithyroid treatment), splanchnomegaly especially with increased liver and pancreatic size, nausea and vomiting in thyroid crises and even acute abdominal pain requiring diagnostic attention. Irregularities of bowel action are very common, usually taking the form of recurrent persistant diarrhea, but in early cases, with marked asthenia, there may be atonic constipation. The diarrhea is due to excessive gastrcintestinal motility, increased parasympathetic activity and also possibly hypochlorhydria.

Hypothyroidism

The diminished cellular metabolic activities results in generalised slowing of function. In the gastrointestinal tract there is anorexia, dryness of mouth and throat, achlorhydria and diminished intestinal secretions due to

mucosal atrophy, and colonic atony with distension, tympanitis and constipation. Malabsorption of glucose and fat occurs. The thining and diminished vascularity of intestinal villi and reduction of enzyne activity of the mucosal cells romally responsible for the absorption and transfer of nutrients has been demonstrated. In marked and neglected cases, even ascites develops. The big tongue in cretinism with diminished salivation interfere with swallowing and speech. Diencephalic and vagal agitation may contribute to gastroduodenal ulceration.

Hashimoto's disease is now recognised as an autoimmune disease. Antibodies demonstrated in this disease were demonstrated to be active also against the pareital cells of the stomach in cases of chronic atrophic gastritis with or without pernicious anaemia.

THE PARATHYROID GLANDS

The effect of altered parathyroid function on the gastrointestinal tract is medaited by the level of blood calcium, this acts on the gastrointestinal motility.

Hypoparathyroidism

Hypoparathyroidism, by hypocalcaemia causes increased irritability of the gastrointestinal tract. This leads to vomiting, migratory abdominal pains with hyperperistalsis and alternating constipation and diarrhea. Chronic diarrhea and steatorrhea are features of hypoparathyroidism. In tetanic crises esophageal spasm cause dysphgia. Chronic hypocalcaemia during growth affects dentition and the integrity of the teeth.

Hyperparathyroidism

Hypercalcaemia can cause anorexia, nausea, vomiting and constipation. It may also be a factor in the causation of some cases of pancreatic disease like acute pancreatitis, pancreatic lithiasis and relapsing pancreatitis. All

these can occur with or without the presence of bone involvement or renal calcinosis. Peptic ulceration has been reported in from 8 to 24 percent of cases of hyperparathyroidism. For these manifestations this disease is termed "stones, bones and abdominal groans".

As regards the etiology of the hypercalcaemia, other than primary hyperparathyroidism, it can be encountered from excessive ingestion of milk and soluble alkalies (the milk-alkali syndrome) as for instance during the treatment of dyspepsias and peptic ulceration. This should, therefore, be remembered as a cause of anorexia, nausea, ... etc., and renal clacinosis, it is to be differentiated from hyperparathyroidism.

THE ADRENAL CORTEX

The glucocorticoids exert an effect on carbohydrate, fat, protein and calcium metabolism. Aldosterone exerts its effect on calcium and potassium. Both glucocorticoids and aldosterone have definite effects on gastrointestinal functions.

Addison's Disease

Hypo-adrenalism (hypocorticalism) in its early stages is often difficult to diagnose and it may for a long time mascarade under various gastrointestinal symptoms. There is often anorexia or perverted appetite, nausea, vomiting and diarrhea. Aggravation or rapid appearance of these symptoms may herald the onset of crises. Morning nausea, like that of pregnancy is often complained of. There is also retching, abdominal pain, hiccup, distension, salt craving and vomiting with abdominal distension, similarity to acute abdomen may in fact by very close. The patients are very sensitive to laxatives and they may even precipitate crises. Glucose absorption is poor and this leads to hypoglycaemia. Hypochlorhydria is a common finding.

The alarm reaction and adaptation syndrome of Selye is associated with exhaustion of suprarenal cortical function, and serious gastrointestinal disturbances occur in this condition. These may occur as gastrointestinal ulce-

rations as in extensive burns; vomiting, diarrhea and abdominal pains in Waterhouse-Friederichsen syndrome; and acute pancreaitis. The appendix contains abundant lymphoid tissue and its sudden disintegration during this syndrome or with the excessive administration of corticosteroids may lead to acute appendicitis.

