OTOSCLEROSIS, AUDIOLOGICAL APPROACH TO COCHLEAR AND VESTIBULAR EVALUATION

Thesis

Submitted for partial fulfillment of Master Degree in

Audiology

By

Mostafa Youssef Ahmad

M.B., B. Ch.

Supervised By

Prof. Dr. Nadia Kamal

Prof. and Head of Audiology Unit

E.N.T. Dept.

Faculty of Medicine

Ain Shams University

Dr. Nagwa Hazzaa

Lecturer of Audiology, E.N.T. Dept.

Faculty of Medicine

Ain Shams University

Faculty of Medicine

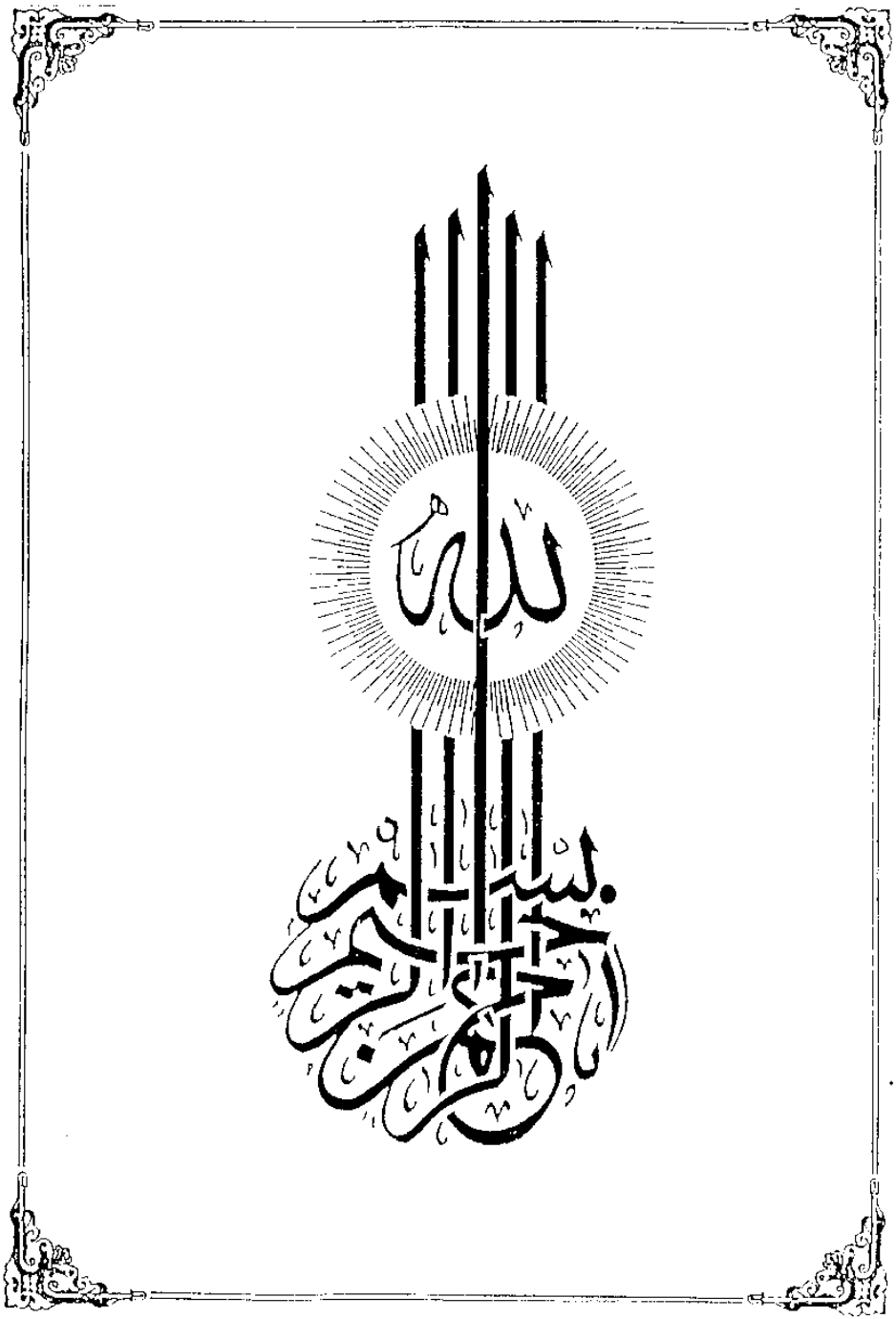
Ain Shams University

1996

بسم الله الرحمن الرحيم

إن الله وملائكته يصلون على النبي يا أيها الذين
آمنوا صلوا عليه وسلموا تسليما *

سورة الأحزاب (٥٦)



ACKNOWLEDGMENT

Thank God, our lord, who taught me how to think; how to write; how to work and how to learn.

