THE ROLE OF MAGNETIC RESONANCE IMAGING IN DIAGNOSIS OF CEREBELLOPONTINE ANGLE LESIONS

Essay

Submitted in Partial Fulfillment of master degree in Radio-diagnosis

By

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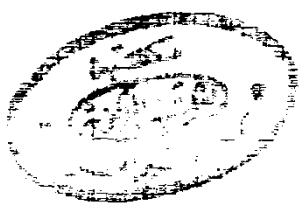

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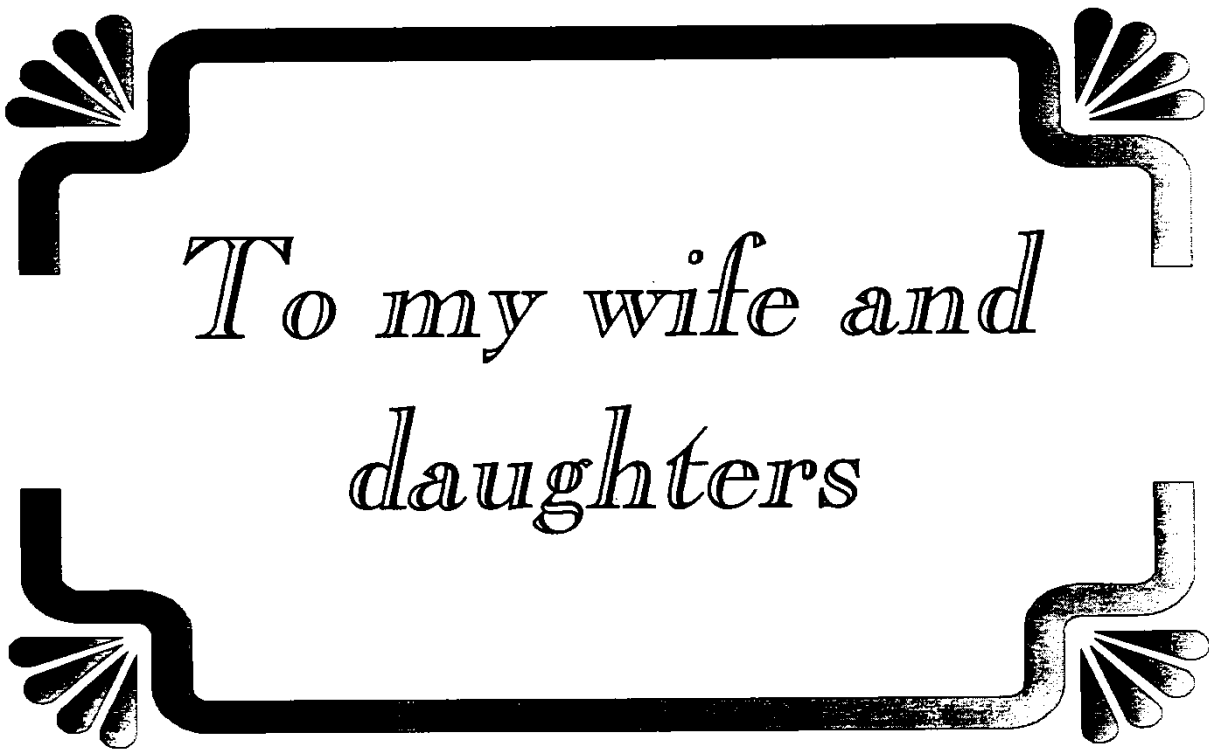

