

A COMPARATIVE STUDY OF CANAL WALL UP AND CANAL WALL DOWN PROCEDURES IN THE MANAGEMENT OF ATTICOANTRAL DISEASE

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ABSTRACT

BACKGROUND

Canal wall down and canal wall up mastoidectomy represent two surgical approaches to middle ear cleft pathology. Much literature has been devoted to the merits and demerits of these two procedures. In terms of eradication of disease and hearing improvement, a prospective analytical study is done on canal wall up and canal wall down techniques in atticoantral type of CSOM.

MATERIALS AND METHODS

The study was carried out at Government ENT Hospital, Visakhapatnam, from June 2016 to June 2017. A total number of 250 patients with atticoantral variety of CSOM were included in the study and subjected to surgical treatment by canal wall up or canal wall down mastoidectomy along with tympanoplasty.

RESULTS

Results were analysed in terms of condition of cavity, condition of graft and gain in hearing. In patients who underwent canal wall up tympanomastoidectomy, there were 91.3% of graft take up and also improvement in hearing. In patients who underwent canal wall down tympanomastoidectomy, the outcome was excellent with 93.49% graft take up and 92.68% restoration of hearing.

CONCLUSION

Although, the statistical evidence of success is almost similar in both the procedures, yet canal wall down procedure provides maximum benefit to patients with low socioeconomic status and poor follow up in terms of eradication of disease and hearing improvement.

KEYWORDS

Cholesteatoma, Canal Wall Down, Canal Wall Up, Mastoidectomy, Chronic Suppurative Otitis Media.

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BACKGROUND

Chronic Suppurative Otitis Media (CSOM) is clinically characterised as an inflammatory condition associated with otorrhoea and tympanic membrane perforation in some cases. The disease course is more than 3 months in duration and histopathologically it is associated with irreversible tissue changes and significant hearing loss.¹ It is characterised by epithelial accumulation with keratin production in the middle ear. Atticoantral disease erodes the bone, destroys the ossicles and has the potential to cause life-threatening complications. Cholesteatoma is classified as congenital or acquired and is further categorised as primary or secondary cholesteatoma. The incidence of CSOM is

higher in less developed countries. Malnutrition, poor hygiene and higher population densities are factors that are associated with a higher incidence of middle ear infections.² It is widely accepted that CSOM with atticoantral disease invariably requires surgical management. Generally, two surgical approaches canal wall up and canal wall down mastoidectomy have been performed in CSOM with atticoantral disease. Otological symptoms, clinical findings, audiometric evaluation, operative procedures and results were evaluated in this study of management of unsafe type of CSOM. Air and bone conduction thresholds were analysed. The air-bone gaps of the diseased ears were analysed pre and postoperatively.

Canal wall down mastoidectomy allows for better visualisation, greater assurance of cholesteatoma eradication and a lower recurrence rate than canal wall up mastoidectomy. On the other hand, canal wall up mastoidectomy is not associated with mastoid bowl problems and allows for good hearing outcomes. However, it is associated with higher recurrence rate than canal wall down mastoidectomy owing to poor visualisation and an increased likelihood of the postoperative formation of a

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retraction pocket. Retrograde tympanomastoidectomy combines the virtues of both canal wall down and canal wall up procedures by the partial or entire removal of the posterior bony canal wall depending on disease extent.^{3,4}

Involvement of attic, antrum and mastoid cavity with cholesteatoma necessitates either a canal wall down mastoidectomy or an intact canal wall mastoidectomy. The operation performed was canal wall down mastoidectomy with tympanoplasty in majority cases and the rest with intact canal wall mastoidectomy with tympanoplasty. The postoperative result with intact canal wall mastoidectomy is anatomically and functionally more similar to normal ear. This technique however is associated with some incidence of residual and recurrent cholesteatoma, if proper care is not taken in the removal of disease from key areas like sinus tympani, around intact ossicular chain and facial recess. Sometimes, one may have to take a bit of canal wall in order to gain access to hidden areas followed by reconstruction of the defect. In cases which are encountered with recurrent or residual disease, canal wall down technique is employed in order to make ear free of disease.

A plethora of literature cites the benefits and pitfalls of canal wall up mastoidectomy and canal wall down mastoidectomy with mastoid obliteration/canal wall reconstruction techniques. The primary goal of cholesteatoma surgery is to clear the disease and produce a safe and stable ear, but there is still debate on whether these goals are best achieved by canal wall down or canal wall up procedures. Improvement of hearing is important, but should not be at the cost of the primary goal.