The use of corticosteroids in acute inflammatory abdominal disease is a matter for very delicate judgement. They are often life-saving but should be considered with great reluctence and care since their anti-inflammatory and immmuno-suppressive actions may be deleterious in causing spread of disease. In addition patients on corticosteroid therapy may develop perforation in a peptic ulcer or typhoid ulcer without producing pain.

Conn's Syndrome (hyperaldosteronism)

This syndrome may lead to intestinal atony due to hypokalaemia. Conversely, estimations of aldosterone have shown high values in patients with cirrhosis of the liver, probably due to its defective inactivation in the diseased liver and its increased production in patients with ascites. This finding may be related to the musuclar asthenia present in these patients.

Cushing's Syndrome

Hypercorticalism may present with abdominal symptoms arising from the presence of a large tumour or renal colic. Peptic ulcer may also be present although it is doubted whether its incidence in Cushing's syndrome is greater than in the general population.

THE ADRENAL MEDULLA

Among its various and widespread actions, epinephrin affects the gastrointestinal organs and their functions. It causes stimulation of gastrointestinal sphincteric action and inhibition of the gastric and intestinal tone and motility. Other than being a side effect of large or repeated doses of the drug, these effects have no actual clinical significance.

Pheochromocytoma

In cases of pheochromocytoma, some of these effects may be noted as well as haemorrhage into the lumen of the gastrointestinal tract. Constipation is a common symptom in pheochromocytoma. Megacolon is reported in a small number of cases.

THE GONADS

The development and normal functions of the reproductive system is dependent on adequate nutrition. Malnutrition or starvation has been demonstrated to reduce gonadal functions.

Following the secretion of the sex hormones by the ovaries, testicles and adrenals they undergo metabolic changes in the liver. Estrogens are removed from the circulation, inactivated by metabolic degradation, conjugation with glucoronic and sulfuric acid which are excreted in the urine. The liver may occasionally convert estrogens into more potent preparations as estrone or estradiol. In the presence of liver disease these functions are impaired with the development of hyper-estrogenaemia with its subsequent clinical manifestations as gynaecomastia in males and amenorrhea in females. Progesterone is also metabolised by the liver, it is reduced into pregnandiol and other inactive metabolites. These are conjugated with glucuronic acid passed into the circulation and excreted in the urine. The liver also converts the testicular hormone (testesterone) by certain enzymes to androgen metabolites and conjugates it to produce water soluble compounds, which are partly excreted in bile (as estrogens).

Gastrointestinal Manifestations Related to the Gonads

Gastrointestinal symptoms commonly take place during the premenstrual period, pregnancy and the climacteric. These are flatulence, diarrhea and rectal and lower abdominal fullness, pain and tenderness. They are due to

pelvic congestion either due to hormonal disturbance as estrogen-progesterone imbalance, rise and fall of chorionic gonadotrophin in pregnancy, of reflex autonomic irritability from pelvic congestion. Functional disturbances of the bowel are aggravated by the menopause. Similar symptoms take place in endometriosis. The therapeutic use of estrogen and ovulatory suppressants also cause nausea.

The oral tissues are also susceptible to the actions of sex hormones and congestion of these tissus with hypertrophy of the gums and oral structures up to bleeding occurs during puberty and in pregnancy.

In the male child descent of the testicles, spontaneously or during treatment of cryptorchidism sometimes causes abdominal pain.

Liver Disease and Gonads

Parenchymatous liver diseases and cirrhosis in their advanced stages are associated with symptoms and signs of hyperestrogenism such as amenorrhea and irregular uterine bleeding in females and malar flushing, loss of hair, gynaecomastia and testicular atrophy in males. It is generally agreed upon that the cause of these changes is deficient conjugation of estrogens. Although direct proof is still lacking, there is evidence of increased estrogen secretion in these patients.

Cholestatic Jaundice

The administration of methyl testostreone has frequently resulted in the production of a cholestatic type of jaundice.

THE PANCREATIC ISLETS

The pancreas is an important gastrointestinal organ by reason of its digestive exocrine secretion. Yet, its endocrine function is completely independant and equally important. Any effects of this function on other gastrointestinal functions and organs is not due to its anatomical relation to them but must be mediated through the general metabolic actions of its hormones.

