
LIST OF TABLES

Table		Page
(1)	Developmental classification and traces it to the anatomic structures found in the basal ganglia.	2
(2)	Differential diagnosis of the diseases on the basis of their MR signals characteristics	28
(3)	Clinical and neuroimaging features of bilateral abnormalities of the basal ganglia and thalamus.	29-30
(4)	Distribution of patients according to different age groups.	35
(5)	The final suggested diagnosis reached by cMRI and MRS included.	36
(6)	Distribution of patients according to the age groups.	37
(7)	Distribution of the patients according to the onset of the clinical presentations regardless the final diagnosis of the basal ganglia lesions.	39
(8)	Distribution of patients according to the different clinical presentations.	41
(9)	Distribution of patients according to different Pathological categories	42
(10)	Distribution of patients according to the different pathological category and their sub groups.	42
(11)	Distribution of patients presented by asymmetrical basal ganglia nuclei affection.	43
(12)	Distribution of patients presented by symmetrical basal ganglia nuclei affection.	43
(13)	Distribution of patients according to: cMRI and MRS diagnosis matching with the clinico-laboratory and histo-pathological data	44
(14)	Distribution of patients according to the different laboratory and histopathological findings in relation to their pathological category and final diagnosis.	45
(15)	Represents the imaging findings of the cases by the cMRI.	46-47
(16)	Represents the imaging findings of the cases by the advanced MRI techniques.	48
(17)	Distribution of patients according to the associated MRI findings with the basal ganglia lesions related to the same pathology.	49
(18)	Distribution of patients according to the associated MRI findings with the basal ganglia lesions unrelated to the same pathology.	50
(19)	Distribution of patients according to the basal ganglia lesions with no associated MRI findings.	50

LIST OF FIGURES

Figure		Page
(1)	Diagrammatic illustration of Drawing showing the deep gray matter nuclei.	1
(2)	Schematic diagram for the divisions of the basal ganglia.	1
(3)	Arterial supply of the basal ganglia.	2
(4)	Drawing showing the major superficial and deep veins of the brain.	3
(5)	Connectivity diagram, showing the different functional pathways.	4
(6)	Axial T2 MRI showing the basal ganglia with progressive maturation of the globus pallidus.	5
(7)	Axial T2 MRI showing the radiological anatomy of the basal ganglia.	6
(8)	Coronal T2- reveals normal-appearing striatum.	7
(9)	Substantia nigra on proton-density axial image.	8
(10)	Different imagings showing Virchow-Robin spaces, physiologic calcification, physiologic iron.	9
(11)	Axial T2 MR image shows the normal anatomy of the basal ganglia.	10
(12)	CT show early infarct.	11
(13)	Drawing shows ATP production and sites of metabolic abnormality.	12
(14)	Co poisoning by Axial T2 and coronal FLAIR.	13
(15)	Methanol poisoning by CT.	14
(16)	Axial T1-weighted MR images of patient with chronic liver failure.	15
(17)	Acute hyper ammonemia T2-weighted (a) and diffusion-weighted (b) MR images.	15
(18)	a) T2-weighted MR image. (b) T2-weighted MR image of HIE	16
(19)	Axial T2-weighted (a) and diffusion-weighted (b) MR images of Hypoglycemic .	17
(20)	Non ketotic hyperglycemia Axial T1-weighted MR image	17
(21)	Leigh disease(a, b)Axial T2-weighted MR images .(c) MR spectroscopy	18
(22)	osmotic demyelination . Axial T2-weighted images	19
(23)	Wernicke encephalopathy (a, b) Axial T2-weighted MR image shows Axial T2-weighted MR image shows.	20
(24)	Hallervorden-Spatz disease. Coronal T2-weighted MR image demonstrates (eye-of-the-tiger sign).	21
(25)	CJD. T2-weighted (a) and diffusion-weighted (b) MR images reveal	22
(26)	Fahr disease in a 44-year-old man CT scan.	22

