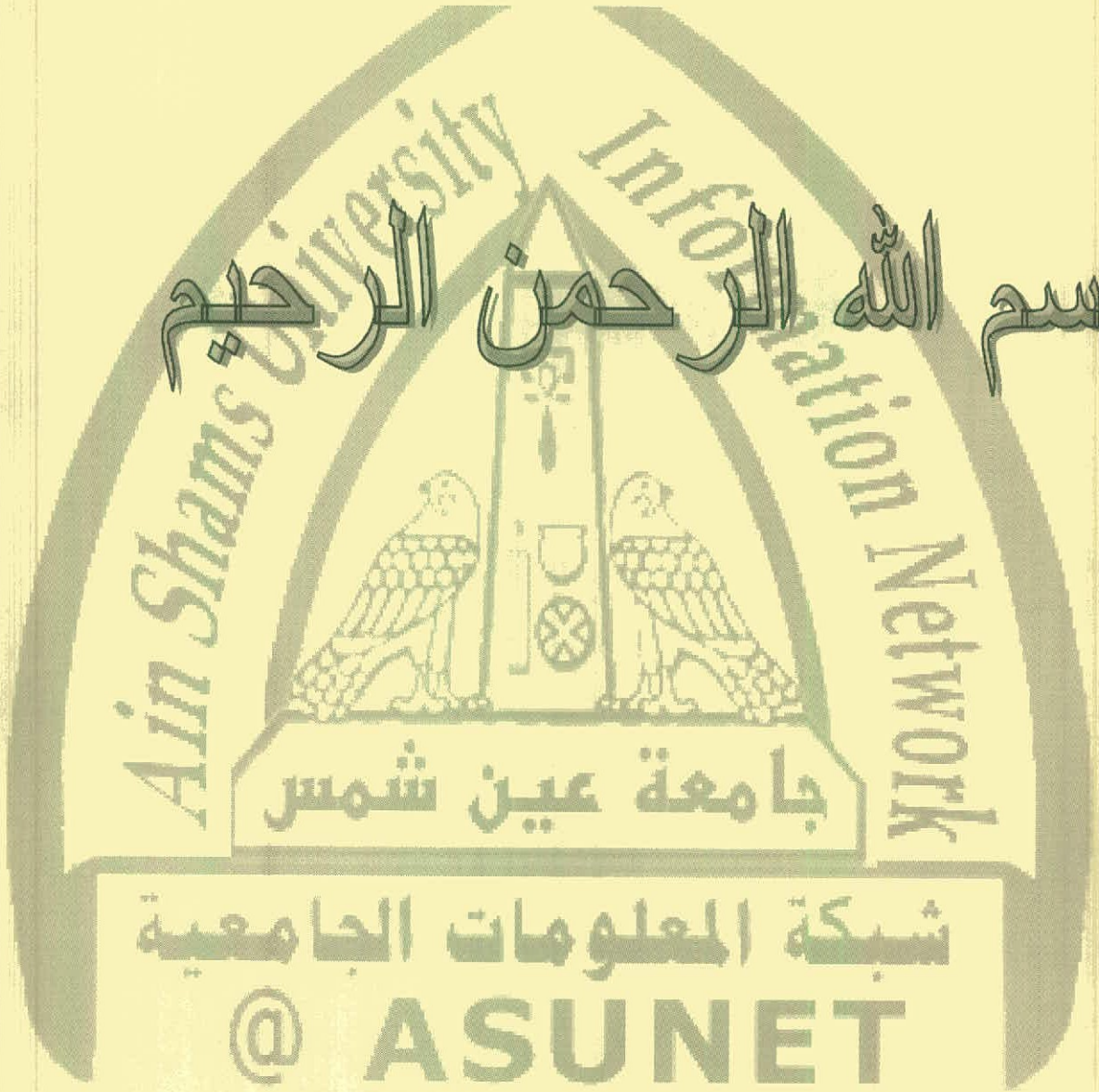

شبكة المعلومات الجامعية




# بسم الله الرحمن الرحيم


# شبكة المعلومات الجامعية

# التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

# جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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# بعض الوثائـــــــق الاصليـــــة تالفـــة

# بالرسالة صفحات لم ترد بالاصل

# MULTIFREQUENCY TYMPANOMETRY AFTER MYRINGOPLASTY WITH INTACT MOBILE OSSICULAR CHAIN



Thesis

Submitted to the
Faculty of Medicine
University of Alexandria
in Partial Fulfillment
of the requirements for the Degree of

**Master of Otorhinolaryngology**

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2003

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# ACKNOWLEDGMENT

I would like to thank **GOD** for giving me the will and power to accomplish this work with the best of my ability.