Haemochromatosis (haemosederosis)

Removal or diffuse destructive disease of the pancreas results in diabetes mellitus. Haemosiderin deposition in haemochromatosis destroys functional pancreatic tissue and leads to "bronzed" diabetes, pancreatic digestive insufficiency, cirrhosis of the liver and testicular atrophy due to infiltration if all these organs. Thus a mixture of digestive and endocrine disturbances co-exist.

Diabetes Mellitus

Diabetes mellitus usually presents with symptoms of excessive thirst (with polyuria), dryness of the mouth, excessive appetite (with loss of weight and strength) and often constipation. Other gastrointestinal symptoms may complicate or even dominate the clinical picture. Thus achlorhydria, abdominal pains especially with onest of acidosis or during hypoglycaemia episodes and bouts of diarrhea probably dependent on autonomic imbalance and occur at night (nocturnal diarrhea) may all occur.

Changes in the liver and progressive disturbances in liver functions can also happen, commonly in the form of palpable fatty liver but cirrhosis and hepatic functional impairement can subsequently develop, though very rarely. The disturbed lipid metabolism is held responsible for these changes. Similarly, the hypercholesterolaemia so commonly observed in diabetics leads to the frequent association of gall bladder disease and cholelithiasis.

Hyperinsulinism

Gastrointestinal symptoms are prominent among the symptomatology of any form of hypoglycaaemia. There is severe hunger with epigastric pain (from increased gastric motility), and nausea. These symptoms respond rapidly to the administration of glucose or intake of food. Severe insulin overdosage can produce gastric erosions.

Hypoglycaemia results from various endocrine diseases, namely excessive insulin administration, dysinsulinism in the prediabetic phase, islet beta cell tumours, panhypopituitarism, Addison's disease and myxedema. It can also happen in advanced diffuse liver disease, glycogen storage disease and in the post-gastrectomy syndrome and other gastrointestinal shunting lesions and malabsorption diseases.

Zollinger - Ellison Syndrome

Glucagon excreted by the alpha cells of the islets of Langerhan's has a gastric acid stimulating effect. However, no clinical importance is attached to it. Hyperseretion of a glucagon-like hormone may be responsible for the Zollinger-Ellison syndrome. This hormone has a gastrin-like effect responsible for the excessive hyper-acidity and duodenal ulceration . Asimilar hormone secreted also by the alpha cells is sesponsible for the incessant diarrhea of this syndrome.

CHAPTER TWELVE

GASTROINTESTINAL MANIFESTTATIONS OF CARDIOVASCULAR DISEASE

GASTROINTESTINAL MANIFESTATIONS OF CARDIOVASCULAR DISEASE

HEART DISEASE

Hepatic Manifestations
Gastric and Intestinal Manifestations
Heart in Haemochromatosis

VASCULAR DISEASE

Aneurysm of Aorta
Abdominal Angina
Polyarteritis Nodosa
Occlusion of Hepatic Veins (Chiari)
Hypertension and Cirrhosis of Liver
Arteriovenous Anastomosis in Gastric Submucosa
Ulcer Treatment and Coronary Sclerosis
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GASTROINTESTINAL DISEASES SIMULATING HEART DISEASE

Esophageal Hiatal Hernia
Esophageal Spasm
Esophageal Diverticulum
Peptic Ulcer
Acute Abdomen

GASTROINTESTINAL MANIFESTATIONS OF CARDIOVASCULAR DISEASE

Many conditions of the cardoivascular system have gastrointestinal manifestations. This chapter will be concerned with those conditions which have their primary origin in the cardiovascular system. A brief discussion such as this must be limited by ommiting certain related conditions. Some omitted from these are conditions which are cardiovascular in origin and have abdominal symptoms unrelated to the gastrointestinal tract but may be confusing diagnostically, such as angina pectoris with pain referred to the epigastrium. Other conditions not included here are originating in the gastrointestinal tract and causing circulatory changes, an example of this is a serotonin-producing carcinoid tumour.

