What is an adequate meatoplasty?
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Abstract

Aim: To evaluate the different types of meatoplasty procedures and size of meatoplasty in canal wall down mastoidectomy (CWD) with tympanoplasty and to recommend the adequate size of meatoplasty for proper aeration and drainage of mastoid cavity.

Methodology: A prospective and retrospective observational study was conducted from 1st May 2012 to 30th April 2013 at the Dept of ENT and Head & Neck Surgery, at a tertiary care institute. All 48 patients having squamosal type CSOM, in the age range of 12 to 50 years were selected. Four different groups were made with 12 cases each having similar age range and sex composition. Standard surgical procedure for CWD mastoidectomy with tympanoplasty by a single senior surgeon was performed with four different techniques of meatoplasty namely korner’s flap, siebenmann’s flap, Mawson’s flap and Bhatia et al’s flap. Each patient were follow up at 3weeks, 6 weeks, 3month, 6 month and 1year after surgery for reassessment. One way ANOVA and students’ paired ‘t’ were used for comparison of results.

Result: The mean size of Conchomeatoplasty in our study group was 1.59 cm. The mean decrease in the diameter of the conchomeatoplasty at the 3 month post operative follow up was 3mm (18.8%). The mean volume of mastoid cavity at the end of surgery was 4.37 ml. The mean reduction in the volume at end of 3 months after surgery was 0.81 ml.

Conclusion: Conchomeatoplasty is an essential part of canal wall down mastoidectomy procedure. It provides a channel for the epithelialisation of the raw post operative mastoid cavity, drainage of secretions, aeration of the entire cavity and post operative care. Adequate meatoplasty means that it should be large enough to cater to the needs of post operative cavity which has a much larger volume than the space that is normally exposed to the natural meatus.

Key words: Canal wall down mastoidectomy, conchomeatoplasty, unsafe, CSOM.

Introduction:
The global burden of chronic suppurative otitis media (CSOM) involves 65-330 million individuals. In India, the prevalence of CSOM is above 4%. CSOM may be safe or unsafe type. Unsafe CSOM often need a canal wall down (CWD) mastoidectomy for complete eradication of disease with or without Tympanoplasty with the creation of mastoid cavity exteriorized into the external auditory canal.

An adequate Conchomeatoplasty is necessary with the CWD mastoidectomy to facilitate adequate ventilation of the exteriorised cavity, egress of desquamated epithelial debris and provide access to the mastoid bowl for the rest of the life of the patient. Meatoplasty should be so performed as to achieve adequate size of meatus in accordance with the size of mastoid cavity to provide an adequate surface volume ratio for aeration, epithelial stability and good postoperative visualization of the cavity. The volume V/S/ (V- volume of air circulating through mastoid cavity, S- surface area of the mastoid cavity) ratio provides the relation between the size of the cavity and that of meatoplasty.

A large meatoplasty aid epithelialisation of the mastoid cavity and eases post operative care. On the other hand, a disproportionately large meatoplasty will cause water intolerance and ill fittings hearing aids apart from poor cosmesis.

Use of a surgical technique continuously gets refined in patients having different health-and disease contexts. A variety of approaches to surgical procedures are applied to construct an adequate and persistent Conchomeatoplasty opening eg. Korner’s flap, siebenmann’s flap, Mawson’s flap, 3 flap meatoplasty, Fisch meatoplasty, Bhatia et al’s technique etc. to name a few. Studies available in literature reveals no clinical determinants for choice of particular meatoplasty technique.

Material and methods:
A prospective and retrospective observational study was conducted from 1st May 2012 to 30th April 2013 at the Dept of ENT and Head & Neck Surgery, at a tertiary care institute. All 48 patients having unsafe CSOM, in the age range of 12 to 50 years were selected. Four different groups were made with 12 cases each having similar age range and sex composition. Standard surgical procedure for CWD mastoidectomy with tympanoplasty by a single senior surgeon was performed with four different
techniques of meatoplasty namely korner's flap, siebenmann's flap, Mawson's flap and Bhatia et al's flap. Patients under the age of 12 years and those with intracranial complications were excluded from the study.