I would like to express my deepest thanks, appreciation and gratitude to **Prof. Dr. Mohamed A. Mandour**, professor of Otorhinolaryngology, Faculty of Medicine, Alexandria University , whose scientific way of thinking and ever fatherly attitude encouraged me to develop interest in this subject. His planning ideas and continuous valuable guidance created this thesis.

I am greatly indebted to **Prof. Dr Mona I. Mourad**, professor of otorhinolaryngology, Audiolgy division, Faculty of Medicine , Alexandria University for her precious time ,experience , unlimited support and help during this work. she generously gave me a lot of her elegant ideas and much of her precious time during supervising and revising whole work.

I would like also to thank **Dr. Mohamed Badr Eldine**, Assistant Professor of otorhinolaryngology, Faculty of Medicine, Alexandria University. For his active cooperation and constant assistance in the clinical part of the study.

I am deeply indebted to my **Family** for their encouragement, tolerance and continuous support to complete this thesis.

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| ABG | Air-bone gap |
| AC | Air conduction |
| B | Frequency at which the sound pressure curve showed the minimum value. |
| BC | Bone conduction |
| ET | Eustachian tube |
| ME | Middle ear |
| P | The frequency at which the phase curve showed the maximum value |
| $P_{min}$ | The minimum value in the sound pressure curve |
| PTA | Pure tone audiometry |
| RF | Resonance frequency |
| Z | The frequency at which the sound pressure curve crossed the 0-10 dB line |
| θmax | The maximum value of the phase curve. |

# INTRODUCTION

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## Rationale

By definition myringoplasty deals with repair of a tympanic membrane perforation only. The magnitude of the air- bone gap usually reflects the amount of sound transmission loss across the perforated tympanic membrane and the middle ear ossicular chain.

Post-operative assessment of middle ear transmission includes measurements of AC, BC thresholds and evaluation of middle ear pressure and compliance. After successful myringoplasty and in spite of a complete closure of the air-bone gap there may be still a non-compliant middle ear system as measured by single frequency tympanometry.

In order to overcome the limitations of single frequency admittance measurement, use of multifrequency tympanometry shows the middle ear resonance, stiffness and mass acoustic transmission. Combination of all three measurements AC, BC thresholds, mono and multifrequency tympanometry is expected to reveal the acoustical transmission through the grafted tympanic membrane.

## Review of literature

The tympanic membrane is an inverted cone with curved sides. Based upon the mechanical principles of curved membranes, Helmholtz postulated that the tympanic membrane should transform relatively large displacements of the low force, occurring on both sides about midway between the manubrium and the clamped rim, into smaller displacements of larger force at the manubrium. [1, 2, 3] (Figure 1).

The study of the dynamics of the human tympanic membrane is important for better understanding the hearing mechanism of the normal and reconstructed middle ear. The methods reported to measure these vibrations includes capacitive probe, holography, laser interferometer, and a Mossbauer techniques. However, some of these methods are so sophisticated and others are so invasive, that their use is not widespread.[2-6]

The mode of vibration of the tympanic membrane was first measured by Von Bekesy in 1941. Measuring the vibration amplitude for 2 kHz - point by point- by using a capacitive probe, Bekesy concluded that the tympanic membrane vibrated like a stiff plate hinged superiorly around the ossicular axis of rotation. Kirikae using a microscope and photography found that at 0.1-0.8 kHz the vibration of the TM was greatest and symmetrical in a circular intermediate area surrounding the central zone of the TM. [1, 7-10]