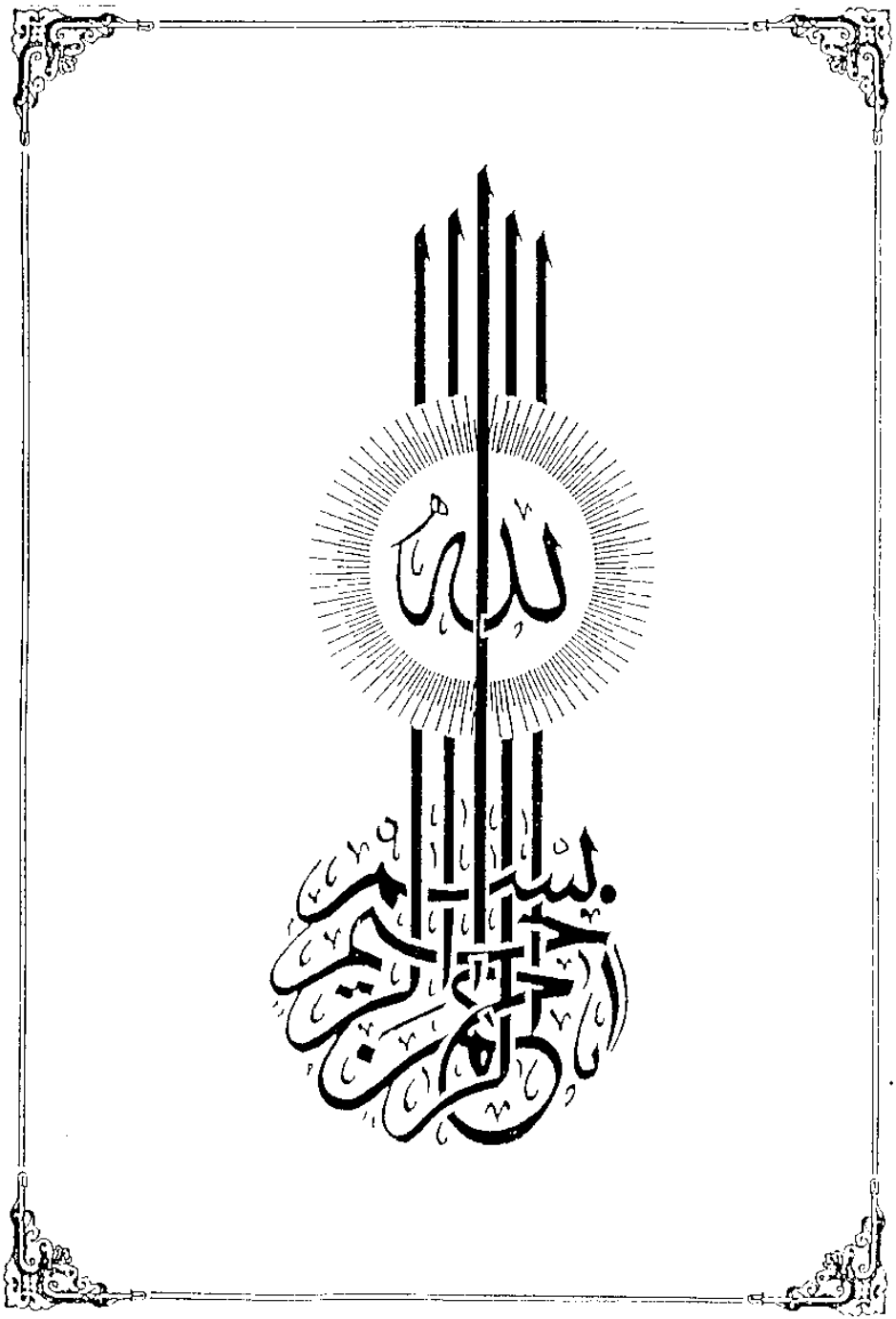

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Atef Banoub

CORRECTION OF LANGUAGE MISTAKES

PAGE	LINE	WORD	CORRECTION
1	13	Mr	MR
3	missed sentences at the end of the page to cochlear endolymph. It is seen on coronal CT sections just posterior to the plane of the		
5	6	creats	creates
8	14	larger	Larger
8	26	eight	eighth
13	21	most	Most
13	23	intrtympanic	intratympanic
14	1	most	Most
19	16	less	loss
21	19	process	precess
29	18	isointensive	isointense
29	21	spreads	separates
33	21	Gd. DPTA	Gd. DTPA
34	21	Gd. DPTA	Gd. DTPA
34	27	MPCA	MCPA
35	6	MPCA	MCPA
41	10	Displacemeut	Displacement
41	24	weigbted	weighted

LIST OF ABBREVIATIONS

ABR	Audiometry brain stem response
ANs	Acoustic neuromas
CN	Cranial nerve
CPA	Cerebellopontine angle
CSF	Cerebrospinal fluid
CT	Compeuterized tomography
Gd- DTPA	Gadolinium diethylenetriamine pentaacetic acid
GRE	Gradient recalled echo
IAC	Internal auditory canal
IV	Intravenous
MCPA	Meningioma of the cerebellopontine angle
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
RF	Radiofrequency
SE	Spin- echo
T_1	Longitudinal relaxation time
T_2	Transversal relaxation time
TE	Time to echo
TI	Inversion time
TR	Time to repeat

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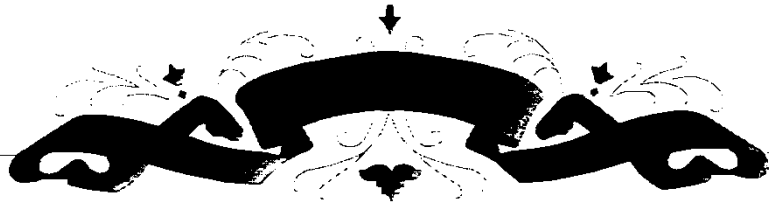

INTRODUCTION

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AIM OF WORK

INTRODUCTION AND AIM OF WORK

MRI is a non invasive method of mapping the internal structures of the body which completely avoids the use of ionizing radiation and appears to be without hazard. It employs radiofrequency (RF) radiation in the presence of carefully controlled magnetic fields in order to produce high quality cross sectional images of the body in any plane. It portrays the distribution of hydrogen nuclei and parameters relating to their motion in water and lipids. Like X-ray computed tomography (CT), the display of soft tissue detail is of prime importance. MRI has the advantage that contrast between different tissues can be manipulated in order to highlight pathological change by altering the pattern of applied RF pulses. *(Grainger R.G. & Allison D.J., 1992)*

MRI is particulary well suited for imaging the posterior fossa. The lack of bone induced artifacts results in a clear depiction of the anatomy of the brain stem and cerebellum. Multiplanar imaging allows for accurate delineation of lesion margins, showing their relationship to the fourth ventricle, tentorial incisura and foramen magnum. In general the axial and sagittal planes are preferable for midline lesions, hemispheric cerebellar masses are shown best with axial and coronal scans. *(Edelman R.R., et al 1990)*

Great strides in the early diagnosis of cerebellopontine angle (CPA) tumors have been made in the last fifteen years. The advent of auditory brain stem response (ABR) testing and computerized tomography (CT) has enabled earlier diagnosis of smaller lesions. Contrast enhancement increased the sensitivity of CT in detection of acoustic neuromas from 18% to 80% and from 45% to 88% in two studies.

