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BIRTH BY CESAREAN DELIVERY ON NEWBORN HEARING SCREENING TEST: A RETROSPECTIVE STUDY

ALI GOLJANIAN TABRIZI[1], MAHBOOBE ASADI[1*], BEHROZ BARATI[1], MARYAM SHAHABI RABORI[2]

[1]Faculty of Medicine, Department Of Otolaryngology and Head and Neck Surgery, Shahid Beheshti University of Medical Science, Tehran, Iran
[2]Department of audiology, Tehran University of Medical Science, Tehran, Iran.

ABSTRACT

Hearing loss (HL) is the most common sensory disorder. False positive result of newborn hearing screening increases cost and maternal anxiety and worry. This retrospective observational study was performed in newborn hearing screening center between January 2013, and May 2015.All of the newborns with no risk factors were screened by otoacoustic emission test and timing and results of OAE and AABR tests were recorded.Overall, 1396 infants were studied. Results showed that there was no significant difference between OAE failure rates between two delivery mode groups after 3 day. Post ponding the first OAE after cesarean delivery should be considered to improve success rate, minimize maternal anxiety, and decrease costs.

Keywords: Cesarean, OAE, hearing loss, screening, delivery

INTRODUCTION

Hearing loss (HL) is the most common sensory disorder estimated to affect 70 million people worldwide. [1] Childhood hearing impairment may affect speech and language acquisition, academic achievement and social development. [2] Since the 1990s different screening programs have been applied. [3] It is well known that false positive result of newborn hearing screening increases cost and maternal anxiety and worry. [4] Cesarean delivery is lifesaving procedure for obstructed labor and other emergency obstetrical conditions. [5] However, as other surgical procedure, there are risks of multiple complications and overuse can be harmful .therefore, World Health Organization (WHO) recommended that national rates not exceed 10 to 15 cesarean deliveries per 100 live births. [6] Most studies indicated that infants born by cesarean delivery faced to some problems. [7] The purpose of this study was to investigate the influence of cesarean delivery on the newborn hearing screening test results.

MATERIAL AND METHODS

This retrospective observational study was performed in newborn hearing screening center, Shahid beheshti University, Medical Faculty. All 1396 inborn newborn infants born beyond 37 weeks' gestation between January 2013, and May 2015 were considered for inclusion in the study. All of the newborns with no risk factors were screened by otoacoustic emission test (Otoport Lite, Otodynamics Ltd, UK). Routinely the test was performed before discharge from nursery but in some cases it may postponed. Infants who failed first OAE (at least in 1 ear) had repeated OAE within 10 days (up to 2 OAE tests). If failure persisted, AABR (GSI Audio Screener, Grason-Stadler, Eden Prairie, MN) was then performed. If AABR was abnormal (at least in 1 ear), the infant was referred for further hearing examinations and close follow-up. For each infant included in the study, the timing and results of OAE and AABR tests were recorded. Statistical analysis was performed by using SPSS (Statistics Products Solutions Services) 18.0 software for Windows. The Student t test and x2 test were used for comparison of 2 modes of delivery (cesarean delivery and normal delivery) and hearing test results. A P value of, .05 was considered statistically significant. Overall, 32 neonates were

excluded from study as follows: hospitalization in the NICU (n = 18); microtia (n =1); and history of parental hearing loss (n = 2).

RESULT

Overall, 1396 infants were studied. Among them, 957 infants born by cesarean delivery and 439 infants born by normal delivery. Between 0_3 day 170 infant born by normal delivery underwent hearing screening by the OAE test. Among them 15 infants refer for repeat the OAE test and 3 of them refer for AABR and finally 1 infant refer for further evaluation. Also between 314 infants born by cesarean delivery in this time 38 infants refer for repeat the OAE test and 4 of them refer for AABR and finally 2 infant refer for further evaluation. Comparison the OAE failure rate between the two delivery mode groups showed statistically significant result (Table1).

Table1
1_3 day

Mode of delivery			**OAE 1**		**OAE 2**		**AABR**
Normal vaginal delivery	170	15	P value:0.04	3	P value:0.82	1	**P value:0.91**
Cesarean delivery	314	38		4		2	

Between 106 infants born by normal delivery and 223 infants born by cesarean delivery that screened by OAE test for the first time in 4_6 day, first OAE test failure rate was 11.32 and 11.21 respectively (Table 2).

