DISCUSSION

Bile duct strictures, independent of etiology, can cause significant morbidity from recurrent obstructive jaundice, right upper quadrant abdominal pain, biliary stones, and recurrent episodes of ascending cholangitis most benign distal bile duct strictures (biliary strictures) are iatrogenic, resulting from operative trauma Malignant biliary obstruction is commonly due to pancreatic carcinoma, cholangiocarcinoma and hepatic or nodal metastatic disease. Other causes include gall bladder carcinoma, hepatocellular carcinoma, lymphoma and advanced gastric or duodenal cancer.

The major determinant of mortality in patients with bile duct strictures is the underlying disease condition. Patients with biliary strictures due to operative injury, radiation, trauma, or chronic pancreatitis generally have a good prognosis. Conversely, patients with bile duct strictures due to PSC and malignancy have a less favorable outcome.

Percutaneous and endoscopic biliary decompression prior to surgery has been performed for many years. When surgery is delayed, percutaneous or endoscopic drainage of an obstructed biliary system not only relieves the associated symptoms of jaundice (eg, nausea, purities) but also helps to correct the biochemical derangements caused by prolonged biliary obstruction. Preoperative drainage allows time for surgical planning, detailed imaging, and proper laboratory testing. Correction of nutritional and biochemical derangements prior to surgery may result in improved surgical outcomes

Most patients who present for ERCP have previously undergone noninvasive diagnostic testing (e.g., computed tomography [CT], magnetic resonance cholangiopancreatography [MRCP], or ultrasonography) that revealed an abnormality potentially amenable to intervention via ERCP. Thus, cholangiography, pancreatography, or both are performed to confirm or to better characterize a potential lesion and are followed by an intervention if treatment is indicated.

Although a multitude of therapeutic ERCP maneuvers are known, the most common are those dealing with biliary or pancreatic duct stones, malignant or benign strictures or stenoses, leaks, and tissue sampling. For example, to manage choledocholithiasis, a biliary sphincterotomy is generally performed initially to facilitate passage of the stone through the distal bile duct.

Another common intervention involves placing a biliary stent into the bile duct to treat a biliary obstruction secondary to benign or malignant biliary stricture multiple stents are available, varying in design, material, and size; the choice of an appropriate stent depends on the clinical situation. Typical materials used in the composition of plastic stents include Teflon, Percufex, polyethylene, and polyurethane. Plastic stents are prone to early occlusion secondary to bacterial colonization and development of a bio film over their internal surface. Metal stents which are self-expanding, allowing their deployment over a narrow track if done percutaneously, or via standard delivery systems if positioned endoscopically. Another line of treatment is stricture dilatation which can be done for malignant or benign strictures

Benign biliary strictures may be dilated with hydrostatic balloons or a graduated catheter passed over a guide wire. Indications for endoscopic dilation of benign strictures include postoperative strictures, dominant strictures in sclerosing cholangitis, chronic pancreatitis, and stoma narrowing after choledochoenterostomy. Dilation of malignant strictures may occasionally be necessary before stent insertion.

ERCP is an advanced endoscopic technique that carries a higher risk of procedure-related complications than other endoscopic procedures do. Besides the risks associated with most other endoscopic procedures (e.g., mucosal perforation related to traumatic passage of the endoscope, cardiopulmonary events, adverse intravenous medication reactions, hemorrhage, infection, or oxygen desaturation), ERCP also carries a risk for the following specific complications: Post ERCP pancreatitis, Postsphincterotomy bleeding, Infection (cholangitis, bacteremia) .Retroperitoneal perforation.

Percutaneous transhepatic biliary drainage: is a therapeutic procedure that includes the sterile cannulation of a peripheral biliary radicle after percutaneous puncture followed by imaging-guided wire and catheter manipulation. Placement of a tube or stent for external and/or internal drainage completes the procedure.