It should be emphasized that by far the majority of these cardiovascular effects on the gastrointestinal tract are the simple result of altered blood flow to or from the organ and that the resulting symptoms are not diagnostic of the etiology of the cardiovascular disease.

In the differential diagnosis of gastrointestinal disease, circulatory disturbances either local or general must be considered as capable of producing or modifying the various syndromes.

It is also important to remember that drugs commonly used in the treatment of cardiovascular disease may be important causes of gastrointestinal disturbances.

HEART DISEASE

Almost all pure cardiac disease effect their changes through the common mechanism of congestive failure which affects all of the abdominal organs.

Hepatic Manifestations

Cardiac decompensation is accompanied by a rise of the right atrial pressure. This increase is transmitted into the inferior vena cava and into

the hepatic veins which empty into the inferior vena cava very close to its termination in the right atrium. Congestion of the hepatic veis impairs normal oxygen transport to the hepat.c cells themselves. Decreased cardiac output may also diminish the oxygen supply coming to the liver by way of the hepatic arterial system and the portal radicals. This injury is most in the central portion of the lobule since the oxygen concentration gradient extend from the periphery to the center of the lobule.

Pathology : The gross appearance of the liver in congestive failure is characteristic. The liver is usually enlarged, purple, and its margins are rounded. A cut surface shows markec engorgment of the central veins and the peripheral portions of the lobule yellowish as the result of fatty degeneration. This speckled or mottled appearance is the classic "nutmeg" liver.

Histologically the picture varies according to the duration and severity of the congestive failure. The central vein is dilated and the tributary sinusoids engorged. The hepatic cells are atrophic in the central portions of the lobule, more normal near the portal radicles. Bile thrombi in the periportal zone may be seen. Fibrous tissuse proliferation begins in the zone surrounding the central vein. If there has been long-standing failure, the fibrous proliferation may proceed to the point where central lobules are joined together and the portal region remains as a normal island. This is the reverse of the picture seen in Laennec's cirrhosis. Necrosis of the central lobular liver cells is more marked in those conditions associated with increased right atrial pressure. Haemorrhages in the central zone are also more severe in these conditions. Improvement in the congestive failure results in a partial reversal of the alterations, but failure over a period of weeks or months usually produces irreversible changes.

Clinical Picture : Hepatic affection in congestive heart failure presents itself in many symptoms and clinical signs.

Symptoms

1. Pain in the Right Hypochondrium and Epigastrium : This pain is the result of congestion of the liver with stretch of its capsule. After repeated episodes of cardiac decompensation, the capsule may become so stretched that pain is no longer produced by subsequent swellings.
2. Jaundice : Jaundice in cardiac decompensation is usually mild and is fairly common. The factors responsible are haemolysis in an area of infarction (pulmonary or cardiac), impaired function of the hypoxic liver cell leading to its inability to take-up or conjugate bilirubin in addition to an intra-hepatic cholestatic factor. Jaundice is deeper in cases of mitral stenosis associated with pulmonary infarction.
3. Loss of Weight : This is a complication of long standing congestive heart failure and severe mitral stenosis. The factors responsible for loss of weight are
   i. Failure of the anabolic functions of the liver.
   ii. Anorexia. This is due to the low sodium diet imposed on these patients, digitalis and potassium supplements used in conjunction with diureties.
   iii. Abdominal pain and discomfort induced by eating due to the congested stomach, intestine and liver.
   iv. Protein-losing enteropathy from the congested edematous intestines and cirrhosis of the liver with distended lymphatics in its wall.
   v. Sense of Fullness : This occurs after a small meal as the result of the crowding of the abdomen being overfull by the congested liver, ascites and gas-filled intestines.

Clinical Signs

On clinical examination the following clinical signs may be elicited.

1. The Liver : The liver shows the following.

   i. Enlargement (down to the umbilicus in some cases).

   ii. Soft in consistency in the early cases, later it becomes firm.

   iii. Expansile pulsations with a hepato-jugular reflux and a positive type of venous cervical pulsations occurs with tricuspid incompetence.

   iv Tender.

   v. The surface is smooth in early cases but later with cirrhosis it becomes irregular.