Figure	Page
(27) Demonstrating how to measure: frontal horn width, inter caudate distance inner table width.	23
(28) CNS toxoplasmosis (a) Axial T2-weighted image (b) axial contrast-enhanced T1-weighted MR image obtained at a lower level.	25
(29) Primary CNS lymphoma (a) Axial T2-weighted MR image (b) a coronal contrast-enhanced T1-weighted MR image.	26
(30) Bright objects” in NF 1. (a) Axial T2-weighted MR image. (b) an axial T1 weighted MR image.	27
(31) Distribution of patients according to different age groups	35
(32) Distribution of patients according to the gender.	36
(33) Distribution of patients according to the age groups.	38
(34) Distribution of the patients according to the onset of the clinical presentations regardless the final diagnosis.	40
(35) a) T2 axial cuts” eye of the tiger sign”; More manifest on (b) Diffusion weighted images.(c),(d)zoom in of (a),(b) .	51
(36) Leigh disease (a) (b) Axial T2 sequence. (c) MRI diffusion sequence (d) MRS analysis from the affected deep gray matter.	52
(37) Chronic hepatic failure (a) Axial T1 MRI sequence revealed bilaterally globus pallidus hyperintensity, (b) axial T2 MRI sequence reveals high signal intensity within white matter. (c) Sagittal T1 MRI sequence reveals hyperintense pituitary gland.	53
(38) Toxoplasmosis (a) Axial FLAIR (b) Axial T2 MRI(c) Sagittal T1 post contrast MRI sequence. (d) Axial FLAIR MRI sequence.	54
(39) Global ischemia (a) Coronal T1MRI sequence (b) coronal T2 MRI sequence. (c) Axial FLAIR MRI sequence. (d) Restricted diffusion of the basal ganglia and the gyri bilaterally	55
(40) Prolonged profound HIE.(a) Axial T1 MRI sequence.(b)Axial T1 MRI sequence (a,b)Shows the associated diffuse encephalomalachic changes.(c)axial T2 MRI sequence (d) Diffusion MRI sequence shows restricted diffusion of the basal ganglia , thalamus and	56
(41) Glutaric acidemia type I, A) T1 Axial b-c) axial T2 MRI sequence d) Axial FLAIR MRI sequence.	57
(42) Hemorrhagic venous infarction a-b) axial T1MRI sequence c) axialT1 MRI.d) axial T2 MRI sequence e) MRI venography.	58-59

LIST OF ABBREVIATIONS

ADC	Apparent diffusion coefficient
AIDS	Acquired immune deficiency syndrome.
ATP	Adenosine tri phosphate.
BG	Basal ganglia.
CBC	Complete blood count .
CBF	Cerebral blood flow.
CD	Canavan disease.
CJD	Creutz feldt-jacob disease.
CNS	Central nervus system.
CO	Carbon monoxide.
CSF	Cerebrospinal fluid
CT	Computerized tomography.
cMRI	Conventional Magnetic resonance imaging.
D1	Dopamine1 receptor.
D2	Dopamine2 receptor.
DWI	Diffusion weighted imaging.
DWM	Deep white matter.
EEG	Electroencephalography.
FLAIR	Fluid attenuation inversion recovery.
FOV	Field of view.
Gad	Gadolinium
GP	Glopus pallidus.
GPe	Glopus pallidus externa.
GPi	Glopus pallidus interna.
GWMJ	Gray white matter junction.
HIE	Hypoxic ischemic encephalopathy.
HIV	Human immune deficiency virus.
IgG	Immuno-globulin G
LSA's	Lenticulo striate arteries.
MCA	Middle cerebral artery.
MRI	Magnetic resonance imaging.
MRS	Magnetic resonance spectroscopy.

msec	Milliseconds
NBIA	Neuro-degeneration with brain iron accumulation.
NF1	Neurofibromatosis type 1.
ODS	Osmotic demyelination syndrome.
OPM	Osmotic pontine myelinolysis.
PANK2	Panthothenate kinase.
PD	parkinson's disease.
PET.	Positron emission tomography
prpSc	Prion protein
PVWM	Peri-ventricular white matter.
RE	Rasmussen encephalitis.
ROI	Region of interest
SPECT	Single-photon emission computed tomography.
STN	Sub thalamic nuclei.
SNe	Substantia nigra pars compacta.
SNr	Substantia nigra pars reticulata.
SWI	Susceptibility weighted images
T	Tesla
TI	Inversion time
T1WI	T1 weighted image
T2WI	T2 weighted image
TE	Echo time
TR	Repetition time
VRS	Virchow- robin spaces.
VTA	Ventral thalamic aspect.
WM	White matter