The size of meatoplasty was measured by a measuring gauze at the end of the surgery and subsequently at the follow up visits. The diameter of conchomeatoplasty was measured from the medial end of tragal cartilage horizontally backwards touching the anterior margin of the conchal bowl. The volume of the mastoid cavity was measured by instilling saline into the mastoid bowl from an insulin syringe and measuring the volume of saline required to fill the bowl at end of drill work during surgery and at subsequent follow up visits.

Each patient were follow up at 3 weeks, 6 weeks, 3 month, 6 month and lyear after surgery for reassessment.

Percentage and proportions of each procedure of Conchomeatoplasty was tabulated including details of patients condition, surgery, result and outcomes.

One way ANOVA and students' paired 't' test were used for comparision of results within one surgical method, for different degrees of change in meatus size and non problematic mastoid cavity.

Results:
The mean size of conchomeatoplasty in our study group was 1.59. The mean size of the meatoplasty for korner's technique was 1.6cm; for Siebenman's technique, 1.57cm; for Mawson's technique, 1.57cm; and Bhatia et al's technique 1.64cm.

The mean decrease in the diameter of the conchomeatoplasty at the 3 month operative follow up was 3mm (18.8%). The mean decrease in the size of conchomeatoplasty for korner's technique was 3mm (18.75%); for Siebenman's technique 2.8mm (17.83%); for Mawson technique 3.2mm (20.38%); and for Bhatia et al's technique, 3.4mm (20.73%).

The mean volume of the mastoid cavity at the end of the surgery was 4.37ml. For korner's technique the volume was 4.44ml, for siebenman's technique , 4.06; for Mawson's technique 4.09 ml; and for Bhatia et al 4.88ml.

The mean reduction in the volume at the end of 3 months after surgery was 0.81ml. The mean contraction in the volume for korner's technique was 0.89ml; Siebenman's technique, 0.68ml; for Mawsons technique 0.67 ml; and Bhatia et al's technique, 1.0ml.

Discussion:
CWD mastoidectomy with tympanoplasty is our choice of surgery in extensive unsafe variety of CSOM. The three principles of the surgery are elimination of progressive disease, modification of anatomy of tympanomastoid compartment and reconstruction of hearing mechanism. An adequate and proportionate conchomeatoplasty by size in relation to the mastoid cavity size is essential to achieve dry cavity in majority of the cases.

Meatoplasty is probably the most neglected and often the worst performed part of the mastoid surgery. An inadequately performed meatoplasty or subsequent stenosis due infection results in inadequate ventilation of the cavity or a cavity that is not self cleansing with accumulation of debris and secondary infection.

Adequate conchomeatoplasty should be a routine part of a canal wall down procedure. It should be so designed as to provide a well epithelialised wide opening for ventilation of the mastoid cavity, while allowing proper sound conduction along with visualization and self drainage of the cavity.

Portman M & Portmann D* (1989) opined that after meticulous canal wall down mastoidectomy, it's essential to fashion a sufficiently large conchomeatoplasty. With time the depths of the cavity become lined by squamous epithelium, which must be adequately aerated if it is to remain biologically stable; otherwise there is risk of recurrent cholesteatoma. This is law of V/S ratio, where V represents the volume of circulating air arising from outside, and S represents the surface area of the cavity which is essential to aerated. If'S' is very large, then V must also be large. The authors used three flap meatochonchoplasty (one chonchal and two meatal flaps) with removal of cartilage to greater or lesser extent*.

Pariser SC, Levenson MJ & Hanson MB (1996) observed, that an adequately large meatus measures about 1.5 cm in diameter and should easily accommodate the surgeon's index finger.

One of the objectives of the study was to evaluate the different types of conchomeatoplasty procedures as well as the resuting size of the conchomeatoplasty with follow up result in patients of canal wall down mastoidectomy and tympanoplasty.

The outcome parameter of conchomeatoplasty size and reduction in mastoid cavity volume at 3 months follow up after surgery, did not significantly differ in our study.

The surgical technique performed by a single surgeon as per his discretion to the choice of conchomeatoplasty technique appears as the major basis for surgical outcome.

Conclusion:
Conchomeatoplasty is an essential part of the canal wall down mastoidectomy. It provides a channel for the epithelialisation of the raw post operative mastoid cavity, drainage of the secretions, aeration of the entire cavity and

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post operative care. Adequate meatoplasty means that, it should be such to cater to the needs of post operative cavity which has a much larger volume than the space that is exposed to the natural meatus.

References: