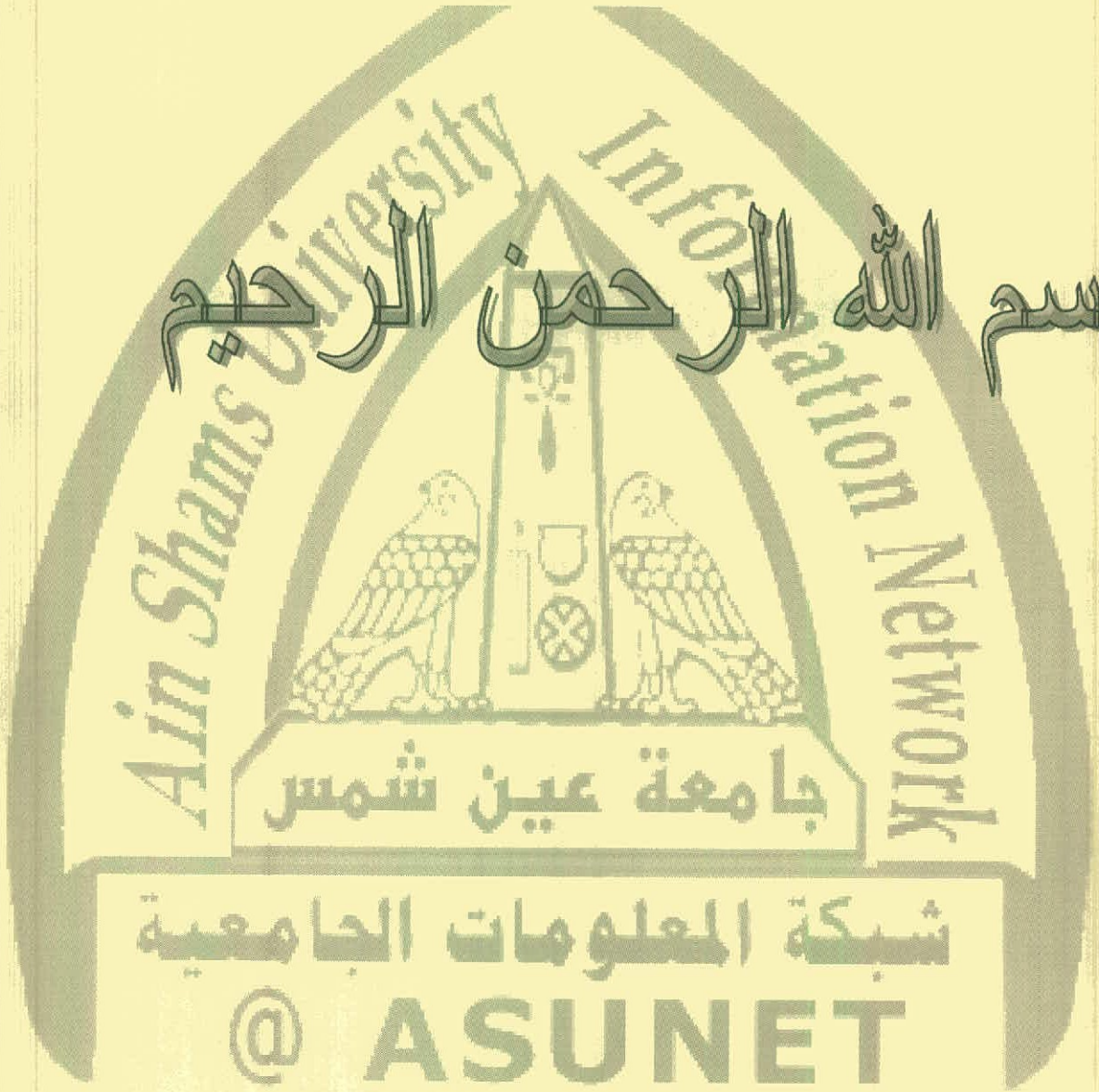
شبكة المعلومات الجامعية



بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

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بالرسالة صفحات لم ترد بالاصل

ASCERTAINMENT OF RESIDUAL HEARING IN SEVERE TO PROFOUND SENSORINEURAL HEARING LOSS IN CHILDREN BY USING ABR-MLR AND SPEECH PROFILE ASSESSMENT

Thesis
Submitted to the Faculty of Medicine,
University of Alexandria,
in partial fulfillment of the requirements
of the degree of
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INTRODUCTION

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Rationale:

Early detection and management of hearing impairment in infants and children is believed to be of paramount importance with respect to subsequent development of language, communication and social skills[1,2]. Optimal procedures for early identification of infants depend on objective electrophysiological tests. The commonly observed agreement between auditory brainstem response (ABR) and behavioral pure tone audiometry has provided objective hearing assessment of infants and children .