Percutaneous therapy of biliary lesions is often staged, requiring several sessions to achieve the therapeutic goals. Currently, metal stents are used almost exclusively for malignant disease.. Major Complications includes: Intraprocedural Sepsis, Hemorrhage, infections(abscess, peritonitis, cholecystitis, pancreatitis).

I. Patients' characteristics

The present study included 40 patients with diagnosis of obstructive jaundice presenting by yellowish discolouration of the sclera (jaundice),cholestatic manifestations (pruritis –anorexia)elevated serum total and direct bilirubin The large majority of our patients were males (23 of 40 patients).,the mean age of the patients was 68.75+_9.5.the majority of our cases were diagnosed to be malignant by means of (radiology ,pathology ,tumor markers),all of the patients were presenting by obstructive jaundice and cholestatic manifestations with mean serum bilirubin preprocedure was 14.25+_5.98

Similarly to the study done by Speer et al[(230)] in which the mean age of the patients presenting by the same clinical presentation was around 70 years however all cases were diagnosed to be of malignant etiology either by radiological investigations or tissue biopsy or simply by the course of the disease.

Another study by Pinol et al[(231)] done on 54 patients with also malignant obstructive jaundice ,in this study the majority of the cases were males similar to the present study which may reflect epidemiological pattern of malignant obstructive jaundice that will need further studies .In the previously mentioned study the mean serum bilirubin was about 16.5+_9.2 similar to our study.

II.Technical success rate

This was defined as successful cannulation of CBD and ensuring free drainage of bile either by stricture dilation or stent insertion using ERCP or successful cannulation of CBD by transhepatic approach and successful insertion of stents.

In the present work Stent insertion was technically successful in 15(75%) of the 20 patients randomly assigned to the endoscopic group and in 14(65%) of the 20 patients randomly assigned to the percuatneous group.

With regard to the five patients in the endoscopic group in whom procedures failed, treatment was not attempted in two patients because of patient's refusal. In three other patients, there was successful cannulation but there were difficulties in stent insertion through the stricture even after dilation, those three patients were subsequently treated by percuatneous stent placement. In the 6 patients in the percuatneous who had failed

procedures due to difficulties in stent insertion through the stricture even after dilation, four of the 6 patients were subsequently treated by means of endoscopic stent placement, and two received no further treatment.

In a study conducted by Pinol et al 2002[231] for treating malignant biliary obstruction stent insertion was successful in 58% of patients with malignant biliary obstruction who was randomly assigned for endoscopic management as compared to 66% (10 patients with malignant obstruction out of 15)in the present study while it was successful in 75% of patients with malignant biliary obstruction who were randomly assigned for percutaneous management as compared to 66% (10 patients with malignant obstruction out of 15) in the present study.

Another study by Hall et al[232] for treating inoperable malignant obstruction reported that technical success rate was 57% by transhepatic approach while it was 78% by combined transhepatic –endoscopic approach and stent insertion.

Another study by Jae Myoung Choi et al[233] 2012 for treating inoperable distal malignant obstruction by endoscopic placement of metallic stent versus plastic stents found that. Technical success rates were 95.2% (20/21) in the covered SEMS group and 100% (23/23) in the plastic stent group, without any significant difference between the two groups (p=0.290), except 1 case of technical failure due to the stent misplacement in the covered SEMS group, which was corrected using forceps to catch the lasso and achieved the functional success.

Another group of studies published of endoscopic and percutaneous approaches for management of malignant obstructive jaundice as shown in table XXVII showed that the mean technical success rate of endoscopic approach (87.5%) was equal to the mean technical success rate of the percutaneous group [231]

Another study by Eickhoff et al[234] which showed the long term outcome of percuatneous trans hepatic drainage for benign bile duct strictures in primary success rate of percuatneous transhepatic drainage (PTBD) was 92%(33/36patients) as compared to 80% (4/5)also no of cases in the present work is considered small which will demand further studies.

Table XXVII: Group of studies published of endoscopic and percutaneous approaches for management of malignant obstructive jaundice.

Trial	Patients with malignancy	Successful insertion
Endoscopic stents:		
Speer	39	89%
Hagenmuller	454	84%
Huibregtse	297	89%
Leung	64	89%
Percutaneous stents:		
Mueller	109	92%
Leung	48	88%
Speer	36	76%
Dooley	40	86%
Hoevels	13	NA
Burcharth	94	82%
Coons	62	NA
Burcharth	455	88%
Pereiors	12	100%

III. Therapeutic success rate

Defined as if stricture dilatation and stent insertion resulted in fall of serum bilirubin greater than 20% of preprocedure value 15 days post procedure (this figure was chosen since this early fall always predicted eventual loss of jaundice).

In the present work technical success rate was found to be 75% (15out of 20) in the endoscopic group as a whole which can be categorized in to 80% (12 out of 15) in malignant cases and 60% (3 out of 5) in benign cases as compared to 70 % (14 out of 20) in the percuatneous group as a whole which can be categorized to 60% (10 out of 15) in malignant cases and 80 % (4 0ut of 5) in benign cases.

Total Serum bilirubin had decreased in the endoscopic group from 14.25 mg/dl pre procedure to 5.981 mg/dl 15 days post procedure as compared to the percuatneous group were total serum bilirubin had decreased from 13.35 mg/dl pre procedure to 8.264 mg/dl 15 days post procedure however the relation between the two groups as regard the fall in serum bilirubin 15 days post procedure was not stastically significant (p=0.765).

With regard to the five patients in the endoscopic group in whom procedures therapeutically failed, causes were attributed to septic cholangitis in 3 patients and pancreatitis in the remaining two who were treated medically and improved later on without any new intervention.

In the six patients in the percuatneous group who were therapeutically unsuccessful all of them developed septic cholangitis in which five of them eventually died and only one patient improved later on without any new intervention.

Results were consistent with Speer et al[230] who found that drainage was more successful in patients presenting by malignant obstructive jaundice managed by ERCP (30/37 (81%) versus (20/33 (61%))in patients managed by percutaneous approach.

On the contrary Pinol et al[231] found in his study on patients with malignant distal biliary obstruction due to various cases therapy was therapeutically successful in 71% (20 out of 28) patients in the percuatneous group and 42%(11 out of 26)patients in the endoscopic group .and the relation between the two groups was stastically significant (p=0.03).on the other hand ,the mean serum bilirubin concentration 15 days after procedure has decreased from (16.5+_9.2) to (4.5+_4.3) mg/dl in the percuatneous group and decreased from (16.9+_9.1) to (9.6mg/dl +_8.6) mg/dl in the endoscopic group and the relation between the two groups was stastically significant (P=0.05).

Another study done by Zilvinas et al[235] on 12 patients with inoperable malignant biliary obstruction of distal origin were selected for percuatneous transhepatic biliary stenting showed clinical success rate of 80%.

IV. Major complications rate and 30 day mortality

In the present study the major complication rate was higher in the percutaneous group than in the endoscopic group, although this difference was not stastically significant 40% (percuatneous) versus 30% (endoscopic) (p=0.744), complications occurred are summarized in table XXVII

Table XXVIII: Complications occurred in both groups of the study.

items	Endoscopic (n=20)	Percutaneous (n=20)	P value
Major complication rate:	7(20)	8(20)	0.744
Cholangitis	3	6	0.256
Acute pancreatitis	3	-	0.147
Hemorrhage	1	1	1
Bile leak peritonitis	-	1	0.147
30-day mortality	6(20)	8(20)	0.507
Causes of death:			
Cholangitis	2	4	0.342
Multiorgan failure	2	5	0.457
Hemorrhage	-	-	-
Tumor progression	2	3	0.232

As regard 30 day mortality there were no statistical significance between the two groups although the mortality rate was higher in the percuatneous group (40% in which 87.5% of them were malignant while the 12.5% was benign) while the endoscopic group (30% in which 71.5%of them were malignant and 28.5% of them were benign).