Modified radical mastoidectomy is an evolutionary surgical development that attempts to incorporate the major goal of cholesteatoma surgery, i.e. exteriorisation of disease with sealing of middle ear space to avoid chronic drainage from exposed mucous membrane. It allows good visualisation and proportionally good chance of complete removal of disease. The mastoid and middle ear can be readily inspected in the follow up period in the outpatient setting. This procedure along with tympanoplasty is widely performed for cholesteatoma with the advantage of less recurrences and good hearing.

MATERIALS AND METHODS

This prospective study was carried out at Government ENT Hospital, Visakhapatnam, from 2016-2017. A total number of 250 patients with atticointral variety of CSOM were included in the study. All cases were studied and investigated, those cases fit and willing for surgery were subjected to surgical treatment by canal wall up or canal wall down mastoidectomy with tympanoplasty. The selection of technique in most cases was made intraoperatively and then decided according to the extent of disease.

RESULTS

Among 250 patients selected for study, 142 were males and 108 were females. The patients belonged to the age group ranging from 6 years to 60 years.

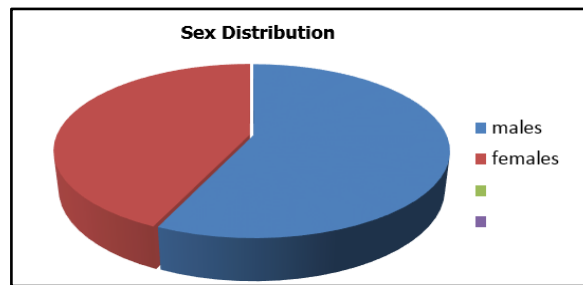


Figure 1. Showing the Distribution of Males and Females

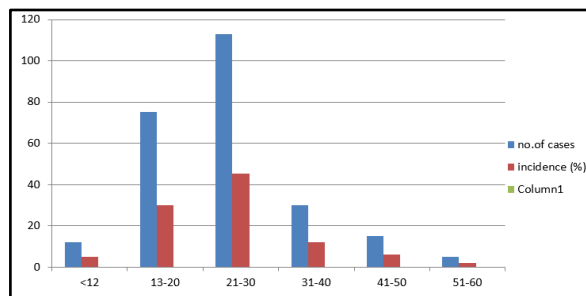


Figure 2. Showing No. of Cases in Each Age Group and Age Incidence

The peak incidence of the disease in the present study was between 21-30 years old patients (45.2%).

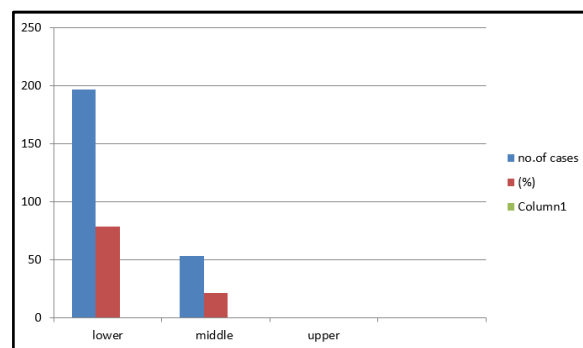


Figure 3. Showing Number of Cases in Each Socioeconomic Group

Treatment Results

Procedure	No. of cases	Percentage
Canal wall down	123	84.24%
Canal wall up	23	15.75%

Table 1. Treatment Results

No. of cases that got operated were 146.

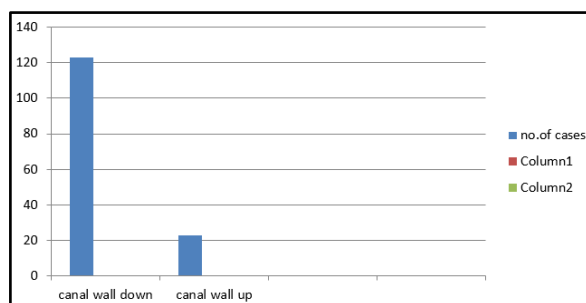


Figure 4. Showing Number of Cases Undergoing Canal Wall Down and Canal Wall Up Procedures

Outcome of the Procedure

No. of Cases	Taken Up Grafts	Improved Hearing	Failed
123	115 (93.49%)	114 (92.68%)	5 (4%)

Table 2. Canal Wall Down

No. of Cases	Taken Up Grafts	Improved Hearing	Failed
23	21 (91.3%)	21 (91.3%)	1 (4.34%)