I would like to express my deepest gratitude and sincere appreciation to ***Prof. Dr. Nadia Kamal,*** Professor and Head of Audiology Unit, Ain Shams University. She gave me the opportunity to work under her supervision, and this was a great privilege.

I am very grateful and indebted to ***Dr. Nagwa Hazzaa,*** Lecturer of Audiology, Ain Shams University, for her scientific remarks and valuable guidance.

I would like to express my extreme thankfulness to ***my Professor Dr. Abd El-Mateen Mousa,*** Dean of Faculty of Medicine, South Valley University, for his kind support and encouragement.

I wish to extend my thanks to ***all the staff members*** of Audiology Unit, Ain Shams University, for their generous support and guidance.

I am also grateful to ***my colleagues,*** with special thanks to my friend ***Dr. Hossam Sany El-Bahaa.***

Finally, thanks to ***my parents and my teachers,*** to whom I owe everything I have learnt throughout my life.

Mostafa Youssef

CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION AND RATIONALE

INTRODUCTION AND RATIONALE

Otosclerosis (synonym: otospongiosis) is a focal or diffuse spongifying disease of the bony labyrinth **(Donaldson and Snyder, 1993).** The otosclerotic focus may be asymptomatic, however, its usual presentation is conductive hearing loss if it is located in the area of the stapes footplate. When the disease process extends into other parts of the labyrinthine capsule, a sensorineural hearing loss develops, which may be accompanied by vestibular abnormalities **(Hannley, 1993).**

One of the major therapeutic problems encountered in the natural history of otosclerosis are lesions affecting Corti's organ **(Bonfils et al., 1989). Sliwiniska (1989)** reported that conventional bone conduction does not reflect the actual cochlear reserve. Since the description of surface recorded brainstem potentials by **Jewett and Williston** in 1971, the auditory brainstem response (ABR) has been used clinically in the identification and diagnosis of hearing loss.

All hearing impairments do not influence the ABR equally. Typically the latency-intensity functions are different for conductive and sensorineural losses. A conductive hearing loss routinely extends latencies approximately equally across intensity levels **(Finitzo and Friel, 1985)** while a sensorineural hearing loss may result in a variety of latency-intensity functions **(Keith and Greville, 1987). McGee and Clemis (1982)** proposed that the latency-intensity function's relationship to the air conduction audiogram is perhaps a more accurate estimate of the

conductive loss for pure ossicular chain disorders than is the audiometric air-bone gap.

Although less commonly encountered than hearing loss, vestibular symptoms were reported by many patients with otosclerosis **(Hannley, 1993).** Some investigators recommended electronystagmographic evaluation (ENG) of the vestibular function in otosclerotic patients specially in those with vestibular symptoms because of the differences in the therapeutic approaches **(Virolainen, 1972; Cody and Baker, 1978; Emmett and Shea, 1989; and Donaldson and Snyder, 1993).**

Accordingly, ABR and ENG testing combined with the basic conventional hearing assessment may prove to be helpful in establishing the diagnosis of cochlear and/or vestibular disorders in otosclerosis. Subsequently, better planning for the surgical, medical or rehabilitative management could be obtained in otosclerotic patients.

AIMS OF THE WORK

AIMS OF THE WORK

1. To study the latency-intensity function of wave V of the ABR as an index of cochlear affection and to compare the shift of that function with the audiometric air-bone gap in cases of otosclerosis.

2. To study the vestibular function in otosclerotic patients.

3. To study the relation between cochlear and vestibular compromise in those patients.

REVIEW OF THE LITERATURE

REVIEW OF LITERATURE

OTOSCLEROSIS

Otosclerosis is a bone disease unique to the otic capsule. One or more foci of histopathologically distinct abnormal bone in the labyrinth may be asymptomatic or may cause progressive conductive hearing loss, mixed hearing loss, or, occasionally, sensorineural hearing loss. Otosclerosis is an important cause of auditory and, to a lesser extent, vestibular symptoms, and both can be treated effectively in most cases **(Donaldson and Snyder, 1993)**.

Fixation of the stapes as a cause of hearing loss was first recognized by **Joseph Toynbee** in 1860. In 1894, **Politzer** called the ankylosis "otosclerosis". In 1912, **Siebenmann's** microscopic examination showed that the lesion apparently began as a spongification of the bone, hence, the term otospongiosis, which is used in some parts of Europe. If the condition of bony changes and their secondary effects has clinical manifestations, the term used is "clinical otosclerosis", while if the bony changes are not translated into clinical manifestations, the term "histologic otosclerosis" is applicable **(Goycoolea, 1991)**.

Epidemiologic considerations :

The prevalence and incidence of otosclerosis vary depending on whether clinical criteria or autopsy findings and other descriptive features are used to determine its presence **(Donaldson and Snyder, 1993)**. Race also is a factor, Otosclerosis is more common in whites (5 cases per