A finding consistent with Pinol et al[231] who found that the major complications rate was higher in the percuatneous group 61% (17 out of 28) than the endoscopic group35% (9 out of 26), however they were not stastically significant (p=0.09)

In his study the cholangitis had occurred in 12 out of 28 (42%) patients in the percuatneous group and occurred in 6 out of 26 (23%) patients in the endoscopic group .Pancreatitis has occurred in only one patients in the endoscopic group and didn't occur in any patient of the percutneous group. Hemorrhage either from puncturing the liver in the percutaneous group or from biliary sphincterotomy in the endoscopic group had occurred in 2 patients of the percutaneous group and 2 patients of the endoscopic group.

On the contrary to the present work the 30 day mortality rate in the previously mentioned study was 36% (10 out of 28) in the percutaneous group as compared to 42% (11 out of 26) in the endoscopic group.

The study by Speer et al[230] who did his study on 54 patients with malignant obstructive jaundice of distal origin had found that complications arose within 30 days of the procedure on 19% of (7 out of 37) patients with endoscopic management and 67% of (22out of 33) patients with percutaneous management however the relation between the two groups was not stastically significant.

Cholangitis occurred in both groups in which 5 patients in the percutaneous group developed cholangitis as compared to 7 patients in the endoscopic group.

Hemorrhage occurred in 5 patients in the percutaneous group while none occurred in the endoscopic group As regard the 30 day mortality it was found that the rate of mortality in the endoscopic group was significantly less than that of the percutaneous group -6 (15%) versus 12 (33%), p=0.016 which was statistically significant.

V. Mean hospital stay

In our study it was found that mean hospital stay of the endoscopic group was found to be 7.35+_5.8 as compared to mean hospital stay of the percuataneous group which was found to be 13.5 +_10.8 which was found to be stastically significant p=0.027 the causes were attributed to many factors that included development of complications that needed hospitalization such as (cholangitis ,pancreatitis),daily follow up of serum bilirubin in patients with internal external drain ,logistical problems as availability of the stents and economical problems.

On the other hand Pinol et al[231] had found that mean hospital stay from day of procedure till discharge in 54 patients with malignant biliary obstruction managed by biliary stent placement was 11.9+_8.5 in percutaneous group and 8.5+_7.1 in the endoscopic group (p=0.12) as compared to the present work in which the mean hospital stay of patients with malignant biliary obstruction managed by ERCP was 5.9+_2.6 and was 9.6 +_3.5in patients managed by percutaneous approach (p=0.042).

The study by Speer et al [230] had found that the median number of days spent in the hospital after the procedure was less for the endoscopic group (11 range from 2 -49) than for percutaneous group (17, range from 3-24) however this difference was not stastically significant (p=0.4).

Another study by Shepherd A. et al[236] on A total of 52 jaundiced elderly patients who had malignant obstruction of the distal common bile duct and who required palliative biliary decompression were randomized to receive either an endoscopically placed biliary endo prosthesis (10 French gauge) or conventional surgical bypass. Patients within the two treatment groups were well matched and 51 were followed until their death. Patients treated with stent insertion had a significantly shorter initial hospital stay than those treated surgically. In the long term, overall survival in the two groups was similar and jaundice was relieved in over 90 per cent of patients. Despite more re-admissions to hospital for those patients treated endoscopically, the total time spent in hospital still remained significantly shorter in this treatment group compared with those subjected to surgery. The endoscopically placed biliary stent is a valuable alternative to conventional surgical bypass in the palliation of extra hepatic biliary obstruction.

SUMMARY

Bile duct stricture is a condition that requires a coordinated multidisciplinary approach involving gastroenterologists, radiologists, and surgical specialists. Bile duct strictures can be classified according to the level of the obstruction in to distal and proximal with respect to the cystic duct.