Table 3. Canal Wall up

DISCUSSION

In the present study, the youngest patient was 6 years and the oldest was 58 years. The peak incidence of the disease was between 21-30 years old (45.2%). These findings were in fair agreement with those reported earlier by Salman et al in the year 2005 with most common age group 16-30 years.⁵ As per the observations, the sex distribution is mild male predominance with male-to-female ratio of 56.8% to 43.2%. Nelson et al found the incidence of cholesteatoma as being about 1.4 times higher in men compared to women.⁶ Most of the patients were of poor socioeconomic group (78.8%), especially rural area because of lack of attention, ignorance and unavailability of advanced medical care. 60.8% of patients belonged to rural area, whereas 39.2% belonged to urban area.

Intermittent foul smelling scanty discharge and hearing loss are the two principal symptoms in almost all patients. The other symptoms were pain, bleeding from the ear, etc. In this study, most patients were suffering from granulations (52.4%), while from cholesteatoma in 19.6% cases. 72 patients (28.8%) had mild hearing loss. Maximum number of patients, i.e. 158 (63.2%) had moderate hearing loss. Severe hearing loss was seen in 20 (8%) patients. Profound hearing loss was not seen in any patient. According to WHO estimates, CSOM causes a mild-to-moderate conductive hearing loss of 30-60 dB in more than 50% of the cases.⁷ In a retrospective study done by Parisier et al, the most common presenting symptoms were otorrhoea (73%), hearing loss (85%), otalgia (32%), tinnitus (8%) and vertigo (8%). Only 0.8% presented with an intracranial complication.⁸

Out of 250 patients, 146 were subjected to the mastoidectomy procedure along with tympanoplasty. 123 subjects have undergone canal wall down mastoidectomy and 23 subjects have undergone canal wall up mastoidectomy. There were encouraging results in almost all the cases subjected to canal wall down procedures, i.e. 93.49% had successful graft take ups and almost 92.68% restoration of hearing to the useful extent. There were failures in the form of recurrent or residual disease or graft failure in 4% of the cases, i.e. 5 out of 123. We were unable to follow 3 cases in the postoperative period after 2 months. A total number of 23 cases were subjected to canal wall up procedure because of the location of the disease in the accessible areas and where we have noticed limited disease without complications. In this procedure, the results were quite encouraging with 91.3% of graft take ups and also

improvement in hearing. Out of 23, one encountered graft rejection.

The statistical evidence of success in this study is almost similar in both the procedures, even though the number of patients subjected to canal wall down procedure is more than the canal wall up. While according to Hulka and McElveen (1998) in a randomised, blinded and temporal bone study, canal wall down mastoidectomy was significantly superior to the intact canal wall technique in visualising middle ear pathology.⁹ Some authors prefer canal wall up mastoidectomy as hearing threshold are worse after canal wall down mastoidectomy.¹⁰ Numerous modifications have been introduced to canal wall down mastoidectomy to avoid some of its drawbacks whilst maintaining the good exposure it provides. On the other hand, the use of endoscopes has improved visualisation in canal wall up techniques.^{11,12} Merchant et al (1997) studied the efficacy of tympanomastoid surgery for control of infection in chronic otitis media. They found that the outcome was not influenced by variables such as canal wall up versus canal wall down, primary versus revision surgery and the extent of disease.¹³

CONCLUSION

The choice of the surgical technique for chronic ear disease depends on a number of factors including the philosophy and preference of the surgeon, the nature of the pathology and the general health of the patient. Both CWD and CWU procedures carry an intrinsic morbidity, and in some frail or compromised patients, this may prevent definitive surgical treatment of whichever type. The staged surgery of the CWU procedure may similarly prevent this technique being used on the elderly or infirm. If taken broadly, 15 out of 100 patients attending to ENT OP Department are CSOM, out of which, 6% of patients are unsafe type, which needs serious attention. The decision of canal wall up and canal wall down procedures is to be weighed against each other carefully.

It is necessary for clinicians to explain this to patients discuss why the particular treatment strategy is being adopted, explain the circumstances, which might cause a change in approach and prepare them for the long-term sequelae of surgery. Canal wall down mastoidectomy is best, if it is executed with 100% clearance of disease. To conclude, in this era of technological advancement with availability of imaging techniques, operating microscope with aid from telescope and micro drills, the technique of canal wall down mastoidectomy holds the best results.

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