SURGERY FOR ACOUSTIC NEURINOMA
TRANSLABYRINTHINE OPERATION

THESIS
Submitted for partial Fulfilment of
M.D. Degree in Neurosurgery

BY

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﴿ ألم تر أن الله أنزل من السماء ماءً فأخرجنا به ثمرات مختلفاً ألوانها ومن الجبال جددٌ بيضٌ وحمرٌ مختلفٌ ألوانُها وغرابيبُ سودٌ ، ومن الناس والدواب والأنعام مختلفاً ألوانها كذلك إنما يخشى الله من عباده العلماء إن الله عزيزٌ غفور ﴾

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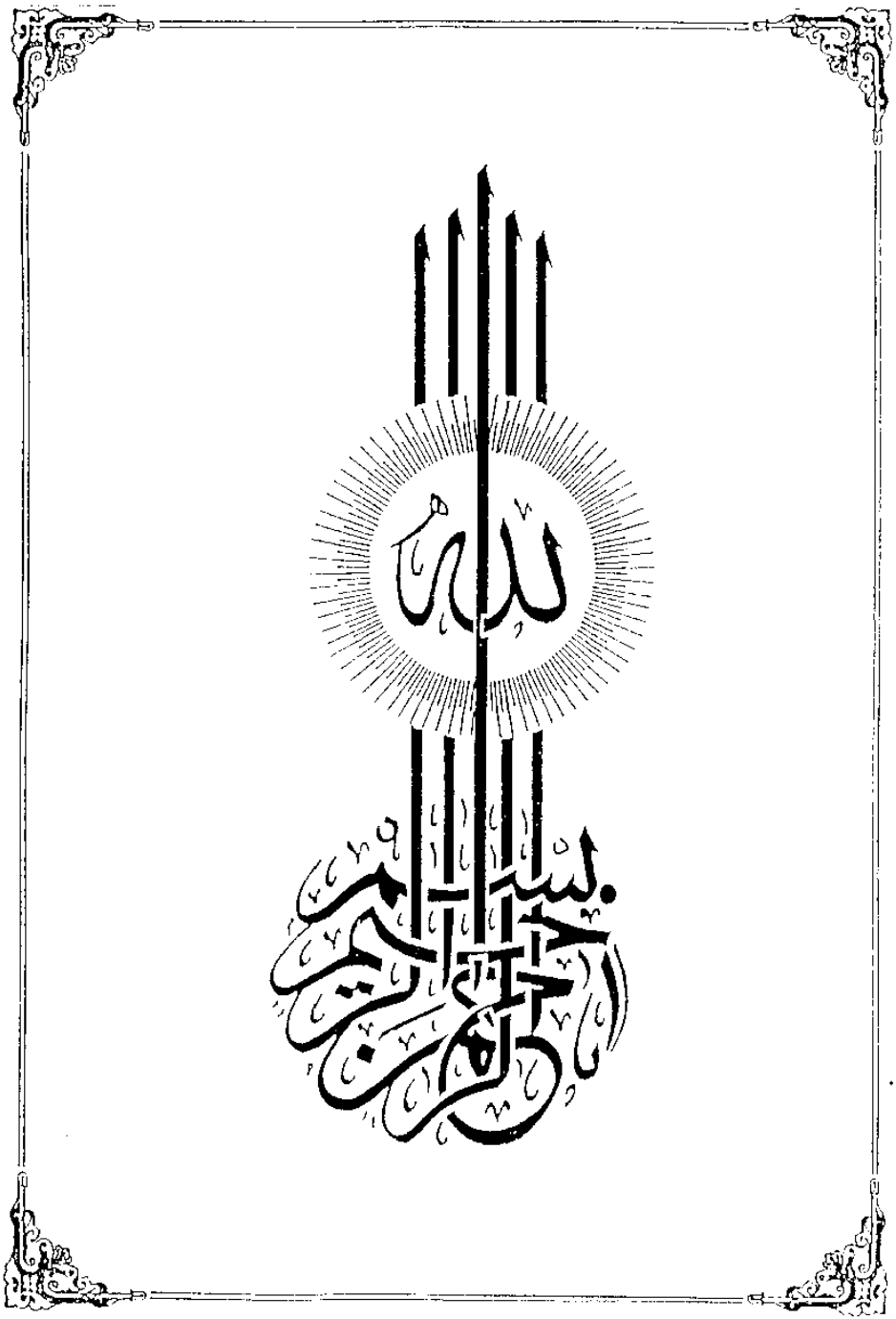

TO MY PARENTS

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CONTENTS

ABREVIATIONS

ABLB	alternate binaural loudness balance
AICA	anterior inferior cerebellar artery
ART	acoustic Reflex Test
BERA	brain stem evoked response audiometry.
CPA	cerebellopontine angle
CSF	cerebrospinal fluid
CT	computered tomography
EAM	external auditory (acoustic) meatus
ENG	electronystagmography
ETL	extended translabyrinthine approach
GCTC	gas CT cisternography
Gd	Gadolinium
Gd-DTPA	Gadolinium-diethylene-triaminepentaacetic acid
HRCT	high resolution computed tomography
Hz	hertz
IAC	internal auditory (acoustic) canal
IAM	Internal auditory (acoustic) meatus
ILD	interaural latency difference
IPL	interpeak latency
IVN	inferior vestibular nerve
IWI	interwave interval
MCTC	metrizamide CT cisternography
MRI	magnetic resonance imaging
Ms	millisecond
PICA	posterior inferior cerebellar artery
PTA	pure tone audiometry (audiogram)
SCA	superior cerebellar artery
SCC	semicircular canal
SDA	sinusodural angle
SDT	speech discrimionation threshold
SISI	short increment sensitivity index
SVN	superior vestibular nerve
T	tesla