Benign biliary strictures are caused by a heterogeneous group of conditions that constitute only a small part of all strictures, the most important causes are as follows:

1. Post-operative biliary strictures which results of iatrogenic injury during surgery most commonly following cholecystectomy or may occur at site of biliary anastomosis, after hepatic resection or liver transplantation,
2. Chronic pancreatitis is a common inflammatory disease. CP induced biliary strictures are seen in 6-23% of patients and account for approximately 10% of all benign biliary strictures.
3. Primary sclerosing cholangitis: is a chronic inflammatory disease of the biliary tree .it is characterized by structuring and dilatation of the intrahepatic and /or extra-hepatic bile ducts.
4. HIV cholangiopathy Patients with HIV cholangiopathy usually have: Papillary stenosis, Sclerosing cholangitis, combined papillary stenosis and sclerosing cholangitis, Long strictures of extra-hepatic bile ducts.
5. Mirizzi syndrome: This condition is observed in 1% of patients with cholecystectomies. Extrinsic compression of the common hepatic duct due to a gallstone impacted in the Hartmann pouch or cystic duct results in jaundice and cholangitis.
6. Choledochal cysts: Choledochal cysts are uncommon anomalies of the biliary system manifested by cystic dilatation of the extra-hepatic biliary tree, intrahepatic biliary tree, or both.
7. Recurrent pyogenic cholangitis The Hallmark of this condition is the presence of both stones and strictures which can be located in both extra-hepatic and intrahepatic ducts. Patients with RPC often present with acute cholangitis which may be the first attack or recurrent episodes.

Malignant causes of bile duct strictures include pancreatic cancer, carcinoma of the ampulla of Vater, gallbladder cancer, distal cholangiocarcinoma:

1. Pancreatic cancer: The pancreatic malignancies that cause distal biliary obstruction involving the head of the pancreas can also obstruct the bile duct. The workup usually begins with a combination of imaging studies. These tools include trans-abdominal ultrasound, CT scan, magnetic resonant imaging (MRI), ERCP, and EUS. These imaging tools enable cancer diagnosis and staging, determine tumor resctability.
2. Ampullary carcinoma: Is often presents with obstructive jaundice and it is suspected if imaging studies detect dilation of the ducts. Ultrasound relies more on indirect evidence such as dilated bile ducts. Computed tomography (CT) scan provides more accuracy, Magnetic resonance cholangiopancreatography (MRCP) is another noninvasive technique and is superior to CT scan in detecting biliary obstruction.
3. Cholangiocarcinoma: This cancer arises from the biliary epithelium and is usually seen in association with choledochal cysts, PSC, chronic ulcerative colitis, and infestation by liver flukes. Cholangiocarcinoma is traditionally classified anatomically as intrahepatic or extra-hepatic, with extra-hepatic disease further classified as proximal (hilar) or distal. In 1982, Bismuth proposed an anatomic classification of bile duct strictures, based on location, into the 5 types.

4. Gallbladder carcinoma: Extension of the cancer beyond the gallbladder can cause long bile duct strictures and obstruction, and it is a poor prognostic sign.
5. Hepatocellular cancer: This is the most common primary liver malignancy. Hepatocellular cancer is the fourth leading cause of cancer-related death in the world and the third most common among men.

Clinical picture: The clinical manifestations of obstructive jaundice may develop rapidly or slowly depending on the underlying cause with chronic cholestasis, xanthomas appear around the eyes, chest, back, and on extensor surfaces. Weight loss and deficiency of calcium and fat-soluble vitamins can occur. Patients also may report anorexia, nausea, vomiting, and cachexia. Insidious weight loss may suggest malignant obstruction.

Investigations: Biliary strictures can be diagnosed by means of laboratory investigations that include serum alkaline phosphatase and gamma-glutamyl trans-peptidase. AST, ALT, Total and direct bilirubin several tumor markers may be helpful in the diagnosis of malignant bile duct strictures that includes A serum carbohydrate antigen 19-9 (CA19-9), serum carcinoembryonic antigen, serum trypsinogen

Radiological investigations that includes ultrasonography, multislice CT scan, MRCP, EUS, ERCP and PTC can help in diagnosis

Management: Medical Care

Medical treatment consists of managing complications of bile duct strictures until definitive therapy can be instituted. Most patients who present with cholangitis have a response to antibiotics and supportive management. Patients who are elderly and frail and those presenting with hypotension or altered mental status are best treated in an intensive care unit.

