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The role of autologous conchal cartilage in ossiculoplasty during canal wall down mastoidectomy

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ABSTRACT

Background: This study was done to evaluate the hearing outcome in patients undergoing ossiculoplasty using autograft cartilage in canal wall down surgery for cholesteatoma.
Methods: This is a retrospective study. This was conducted in a tertiary care hospital from January 2011 to January 2014. This study included 54 patients who underwent canal wall down mastoidectomy with tympanoplasty during this period.
Results: Preoperative and postoperative ABG for short columella were 23.13 dB (±11.21) and 12.66 dB (±8.92) respectively. Preoperative and post-operative ABG for long columella were 36.96 dB (±6.73) and 24.77 dB (±10.36) respectively. This is statistically significant.
Conclusions: The use of autologous cartilage in ossiculoplasty during canal wall down mastoidectomy gives excellent hearing gain. It is also a cheaper option which is financially feasible in developing countries.

Keywords: Autologous, Biocompatible, Cartilage, Cholesteatoma, Columella

INTRODUCTION

There has been extensive evolution in most of the otolaryngology surgeries. The surgery for eradication and reconstruction of middle ear in cholesteatoma is still under developed. There have been numerous attempts by various surgeons to give a dry and serviceable ear by different techniques, but most of which have failed to do so. This has led to recurrence and poor hearing.

Primarily most of the surgeries for cholesteatoma are aimed to eradicate it, as it has propensity to destroy the surrounding structure and lead to dreaded complication.[1,2] In that canal wall down mactoidectomy (CWD) is able to fulfill this aim to certain extent.[3] Thus it is the most favored surgery for eradication of cholesteatoma. Very few surgeons are concerned about hearing in management of patients with cholesteatoma. Because of which there has been not much research for restoration of hearing in cholesteatoma patients. Biocompatible materials are being used for restoration of hearing but have limited success.[4] In developing countries using biocompatible materials for ossiculoplasty is financially unbearable.

The aim of this retrospective study is to evaluate the hearing outcome in patients undergoing ossiculoplasty using autograft cartilage in canal wall down surgery for cholesteatoma.

METHODS

This retrospective study was conducted in a tertiary care hospital between January 2011 to January 2014. Where in

54 patients who underwent canal wall down mastoidectomy with tympanoplasty in our hospital were included in this study.

Patients of all age group, who underwent CWD mastoidectomy with ossiculoplasty using external auditory canal floor cartilage for cholesteatoma involving middle ear and mastoid, were included in this study. The criteria for exclusion from study were: patients who had complications, patients with recurrence and patients in whom other materials were used for ossiculoplasty.

Surgical technique

All patients selected were subjected to canal wall down mastoidectomy with tympanoplasty (ossiculoplasty) at single sitting. All surgeries were done through post aural approach. Cholesteatoma was cleared from mastoid and middle ear completely. Ossiculoplasty was done using external auditory canal floor cartilage (Figure 1). All patients underwent either myringostapediopexy (short columella) or myringoplatinopexy (long columella) depending on presence or absence of stapes superstructure (Figure 2).[5] Middle ear and mastoid obliteration was done with soft tissue graft meatoplasty was done followed by myringoplasty with temporalis fascia.

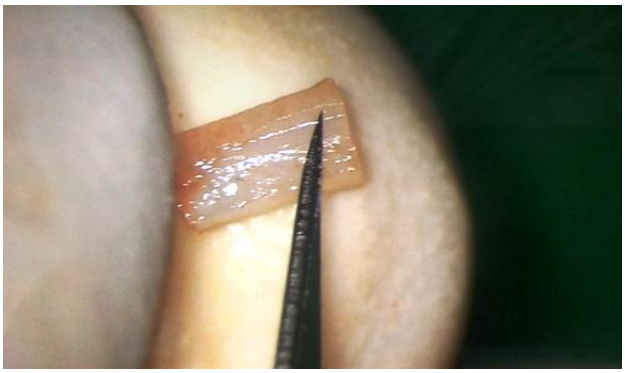

Figure 1: Conchal cartilage being sculptured to approximate dimension.

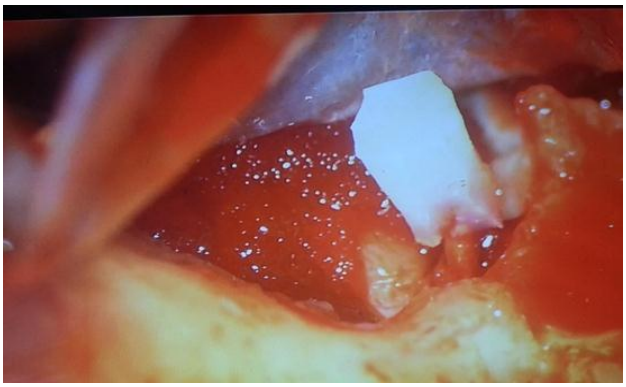

Figure 2: Sculptured cartilage placed on to the head of stapes, after elevating the placed temporalis fascia graft.

All the selected patients underwent routine investigations. HRCT temporal bone was done. Pure tone audiometry (PTA) was done preoperatively and 6 months postoperatively. The mean PTA average of 0.5 KHz, 1 KHz, 2 KHz was taken preoperatively and 6 months postoperatively for comparison. Student T test was applied and the p values were calculated for patients undergoing short and long columella ossiculoplasty.