Despite these advances, the confirmation of small lesions often required invasive techniques. Until recently, air CT cisternography has been the radiographic technique of choice in the diagnosis of small CPA tumors.

Since its wide clinical introduction in the early 1980s, MRI has supplanted CT for evaluation of CPA region. Recent studies have shown MRI to be as successful as air CT cisternography in detecting small acoustic neuromas. Advantages of MRI include increased soft tissue details and non invasiveness. In comparison, air CT cisternography can have false positive results in the presence of arachnoid adhesions or a very narrow internal auditory canal (IAC) as well as the complication of postpuncture headache. *(Kingsley, et al 1985)*

The use of contrast materials to improve test sensitivity has become standard practice in radiology. Gadolinium diethylenetriamine pentaacetic acid (Gd-DTPA) is the first contrast material suitable for clinical use in MRI. Gd-DTPA enhancement has been found to be a useful adjunct in the study of CPA lesions. Gd- DTPA enhanced Mr scans are more sensitive than standard MR scans in detecting small CPA tumors and in study eliminated the need for invasive air CT cisternograms in patient who had not previously undergone one. It is believed that negative Gd- DTPA enhanced MR scan rules out a CPA tumor. It appears to be safe and no adverse side effects have been seen in patients. *(Wayman, et al 1989)*

THE AIM OF WORK is to determine the role of MRI in diagnosis of CPA lesions.

MRI ANATOMY OF TEMPORAL BONE & CPA

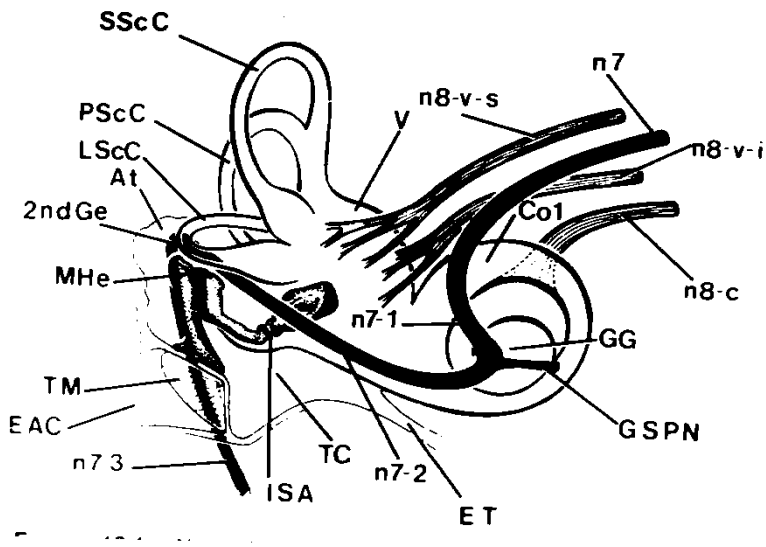

Fig.1: Normal otic anatomy. Modified coronal diagram demonstrating the first division of facial nerve and nervus intermedius (n7) superior to the cochlear nerve (n8-c) within the anterior IAC. They are in front of the superior (n8-v-s) and inferior (n8-v-i) divisions of the vestibular nerve. The cochlear nerve enters the modiolus nucleus of the cochlea and the vestibular nerve enters the vestibule (V). The cochlea is anterior-inferior to the vestibule. The posterior semicircular canal (PScC) shares a common crus with the superior semicircular canal (SScC). The tympanic membrane (TM) separates the external auditory canal (EAC) from the tympanic cavity (TC) the malleus head (MHe) in the attic (At) and incudostapedial articulation (ISA) are labelled. The facial nerve exits the IAC close to its junction with the vestibule and enters the facial nerve canal as the labyrinthine segment (n7-1). The first segment of the facial nerve canal curves around the cochlear base turn (Co1). The first genu of the facial nerve is at the geniculate ganglion (GG). The greater superficial petrosal nerve (GSPN) arises at this point. The horizontal portion of the facial nerve canal (n7-2) in the medial tympanic wall is cranial to the oval window and caudal to the lateral semicircular canal (LScC). At this point, it courses downward at the second genu (2nd Ge) and becomes the "vertical" or third segment of the facial nerve (n7-3). It exits from the vertical facial canal of the mastoid bone at the stylomastoid foramen. The eustachian tube (ET) is shown communicating with the tympanum.