Table 2
4_6 day

Mode of delivery		**OAE 1**			**OAE 2**	**AABR**	
Normal vaginal delivery	106	12	P value:0.08	4	P value:0.73	2	P value:0.93
Cesarean delivery	223	15		3		1	

Among 104 infants born by normal delivery and 211 infants born by cesarean delivery that did they first OAE test in 7_9 day, first OAE test failure rate reported 7.69 and 10.42 respectively (Table 3).

Table 3
7_9 day

Mode of delivery		**OAE 1**			**OAE 2**	**AABR**	
Normal vaginal delivery	104	8	P value:0.76	2	P value:1	1	P value:1
Cesarean delivery	211	22		2		1	

Finally after 9 day 59 infants born by normal delivery and 209 infants born by cesarean delivery screened for the first time. The OAE failure rates respectively were 16.94 and 8.61 (Table 4).

Table 4
After 9 day

Mode of delivery		**OAE 1**			**OAE 2**	**AABR**	
Normal vaginal delivery	59	10	P value:0.67	1	P value:0.80	_	P value:_
Cesarean delivery	209	18		2		1	

Results showed that there was no significant difference between OAE failure rates between two delivery mode groups after 3 day.

DISCUSSION

The prevalence of infant hearing loss was different in various studies from 1 to 6 in 1000 live births, [8-10] in this study the prevalence of apparent congenital hearing loss (abnormal OAE with abnormal AABR in 1 or both ears) was 6 in 1396 live births. Various studies evaluated the influence of mode of delivery (cesarean delivery and normal vaginal delivery) on false positives first screening test based on screening age. Identification and control of these factors can reduce the rate of false positives. Our results show that, in comparison with normal vaginal delivery, birth by cesarean increased the risk of failure on first OAE (P value: 0.041). This was true up to 72hours of age. In addition, no significant failure rates difference were

recorded between cesarean delivered infants and normal delivered infants on repeat OAE tests(P value:0.82) and after 72 hours. Our findings were somewhat similar with those of Smolkin et al.[11] who found that birth by cesarean delivery in comparison with vaginal delivery increased the risk of failure on first OAE by ~3.2-fold, up to 47 hours of age. Although unlike our finding Smolkin stated, higher failure rates among cesarean delivered infants on repeat OAE tests. They also explained that higher failure rates on first OAE in cesarean born infants even after adjusting for potential confounders including gender, SGA, and age at first OAE Maybe because of delayed fluid resorption from their middle ear similar to that occurring in their lungs, a condition known as TTN. Also the partly similar results reported by Xiao et al.[12] in comparison of OAE test between cesarean born and normal delivery born infants. Cesarean born infants had a 3-fold higher rate of the OAE test failure compared with normal delivery born infants (21% vs. 7.1%). The author believed results of the OAE test changed with different test time regardless of the mode of delivery, and the neonatal OAE test failure rate decreased with time. The difference was not significant between cesarean and normal born infants 42 hours or more after delivery. The effect of gestational age on the first OAE test also evaluated by Smolkin et al.[13] the auther found that Late-preterm and early-term infants had 2-fold higher rates of failure on first OAE (up to 42 hours of life) and needed repeated hearing tests. Failure rates after 42 hours become negligible between term infants and Late-preterm and early-term infants. On the other hand different result reported by Olusanya et al.[14] who found, in addition to nonelective cesarean delivery , vaginal delivery were also associated with a more than 2-fold excess risk of hearing loss (OAE and AABR).the authors suggest that intrapartum stress of the trial of labor is a probable cause. Reviewing various studies showed that the pooled OAE test referral rate was 5.5% and Individual referral rates ranged from 1.3% to 39%; the positive predictive values (PPV) from 2 to 40%. Increasing the age at initial screening and performing retests could reduce the referral rate. [15] Also Failure on OAE in neonates may relate to external ear canal secretions, and removal of external ear debris increased the OAE pass rate. [16] Failure on first OAE increases maternal anxiety and worry and mandates a repeated OAE test with an additional cost. Delaying newborn hearing screening improves test results but may not be practical in all contexts. Further study need to determine the definite time and protocol for hearing screening in cesarean born infants.

CONCLUSION

Early detection of hearing loss and appropriate intervention may cause a considerable change in the quality of life of hard-hearing or deaf children. On the other hand Post ponding the first OAE after cesarean delivery should be considered to improve success rate, minimize maternal anxiety, and decrease costs.

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