2 Ascites : Some degree of ascites is a frequent accompaniment of congestive heart failure and severe mitral stenosis. The mechanism impairement of function of the liver cell due to hypoxia interfering with protein synthesis. Greater amounts of ascites occur with the advent of cardiac cirrhosis.

Laboratory Findings

These are rarely of clinical aid.

1. Serum bilirubin values are commonly elevated but clinically manifest jaundice is uncommon. The values usually full within the range of 1 to 3 mg per 100 ml but occasionally values comparable to those observed in severe obstructive jaundice are obtained. In general, the level of the serum bilirubin is proportional to the severity and chronicity of the failure.

2. Bromosulphalein retention may be moderately elevated and this test also parallels quantitatively the severity of the liver cell damage.

Gastric and Intestinal Manifestations

The stomach, intestines and pancreas participate in the general congestion and edema involving the abdominal organs. Anoxia is also present to some exent and can affect their function. These factors may reduce gastric and pancreatic secretion and alter absorption from the small intestines.

Anorexia, nausea flatulence and altered bowel habit may be caused partly by these mechanisms. They disappear or are diminished by successful treatment of the failure, only to recur with the reappearance of cardiac insufficiency.

Cardiac Drugs and the Gastrointestinal Tract

Certain drugs used in the management of congestive failure may produce gastrointestinal symptoms that are difficult to differentiate from those of failure itself.

1. Digitalis : Digitalis, because of its almost universal use in failure, is probably the most frequent offender. Overdosage is characterized by anorexia, nausea, vomiting and occasionally diarrhea. The insidious appearance of the early symptoms of nausea and anorexia may be overlooked or attributed to hepatic congestion, edema of the gut or to some other medication recently added to the therapeutic regimen. This is particualrly frequent when effective diuresis is established by the chlorthiazides in the presence of dietary salt restricition. Digitalis leaf and digitoxin because of their prolonged cumulative action, are most commonly implicated. Therapy consists in stopping administration of the drug.

2. *Ammonium Chloride* : Ammonium chloride is used as an adjunct in diuretic regimens. It may cause nausea and headache.

3. *Potassium Chloride* : Potassium chloride used in conjunction with diuretics causes digestive upsets and occasionally diarrhea.

4. *Low Sodium Diets* : These frequently result in anorexia and weight loss.

When the various drugs and diets are applied vigorously over a prolonged period of time to an already sick patient, the result may be serious malnutrition with clinical dietary deficiencies.

VASCULAR DISEASE

Aneurysm of the Abdominal Aorta

Aneurysms of the abdominal aorta are usually arteriosclerotic. They involve the origins of the celiac axis, and superior mesenteric arteries.

Dissection of such an aneurysm or the extension by dissection of a thoracic aneurysm may cause infarction of the bowel as part of the general picture. There is constant and very severe epigastric pain, associated with clinical findings suggesting large or small bowel obstruction, embolic infarction, or other surgical emergencies. With infarction of the bowel there may be large evacuations of free blood. If these gastrointestinal changes have occurred, the primary disease in the aorta is usually too far advanced for successful surgical repair or graft.

Abdominal Angina

Recently the syndrome of abdominal angina has been more clearly defined. It is caused by arteriosclerotic narrowing of the superior mesenteric, usually of the celiac and occasionally of the inferior mesenteric arteries. The stenosis is almsot always segmental and confined to the orifice or proximal two centimeters. The resultant ischaemia produces the syndrome. It is characterized clinically by severe abdominal pain sometimes referred to the back, cramping in character, occurring 20 to 30 minutes following a meal and lasting for one to two hours. Marked weight loss is common because the patient is unwilling to expose himself to the pain induced by eating.

There is usually constipation. There may be also malasorption and in some cases the passage of copious fatty stools (steatorrhea). Protein-losing enteropathy has also been reported in these cases.

Clinical Features : Clinical examination may reveal a murmur in the upper abdomen.

Routine gastrointestinal X-ray may not give much help but aortography with lateral views gives a definite diagnosis.

Treatment : Therapy is surgical with graft replacement or by-pass. This has resulted in clinical cure with the disappearance of pain, the return of normal function, and the regaining of lost weight.

Prognosis : The syndrome must be considered as a prodrome to thrombosis of these affected arteries and usually leads to bowel infarction with much higher mortality.

