



Retrospective analysis of tympanoplasty in children with cleft palate: A 22-year experience



I. Mesotympanic (non-cholesteatomatous) cases

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ABSTRACT

Background: Contradictory data have been published on the outcomes of ear surgeries in cleft patients. **Objectives:** To investigate whether there are differences in the short and long term outcomes of tympanoplasty performed due to childhood chronic mesotympanic otitis media in patients without and with cleft palate.

Setting: Tertiary care pediatric medical centre.

Methods: The authors retrospectively analysed the first author's data on pediatric tympanoplasties of the past 22 years with the help of a computer programme developed by the third author. The outcomes of 159 'NoCleft' tympanoplasties (119 patients, 144 ears) were compared to the outcomes of 31 'Cleft' tympanoplasties (21 patients, 27 ears) with the average age of the patients being 10.8 and 10.7 years accordingly.

Results: The preoperative ABG (28.76/28.94 dB, $p = 0.468$), the best postoperative ABG (12.78/10.04 dB, $p = 0.096$), the last postoperative ABG (15.59/13.19 dB, $p = 0.192$), the final hearing gain (13.17/15.75 dB, $p = 0.253$) and the postoperative ABG deterioration associated with time (2.81/3.15 dB, $p = 0.376$) were statistically compared in the 'NoCleft'/'Cleft' groups. No significant difference was found between the outcomes of the two groups. The same parameters were examined separately after tympanoplasties performed with intact ossicular chain and after those requiring columella ossiculoplasty. The 'Cleft' group did not have worse outcomes in this respect, either. The average follow-up period of the patients was more than 3 years in both groups. The graft take rate was 100%, reperforation occurred in 3.5% of the cases in both groups. In their study, grommet insertion was more likely to be necessary in the 'Cleft' group.

Conclusion: The authors concluded that there was no significant difference between the expectable outcomes of pediatric tympanoplasties in patients with and without cleft palate regarding mesotympanic cases; therefore, the indications for tympanoplasty are the same in the two groups. They outline the importance of the therapeutic management of cleft patients in the frameworks of a "Cleft Palate Team" and the necessity for their lifelong otorhinolaryngological care due to their vulnerable Eustachian tube function. They are planning to publish the same comparative analysis of their patients with cholesteatoma in a following study.

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1. Introduction

According to our current view, the modern treatment of chronic suppurative otitis media is tympanoplasty. Tympanoplasty allows for the establishment of air-tight middle ear cleft and a novomembrane capable of vibration after healing. This procedure

and the reconstruction of the ossicular chain can be performed either simultaneously or in separate sessions. The aim is to achieve a dry, potentially 'swim-proof' ear, to improve or at least preserve hearing, to eliminate chronic purulence or cholesteatoma as well as to protect the neural structures of the inner ear from the further damaging effects of these noxae and potentially prevent recurrence [1,2,3,4].

The long-term maintenance of the achieved outcomes requires adequate middle ear ventilation potentially with intact and automatic Eustachian tube function or if it is not possible, by ventilation tube (grommet) insertion [3,5].

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In children, maintaining the constant atmospheric pressure of the middle ear is of outstanding importance due to their frequent upper respiratory tract catarrhs. Certain craniofacial anomalies directly affecting the opening mechanism of the Eustachian tube particularly complicate the situation. The most expressed examples of this problem are the different forms of cleft palate and the conditions associated with velopharyngeal insufficiency. We should not forget that one of the most significant pathogenetic factors of different chronic otitis processes (mesotympanic and cholesteatomatous) is Eustachian tube dysfunction. Therefore, our tympanoplastic interventions should always be preceded by all possible conservative and surgical methods aiming to restore Eustachian tube function.

Contradictory data have been published on the outcomes of ear surgeries in cleft patients. Earlier studies mention poor results of tympanoplasties in these patients [6,7], while a relatively low number of more recent studies reflect a more optimistic view [8,9].

The aim of this study was to answer whether there were differences in the short and long-term outcomes of tympanoplasty performed due to childhood chronic mesotympanic otitis media in 'NoCleft' and 'Cleft' patients.

2. Materials and methods

During the last 22 years the first author performed 482 tympanoplasties (301 patients, 354 ears) at the Division of Otorhinolaryngology, Department of Pediatrics, University of Pécs Medical School. The average age of the patients at the time of their first surgery was 10.7 ± 3.6 years (3–21.3). Out of these surgeries, he performed 292 tympanoplasties on 161 patients' 183 ears with cholesteatoma, with the average age of the patients being 10.6 ± 3.5 years (3–19.5) and 190 tympanoplasties on 140 patients' 171 ears with chronic mesotympanic otitis media, with the average age being 10.8 ± 3.7 years (3.3–21.3). Since 1996, the surgeon has performed the inevitably necessary tympanoplasties of patients with cleft palate in the frameworks of the 'Cleft Lip and Palate Team'. At present, the team is responsible for the medical care of more than 500 children with cleft palate. Physicians from different disciplines are involved in the team in order to handle the diverse problems of cleft patients.