RESULTS

Out of 54 patients included in the study 31 were males and 23 were females. Myringostapediopexy was done in 22 patients and 32 patients underwent myringo-platinopexy. This indicates that all of the patients in study group had incus erosion. In which 32 patients had simultaneous erosion of stapes. PTA average for air conduction was 37.2 dB (±13.87) preoperatively and postoperatively the PTA average for air conduction was 22.75 (±10.15). The bone conduction PTA were12.5 dB (±2.63) pre-operative and 12 dB (±2.58) post-operative respectively (Figure 3). Preoperative and postoperative ABG for short columella were 23.13 dB (±11.21) and 12.66 dB (±8.92) respectively. The gain being 10.47 dB. Preoperative and post-operative ABG for long columella were 36.96 dB (±6.73) and 24.77 dB (±10.36) respectively. The gain being 12.19 dB (Figure 4). Student T test was applied and p values were calculated. P value was <0.05 for air bone gap for short columella. Similarly the p value for long columella ossiculoplasty was <0.05. This indicates it to be statistically significant.

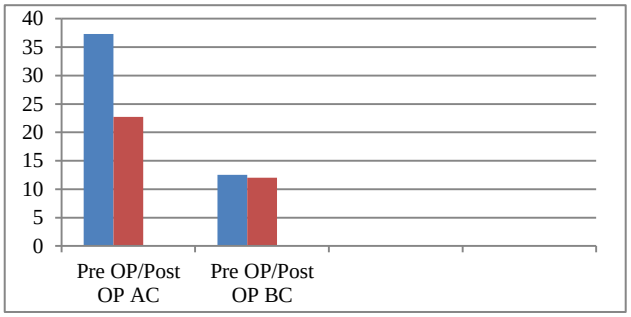

Table 1: Bar chart representing pre/ post op air conduction and bone conduction thresholds.

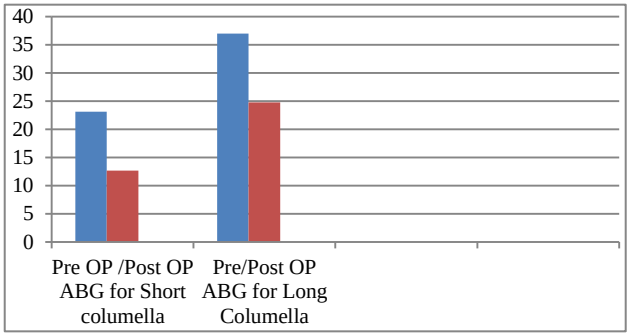

Table 2: Bar chart showing comparison of pre/post op air bone gap in short and long columella ossiculoplasty.

DISCUSSION

Numerous great otologists have tried hard to improvise the surgery for cholesteatoma since the beginning of 20th century. They devised different technique to eradicate it from middle ear and mastoid, in which they are successful to great extent. But the restoration of middle ear function is still enigma to otologist all over the world.

Though few of the otologist are of the opinion that cholesteatoma can be treated by intact canal wall technique. Most of the otologist are of the opinion that canal wall down mastoidectomy is the gold standard in treatment of cholesteatoma.[6]

Hearing loss seen in squamosal type of chronic otitis media is more owing to ossicular erosion associated with cholesteatoma. Previously the chance of recurrence of cholesteatoma was very high because of which very few otologist attempted reconstruction. The scenario has changed now with advent of advanced instrumentation.

In most cases of cholesteatoma, incus is the commonest ossicle necrosed followed by stapes. Malleus is the most resistant for erosion and most important predictor of hearing outcome in most cases of cholesteatoma surgery, ossicular reconstruction was done depending on presence or absence of stapes superstructure.[5-9] In most cases of ossicular reconstruction preference is given to autologous materials.[4] Autogenic materials like ossicles, cortical bone and cartilage can be used for grafting. Since the cortical bone gets absorbed, cartilage and ossicle are best for ossiculoplasty.[9] Homologous grafts, like cartilage, ossicles are also being used in ossiculoplasty in case autologous graft is not available.[10] The graft being used should be of optimum size for good hearing gain.[11] Synthetic graft materials like plastipore, hydroxyapatite and titanium are also being used in ossiculoplasty.[12] Use of titanium prosthesis for ossicular reconstruction provides good hearing results.[13,14] In developing countries the usage of autologous graft is more feasible instead of the costlier synthetic graft. The hearing results with autologous graft are similar to that of synthetic graft.[15,16]

The results of our study are very much similar to other studies conducted.[11,15,16] The hearing gain seen following long columella (myringoplatinopexy) ossiculoplasty was marginally better than short columella ossiculoplasty. In our study conchal cartilage which is removed during meatoplasty procedure was used for reconstruction of ossicular chain. In our study, conchal cartilage removed during meatoplasty was used for ossiculoplasty. In developing countries most of the patients of squamosal type of CSOM are of lower socioeconomic status. The use of biosynthetic materials for ossiculoplasty in them is not feasible. There is no need for separate incision to harvest conchal cartilage.in developing countries like ours were most of the patients of squamosal type of chronic suppurative otitis media are from lower socioeconomic strata; the usage of biosynthetic materials for ossiculoplasty is economically not feasible. Moreover the hearing results associated with autologous graft is very much similar to that of biosynthetic materials[15, 16]. Thus patients undergoing CWD surgery should simultaneously undergo hearing restoration with ossiculoplasty with autograft cartilage.

CONCLUSION

From our study we conclude that all patients who undergo CWD surgery should simultaneously undergo restoration of hearing with ossiculoplasty using autologous conchal cartilage. The use of autologous cartilage in ossiculoplasty decreases the financial burden tremendously. It can be harvested easily while performing meatoplasty. The hearing gain achieved is excellent and in par with other materials.

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