Polyarteritis Nodosa

Polyarteritis nodosa is a disease charaterized by lesions involving the arteries of many organs. The liver and the mesentery are among those affected. The organs may show haemorrhage, thrombosis, infarction and aneurysm formation.

Involvement of the mesenteric vessels may produce pain, weight loss, nausea, and other non-specific gastrointestinal symptoms. Infarction of the bowel with the attendant surgical abdomen may occur in the severe cases.

Invlovement of hepatic vessels may give symptoms of hepatic disease. Needle biopsy of the liver is sometimes diagnostic.

A sprue-like syndrome has been described in patients with polyarteritis

nodosa, confirmed at autopsy. Polyarteritis nodosa may also occasionally cause ulceration in the large intestine, so that confusion with ulcerative colitis may arise.

Chiari's Syndrome

Occlusion of the hepatic veins is a clinico-pathological entity known as Chiari's syndrome. In the majority of cases there is gross obstruction of the hepatic veins leading to engorgement and necrosis of the liver, and ultimately by fibrosis, to portal obstruction (congestive cirrhosis). The commonest site of obstruction is in the mouths of the hepatic veins at their junction with the inferior vena cava, and less often in the hepatic veins themselves.

Etiology : It is due either to a congenital abnormality of the vein such as a valvular fold or fibrous band, or an obstruction secondary to inflammatory, neoplastic or cirrhotic processes which by pressure on the vein, predispose to thrombosis. Generalized disease with a thrombotic tendency such as polycythaemia rubra vera is a common accompaniment but many cases remain unexplained.

Clinical Features : The disease may present acutely with pain, vomiting, rapid accumulation of ascites, and tender enlargement of the liver. Death usually occurs in one to four weeks.

The chronic form has gradual onset with vague dyspepsia, ascites and hepatomegaly. Jaundice is rare and the spleen is only slightly enlarged. The presence of venous collaterals is one of the most important clues to diagnosis. They are most obvious over the upper abdomen and lower chest where anastomosis between the superior epigastric and internal mammary veins occurs. These can be visualised by infra red photography.

Differential Diagnosis : Considerable edema or varicose veins of the legs strongly suggest that the block is in the inferior vena cava rather than

the hepatic veins, and the lower the level of caval obstruction the lower are are the collaterals on the abdominal wall. A caput medusae is uncommon.

Prognosis and Course : Patients with the chronic form of Chiari's syndrome may live for years, but sooner or later signs of hepatic insufficiency develop and portal hypertension may add its specific complications. A by-pass operation is claimed to be of Benefit.

Correlation between Hypertension and Cirrhosis of Liver

An interesting negative correlation between cirrhosis and hypertension suggests that an abnormal liver may have certain compensations and supports the view that a normally functioning liver is necessary for the development and maintenance of essential. hypertension.

Occasionally, however, secondary hyperaldesteronism develops in the cirrhotic patient, and with it, an elevation of blood pressure occurs.

Treatment of Chronic Duodenal Ulceration

The conventional treatment of ulcer patients by frequent meals of a high caloric and fat content leads to gain in weight and coronary sclerosis in many cases which must unfavouraoly influence co-existing heart disease. A correlation exists between coronary disease and peptic ulcer. It is important that weight gain in such patients would be avoided, if necessary by the substitution of antacids for food and a weight reducing diet.

Arteriovenous Anastomosis in Gastric Mucosa

A system of arteriovenous anastomoses in the submucosa of the stomach wall has been demonstrated. These shunts appear to be opened up under conditions of nervous stress, presumably by sympathetic control, so as to favour the sudden formation of acute peptic ulcers in these nervous patients.

Severe Hypertansion and the Small Intestine

Intestinal lesions have been reported in severe hypertension. The arterial lesions of malignant hypertension are widespread and though usually preponderant in the kidneys, arteriolar involvement of the gastrointestinal tract may cause pathological changes such as ulceration with haemorrhage or perforation. The similarity of the arterial lesions in malignant hypertension with those of periateritis nodosa is stressed.

