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SCREENING AND DIAGNOSTIC NEWBORN HEARING SCREENING

Risk factors' effect on abnormal auditory brainstem response: 8 years of universal newborn hearing screening

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Introduction

One newborn in every 500-1000 births in the general population is diagnosed with permanent hearing loss. According to literature, in high-risk sub-populations, this incidence may increase 10 to 50 times. Main risk factors of hearing loss in neonates include premature birth (gestational age ≤34 weeks), low birth weight (<1500 g), family history of hearing impairment, TORCH infections, neurological disorders, hyperbilirubinemia, craniofacial anomalies, syndromes known to be associated with hearing loss, ototoxic medication and severe birth asphyxia (APGAR < 7 at 5 min). These children are referred for further diagnostic hearing evaluation which includes auditory brainstem response (ABR), tympanogram and measurement of stapedial reflexes.

In 2015, Greece established the universal newborn hearing screening program. Therefore, beside high-risk pediatric population, those newborns who failed to pass the otoacoustic emissions (OAEs) first-line screening were also referred for the diagnostic test battery.

Objectives

The estimation of abnormal ABR outcome incidence in high-risk pediatric population compared to children without risk factors, through a universal newborn hearing screening program.

Materials and Methods

A retrospective study was conducted comparing the ABR results of referred children within the time period of November 2015 through November 2023. Main reasons for referral and further diagnostic evaluation consisted of either presence of risk factor(s) or failure to pass the OAEs testing. An estimated hearing threshold higher than 40dBHL bilaterally or unilaterally was considered to be an abnormal diagnostic outcome. Descriptive statistics were calculated as frequencies for categorical variables. The chi-square test was used to compare the incidence of abnormal ABR between children with risk factor(s) and children referred due to OAEs failure. Statistical significance was set at <0,05.

Results

Amongst 1422 referred children, 839 (59%) were males, and 583 (41%) were females. The mean age upon examination was 3,7 months old (min:1,0 -max:9,2; SD: 2,01). More specifically, three hundred and forty-two (24%) were referred due to newborn hearing screening failure and one thousand and eighty (76%) due to the presence of risk factor(s). There was no statistically significant difference in the presence of risk factors between genders (p=0,42). Conductive (CHL) and sensorineural hearing loss (SNHL) were diagnosed in 6,2% and 14,7%, respectively.

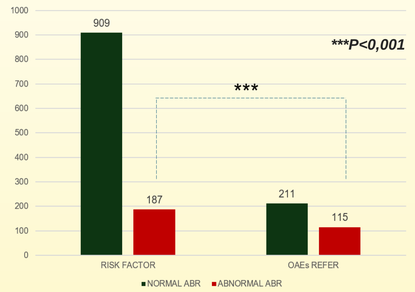

Fig 1. ABR results of the two groups

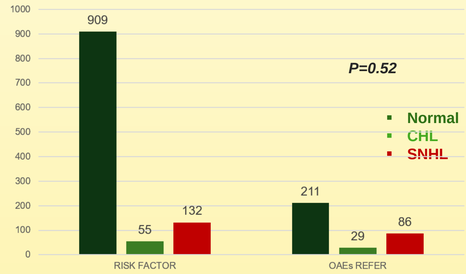

Fig 2. Comparing types of hearing loss between groups

Children with risk factor(s) had a significantly lower incidence of abnormal ABR results compared to those who were referred due to abnormal OAEs (p<0,001) (Fig 1). Children with risk factor(s) did not have a higher incidence of SNHL (p=0,52) (Fig. 2). Our study population's most frequent risk factors were neonatal intensive care unit admission, prematurity and TORCH infections (Fig 3).

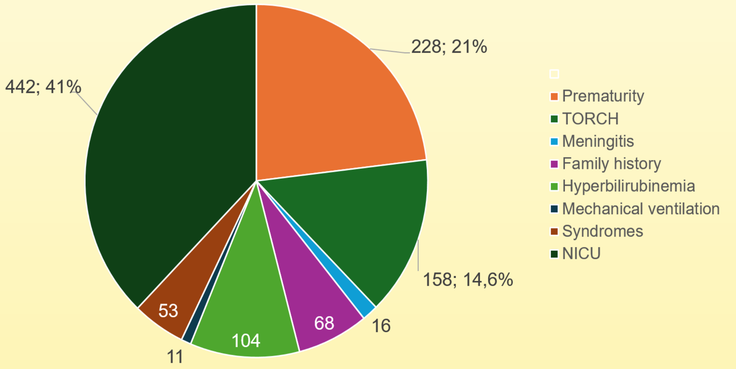

Fig 3. Risk factors' distribution

Conclusion

Our study underlines the importance of universal OAEs screening since there was found no statistically significant difference in the incidence of hearing loss in children presenting with the aforementioned risk factors compared to those who do not. Interestingly, many children of the latter group were diagnosed with middle ear effusion during the diagnostic hearing evaluation.

References

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