Surgical Care

Patients with cholangitis whose conditions fail to improve with conservative treatment usually require urgent decompression of the obstructed biliary system. Surgical management of bile duct strictures is necessary for patients with a low surgical risk in whom endoscopic therapy has failed. Surgical management consists of restoration of biliary enteric continuity, which usually is achieved with a defunctionalized Roux-en-Y jejunal loop by means of hepaticojejunostomy, choledochojejunostomy, or intrahepatic cholangiojejunostomy.

ERCP is a technique using a side-viewing duodenoscope for cannulation of the ampulla of vater and injection of contrast into bile duct. Therapeutic interventions includes stricture dilatation and insertion of stent either plastic or metallic stents according to the etiology. The common adverse events with the use of ERCP include pancreatitis with a rate of 1% to 7%,as well as hemorrhage, perforation, and infection .it is therefore recommended that ERCP is reserved for patients with a reasonable likelihood for therapeutic interventions.

PTC is also an invasive technique of imaging the biliary system. It requires insertion of needle percutaneously into a dilated bile duct followed by opacification of the bile ducts with an injection of contrast .PTC has close to 100% sensitivity and specificity for identifying the site and the cause of biliary obstruction. Theraputic interventions includes stricture dilatation and internal –external drain insertion followed by metallic or plastic stent insertion.

The aim of the current study was to assess the role of ERCP versus percutaneous trans-hepatic approach for management of distal CBD strictures

This study included forty patients with Distal CBD strictures. They were collected at Gastroenterology unit, Internal Medicine Department of The Main University Hospital of Alexandria. They were classified into 2 groups:

Group I: 20 patients with distal CBD strictures with endoscopic management.

Group II: 20 patients with distal CBD strictures with percutaneous trans-hepatic management.

All the two groups were subjected to the following:

1. History taking, complete physical examination.
2. Laboratory investigations that include:
   - Complete blood count (CBC).
   - Renal profile (serum creatinine level, blood urea level).
   - Liver profile (Serum aspartate and alanine aminotransferases (AST and ALT), serum albumin, serum bilirubin (total and direct), serum gamma glutamyl transpeptidase, alkaline phosphatase and prothrombin time.
3. Radiological investigations that include:
   - Ultrasound abdomen
   - Multislice CT scan
   - MRCP
   - Cholangiography
   - In the current study there were no significant differences between the different study groups regarding the demographic data
   - Technical success rate was slightly higher in the endoscopic group than the percutaneous group, however it was not stastically significant
   - Therapeutic success rate: which was defined as decrease in serum bilirubin more than 20% of the preprocedure level was found to be slightly higher in the endoscopic group, than the percutaneous group, however it was not stastically significant
   - Major complications that included cholangitis, bile leak peritonitis, pancreatitis, hemorrhage was found to be higher in the percutaneous group as compared to the endoscopic group.
   - 30 day mortality was higher in the percutaneous group as compared to the endoscopic group but was also not significant .Causes of death include cholangitis, multiorgan failure and disease progression.
   - There was a statistically significant shorter mean hospital stay in the post procedure period in the ERCP group
   - In conclusion, the results of the current study stated that Endoscopic intervention that includes stricture dilatation and stenting is an acceptable approach for patients with distal strictures either benign or malignant as it improves a range of symptoms and enhances quality of life Percutaneous stenting of the biliary tree is a safe and minimally invasive procedure as it provides equally adequate palliation in patients with distal strictures, pspthe technical and therapeutic success rate are satisfactory as compared to endoscopic approach however cost effectiveness as prolonged hospital stay should be taken in considerations against percutaneous approach.