Systemic Lupus Erythematosus

Systemic lupus erythematosus affects small blood vessels throughout the body. Abdominal manifestations of this disease occur in about 20 percent of patients. They include anorexia, nausea, vomiting diarrhea and abdominal pain. In these cases the cause is presumably a vascular change leading to temporary disturbance of function. When vascular involvement is more severe, ulceration may occur.

Hypertension and Constipation

Constipation is a common complication of the treament of hypertension with ganglion-blocking drugs, and the ultimate development of ileus may simulate intestinal obstruction. Occlusion of the inferior mesenteric vessels may produce symptoms and signs strikingly similar to those of ulcerative colitis.

Jaundice and Shock

Jaundice may sometimes follow oligaemic shock. It has been reported after burns, although local tannic therapy has sometimes been a complicating factor. Jaundice occurs also after surgical operations, particularly those on the biliary tract when the combinations of post-operative hepatic and renal damage occur (the hepato-renal syndrome). Combinations of such factors as prolonged hypotension, transfusion reactions, anaesthetic agents and biliary or other infections may be responsible.

The liver may undoubtedly suffer circulatory damage in prolonged oligaemia, because the splanchnic blood flow falls. Bromosulphthalein clearance slowly deteriorates although hepatic oxygen consumption is well preserved until the terminal stages.

Jaundice and Hyperthermia

Jaundice occasionally complicates hyperthermia due to heat stroke or artificial fever. It has been observed in up to 19 percent of patients with gonorrhoea given therapeutic hyperthermia. Jaundice acompanied by nauses and vomiting may appear about 48 hours after the fever and, although it is usually mild and transient, yet fatal cases with hepatic necrosis have been reported. Renal tubular necrosis may also occur. The cause is uncertain, but it is possible that the metabolic needs of the liver at high temperatures may be more than its blood supply.

Hyperthyroidism

Hepatic damage has been described in hyperthyroidism but it is rrae. The hepatic blood flow does not increase in proportion to the increased cardiac output, although the metabolic needs of the liver are high and splanchnic oxygen consumption increases dramatically.

GASTROINTESTINAL DISEASES SIMULATING HEART DISEASE

Manifestations of disease of the heart and the gastrointestinal tract are often so similar that great difficulty arises to know which of them is the cause of a particular presentation of the patient. The following are some gastrointestinal troubles which may be mistaken for heart disease.

Esophageal Hiatal Hernia

Symptoms of esophageal hiatal hernia are very similar to those of angina

pectoris (angina of effort). Both of them may be constricting in nature, located behind the sternum and radiate to both shoulders, one or two arms and to the back. The differentiating point is the causative and relieving factors of pain. Esophageal hiatal hernita pain is produced by meals especially if the patient lies down immediately after taking it,, is relieved by sitting up and antacids. Anginal pain is produced by effort and relieved by rest and trinitrin. Radiology will show the hiatal hernia and an ECG will show the abnormalities of ischaemic heart disease.

Esophageal Spasm

Spasm of the esophagus may give rise to retrosternal pain and discomfort which may be confused with anginal pain. This esophageal pain may be mild or severe to produce marked pallor, sweating and collapse and remain for a long time (hours) simulating cardiac infarction pain. The diagnosis is that esophageal pain does not occur on effort but occurs on emotional upsets or excitement. It is not relieved by rest or nitroglycerin but by sedatives and antrispamodics. Radiology with a barium swallow may show the site of block by spasm during the painful episodes.

Esophageal Diverticulum

An esophageal diverticulum when distended can give rise to retrosternal pain which may radiate to the shoulders and arms. It may lead to vagal reflexes resulting in cardiac syncope.

Peptic Ulceration

Peptic ulceration of the lower part of the esophagus, the cardiac end of stomach or even the duodenum may produce pain and discomfort behind the lower part of the sternum. This pain may be confused with ischaemic cardiac pain.

Acute Abdomen

The occurrence of acute severe upper abdominal pain associated with shock suggests the possibility of ruptured peptic ulcer, acute pancreatitis,... etc. However, the doctor should never forget that cardiac infarction or a dissecting eneurysm of the aorta may present with pain in the epigstrium also associated with shock. The differentiation between these cardiovascular causes and abdominal diseases may at times be extremely difficult and can tax the experience of many experienced physicians.

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