INTRODUCTION

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The first descriptions of the acoustic neurinoma date back to the end of XVIIIth century **[269].** In his classic 1917 publication *"Tumors of the Nervus Acusticus and the Syndrome of the Cerebellopontine Angle,"* ***Harvey Cushing*** credited ***Sandifort de Leyden*** with the earliest descriptive account of the tumor in 1777, where he described a tumor originating from the acoustic nerve in an autopsic sample; ***Leveque-Lasource*** with the first clinicopathological correlation in 1810; ***Sir Charles Bell*** with the first clinical account in 1830. ***Cruveilhier*** presented the most complete clinical and pathological description in reports from 1835 to 1842 **[45].** It was ***Toynbee,*** in 1853 who used for the first time the term acoustic neuroma to describe a small tumor of the internal acoustic meatus **[269].**

The history of surgery of the posterior fossa is reflected in the history of the acoustic neuroma. Prior to the twentieth century, occasional attempts at surgery within the cerebellopontine angle (CPA), were carried out. These were associated with extremely high mortality, and most people including surgeons, considered the operations suicidal. After the turn of the century, improvements in anaesthesia and surgical techniques, led to a reduction in mortality and morbidity of neurosurgery in general and surgery of the posterior fossa in particular. The mortality dropped from 85% in ***Henschens*** cases reported in 1910, to 4% by ***Cushing*** 22 years latter **[20].** This high mortality rate testifies to the difficulties encountered with excision of these tumors at the turn of the century. Because it was impossible to diagnose these tumors early, surgical procedures were performed exclusively on patients with large tumors. In

addition, finger enucleation with resulting oedema, hemorrhage, and compromise of brain stem circulation were responsible for these dismal results **[21].**

The first successful operation is attributed to ***Sir Charles Ballance,*** in 1894 **[6]**. The retrosigmoid suboccipital approach was described by ***Krause*** in 1903, but mortality rate at that time was appalling, ranging from 67% to 84% **[98].** This prompted ***Cushing*** to undertake subtotal removal, by intracapsular gutting of the tumor mass **[21],** since most of the cases were diagnosed in the late stage of intracranial hypertension, where the aim of the treatment was to decrease the intracranial pressure **[269].** This reduced the mortality rate to about 25% by 1917 **[45],** and to 4% by 1931 **[46].** Cushing's approach involved a large bilateral suboccipital craniectomy which, besides gaining access to the tumor, provided palliative decompression of the posterior fossa. He made no attempt to dissect the tumor capsule from the brain stem, the cranial nerves, and the important vascular structures **[21].**

The technique for total removal of acoustic tumors was developed by ***Dandy.*** Initially through a bilateral **[47],** and latter through a unilateral suboccipital craniectomy **[48].** On exposure of the tumor, an intracapsular decompression of the tumor mass was performed first. The remaining capsule with residual tumor was excised with careful dissection **[47].** With this approach ***Dandy*** attempted total tumor removal with preservation of the facial nerve, which he achieved with a mortality rate approximately 40% **[49].**

The translabyrinthine operation was proposed by ***Panse*** in 1904, and developed by ***Quix & Schmieglow.*** Both ***Dandy & Cushing,*** were scathing in their criticism of this operation, which they considered futile, dangerous, and necessarily resulting in facial nerve destruction and incomplete tumor removal **[98].** Despite the discouraging comments, ***William House,*** reintroduced this

exposure in 1964, employing modern microsurgical techniques. In his report of 41 operations, there were no deaths and all patients experienced some return of facial nerve function. Excision was incomplete in 10% of patients **[113].**

Since the reintroduction of the translabyrinthine procedure for removal of acoustic neuromas by ***House,*** the classical suboccipital approach has undergone changes too. The discussion of which method is superior is as interesting today as it was 15 years ago. A fruitful discussion of which method is preferable, should be based on thorough analysis of postoperative results and includes many counter balanced parameters as possible **[260]**.

Finally it is to be remembered that progressive improvement in diagnosis and surgical techniques has led to the modern era **[20].** Where complete tumor removal with sparing of the facial nerve has become the focus of attention during the last two decades. With smaller tumors coming to surgery and with the development of microsurgical techniques, surgeons have been able to spare the facial nerve in most cases. In those cases in which this has not been possible, the operating microscope has permitted intracranial anastomosis of a devided seventh nerve, with or without graft **[21].** An operation which was once believed to be impossible is now performed daily **[20].**

AIM 0F THE WORK

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The aim of this work is to study the translabyrinthine approach, stressing on the advantages of this approach as minimal retraction and manipulation of the brain, facial nerve preservation, and the short period of postoperative hospitalization; with discussion of the postoperative course, morbidity and mortality.

ANATOMY