In our present study, we analysed the surgical data and hearing test results of all the patients ('NoCleft' and 'Cleft') who were operated due to chronic mesotympanic otitis media between 17th July, 1990 and 30th October, 2012 at the Division of Otorhinolaryngology, Department of Pediatrics, University of Pécs Medical School. Therefore, no type of patient selection was applied; the rate of evaluable results was only influenced by the appropriate number of patient visits. The third author developed a computer programme for the detailed analysis of tympanoplasty outcomes and statistical data processing (Pytel SoftWare 2003). According to current guidelines, pure-tone averages were calculated by averaging the thresholds for pure tones at 0.5, 1, 2 and 3 kHz [10]. All surgical data as well as all pre- and postoperative audiograms in connection with the tympanoplasties were registered in the database of Pytel SoftWare. Pytel SoftWare is capable of recording and statistically analysing many kinds of data: the patient's personal data, type and stage of disease, type of surgeries on each ear and temporal registration of audiograms during follow-up. The software selects data according to the desired aspects and makes statistics including average audiograms, average air-bone gap values (ABG) for each frequency spectrum, their distribution and numeric average and all of these statistics can be made pre- and postoperatively. Furthermore, the software makes a percentage distribution table of the average ABGs in 10 dB bins. The best and last postoperative values can be illustrated separately or together for easier comparison. Individual follow-up curves can be made for each ear with different coloured curves for

average air and bone conduction values and for the ipsilateral bone conduction value at 4000 Hz. The abscissa clearly shows the time and type of surgeries performed on the respective ear [3,11].

The surgeon has followed the doctrines of the school of ear surgery marked by the name of Professor Bauer since the very beginning of his career [1,2,3,11,12]. He underlines the importance of the potentially preoperative restoration of Eustachian tube function. This means the mainly conservative treatment of chronic rhinosinusitis cases, the treatment of nasal allergy symptoms; in rare cases, the surgical treatment of suspected septum deviation and in the majority of no-cleft patients, surgical adenoidectomy several months before the ear surgery. He has always applied uniform surgical techniques, which basically means closed techniques. He has performed the reconstruction of the tympanic membrane with underlaid fascia grafts in all cases mostly using the aponeurosis of the temporal muscle [1,2,3,12]. In rare cases, he used the periosteum of the temporal region. The author does not fear from skin elevation in the region of the pretympenic sinus (he pares the bony bulge of the ear canal wall with a drill for better visualization and access). Therefore, this fascia flap can be pushed forward almost until the border of the anterior quadrants, and it can be laid on the neighbouring bony ear canal wall. Normally, the surgeon creates one single tunnel in the anterior-superior quadrant which allows for 'pull-back'. He can successfully prevent lateralisation or blunting (subepithelial connective tissue accumulation in the pretympenic sinus), which can probably be attributed to the continuous use of the underlay technique applied from the beginning of his career. Mastoidectomy was performed in nearly all cases. According to the doctrines of the Bauer School, the original aim of mastoidectomy in non-cholesteatomatous cases was to eliminate the potential pathological conditions in the mastoid cell system responsible for chronic purulence and to provide extensive aditus ad antrum permeability, thus providing an air-tight mastoid cavity. In the past few years, we no longer insisted on the routine performance of mastoidectomy but for the sake of standard processing, we did not change the technique. Ossicular chain reconstruction was carried out with autogenous cortical bone columellae in all cases, according to the methods described by Bauer. This technique means placing the columella between the stapes head and the novomembrane in case of intact, mobile stapes ('short type columella', on the analogy of PORP—partial ossicular replacement prosthesis), while in case of missing stapes crura but mobile stapes footplate, the columella is placed between the stapes footplate and the novomembrane ('long type columella', on the analogy of TORP—total ossicular replacement prosthesis) [1,2,3,13].

Ventilation tube (grommet) insertion was always carried out when necessary depending on the results of microscopic and audiological examinations, irrespective of previous operations on the ear and the presence of cleft palate. Intraoperative grommet insertion was performed when Valsalva positivity could not be ensured preoperatively, and there was no hope that the patient would be able to get air into the middle ear cavity after tympanoplasty. Postoperative grommet insertion was carried out when significant and progressive novomembrane retraction was detected after wound healing with signs of seromucous discharge accumulation behind the membrane; therefore, type C tympanogram was seen, and these processes showed no improvement several weeks after the surgery. In mesotympanic cases, where the lateral bony wall of the attic was not extensively removed in any of the cases, no development of postoperative attic retraction pocket could be detected.

The inevitably necessary cleft palate closure of our cleft patients was carried out at the age of 18 months according to the current guidelines of our team.

In most cases, the statistical comparison of the identical data of the two patient groups was performed with Student *t*-test

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