For proper management of hearing impairment in infants and children estimation of residual hearing sensitivity becomes fundamental, this is difficult since the most reliable objective measure is the fast ABR which emphasize the activation of sensorineural elements limited to the high frequency regions.[3,4] It is thus critical to evaluate the low frequency regions as well. An alternative approach is to investigate the middle latency responses (MLR) which may provide an estimate of the asynchronusly activated sensorineural elements as compared to the synchronusly activated elements using the click as the fast stimulus for evoking potentials in the surviving sensorineural elements.

The goal of this thesis is to investigate evoked auditory responses generated both asynchronously and synchronously from severely and profoundly impaired cochleas.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Sensorineural Hearing Loss In Children

The joint committee on infant hearing (JCIH) recommends that all infants with hearing loss be identified before three months of age and receive intervention by six months of age. This recommendation necessitates the use of reliable objective measures[5,6].

It has long been recognized that children with congenital or early acquired hearing impairment have high risk of speech and language deficiencies and that the impact on their communication ability may result in poor social adjustment, insufficient educational achievement and economic disadvantage.[7,8] In order to prevent these devastating consequences of hearing loss which is an important health problem, hearing screening has been implemented as part of childhood surveillance programs. A comprehensive audiologic evaluation may follow failure of a hearing screening test in order to establish the magnitude, configuration and symmetry of the hearing loss.[8,9] All these should be followed by treatment, to reduce the deficit in verbal IQ and allow language to follow a normal developmental course.

Traditionally, hearing screening has been targeted to high risk populations, such as those infants who have been in the neonatal intensive care unit, those with a family history of hearing impairment, or those with craniofacial abnormalities etc....[10,11]

Until recently, universal newborn hearing screening has been limited by available screening technology. Two strategies have become available: Evoked Otoacoustic Emissions (EOAE) measures for normal abnormal neonates and infants hearing. Auditory Brainstem Response (ABR) for threshold evaluation.[11]

Auditory Brainstem Response (ABR)

The ABR is considered to be far- field reflections of volume conducted electrical potentials that are generated in the auditory nerve and various nuclei and tracts along the auditory brainstem neuraxis.[12] It is composed of several voltage deflections occurring within the first 15 ms after stimulus onset. These deflections (peaks and troughs) represent synchronous activity generated along the basal turn of the cochlea. The ABR latency epoch consists of five to seven wave peaks. In the newborn and infant populations, the response usually consists of only three wave peaks (I. III and V) whose latency and amplitude differ from adult values.[13.14]

Several experimental strategies have been employed to characterize the neural generators of the ABR components. There is recent and compeling evidence to suggest that the first two peaks (I and II) are generated by the auditory nerve.[15] Peak III is mainly generated by the neurons in the cochlear nucleus but may receive small contributions from VIIIth nerve fibers entering the cochlear nucleus. Peak IV is generated by the neurons in the superior olivary complex, in the cochlear nucleus and probably also in nucleus of the lateral lemniscus.[16] Peak V is generated from the inferior colliculus.[5] Multiple generators responsible for wave V resides at levels of the lateral lemniscus and caudal auditory tract.

Stimulus:

The adequate stimulus to elicit ABR is a fast onset click or a short tone burst which will stimulate the basal region of the cochlea in a synchronus manner. If the response is obtained to a low frequency tone bursts with long rise and fall time a degraded response morphology is

observed.[3] To provide a frequency specific threshold information by ABR, tone bursts, tone pips and filtered click were used as frequency specific stimuli.[17,18] To obtain a frequency specific response for evaluation of the low frequency regions of the cochlea two cycles of the stimulus in the rise fall time for adequate frequency specificity was recommended by Davis.[17] This requirment results in progressively longer rise times for low frequency stimuli because of the increasing cycle periods, which will activate the apical regions of the cochlea yet in an asynchronous response and a degraded morphology is seen.[14] On the other hand, a high frequency stimuli will show shorter duration for two cycles rise and fall time and will provide a synchronus response, with a well defined morphology.

Asynchronus responses are important in assessing surviving sensoryneural populations that may provide functional residual hearing. In this respect an asynchronus response may provide for added information to frequency specificity i.e instead of assessment stimuli known to stimulate frequencies of spectral regions of the cochlea there is assessment of functioning sensorineural elements along cochlear partition to be used in remedial therapy.

Thus comes the search for evoked responses that show readable morphology for desynchronized activation rather than synchronus activation which requires a large active sensorineural elemetns.

Indistinction to fast ABR responses that when elicited by low frequency tone bursts are degraded in morphology and provide ambiguous information for threshold estimation, the MLRs being a slower response are less dependent on neural synchrony and are distinct for longer stimulus duration.