

CHOLESTEATOMA WALL-A USEFUL LINING FOR HEALTHY MASTOID CAVITY

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ABSTRACT

Objective: To evaluate the usefulness of residual cholesteatoma wall as a lining of mastoid cavity in achieving a dry mastoid cavity after a canal wall down (CWD) mastoidectomy.

Study Design: Experimental study.

Place and Duration of Study: Combined Military Hospital Lahore, from May 2015 to Oct 2016.

Methodology: Both adults and children (58 cases) undergoing canal wall down mastoidectomies were included in the study. While removing the cholesteatoma, medial wall of fundus was left intact and wide opening was ensured to leave it saucer shaped. Post operatively all patients were observed to see that when their mastoid cavities become dry and asymptomatic.

Results: Out of total 58 patients operated 11 were children and 47 adults. Age range was 11 to 67 years. Thirty patients were males and 28 were females. Following Canal Wall Down mastoidectomies all the mastoid cavities were managed regularly and at the end of four months 27 (47%) cavities became dry. At six months 49 (84%) became dry and one was still wet after one year of surgery.

Conclusion: At 12 month follow up, 98% percent of mastoid cavities were dry and asymptomatic with our technique of leaving part of cholesteatoma wall. However longer follow-up and larger sample is required for better outcome assessment.

Keywords: Cholesteatoma, Canal wall down mastoidectomy, Mastoidectomy, Mastoid cavity.

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INTRODUCTION

A discharging mastoid cavity after mastoidectomy, both canal wall up and canal wall down surgery, is a major concern for both the patient and surgeon. The surgical outcome of open cavity mastoidectomy is often influenced by the extent of cholesteatoma and skill of the surgeon¹. The disadvantages of mastoidectomy include accumulation of keratin debris, frequent vertigo attacks after temperature changes, difficulty in fitting hearing aid and intolerance to water^{2,3}. Numerous modifications have been introduced to canal wall down (CWD) mastoidectomy to avoid some of its drawbacks whilst maintaining the good exposure it provides. On the other hand the use of endoscope has improved the visualization in canal wall up (CWU) mastoidectomy⁴. Interestingly Merchant *et al*, (1997) found that outcome was not

influenced by variables such as CWU versus CWD, primary versus revision surgery and the extent of the disease⁵. One unique way of achieving a smooth lined cavity is to leave the wall of cholesteatoma in place, that lies medially or adherent to underlying structures which acts as lining of the resultant mastoid cavity after CWD mastoidectomy. Our senior author works in a tertiary care hospital and has the opportunity to manage large number of cholesteatoma cases by adopting this specific technique. The aim of this study was to evaluate the usefulness of residual cholesteatoma wall as a lining of mastoid cavity in achieving a dry mastoid cavity after a CWD mastoidectomy.

METHODOLOGY

This experimental study without controls was performed at Combined Military Hospital Lahore from May 2015 to October 2016. Both adults and children (58 cases) undergoing CWD mastoidectomies were included in the study after informed written consent. The approval was obtained from hospital ethical committee.

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Received: 13 Jun 2019; revised received: 26 Jul 2019; accepted: 02 Aug 2019

Patients having extensive granulation tissues and revision surgery were excluded from the study. Cholesteatoma was clinically confirmed by detailed microscopic examination by three consultant otorhinolaryngologists as well as CT scan of temporal bone. After conventional post auricular skin incision temporalis fascia graft was taken and harvested where required later. Temporal bone was drilled out for creation of a large mastoid cavity. A meticulous removal of all mastoid air cells and skeletanization of dural and sinus plates was performed. While removing the cholesteatoma, medial wall of fundus was left intact and wide opening was ensured to leave it saucer shaped. In some cases to make this left part as a saucer shaped, the margins of the left part were raised and underlying bone was drilled out. Meticulous removal of rest of the cholesteatoma, debris and diseased mucosa was carried out. Adequate meatoplasty with inferior based musculo-cutaneous flap was performed to ensure

years. Thirty patients were males and 28 were females. Following CWD mastoidectomies all the mastoid cavities were managed regularly and at the end of four months 27 (47%) cavities became dry. At six months 49 (84%) became dry and one was still wet after one year of surgery (table-I). Three of the cases required slight dead bone removal with burr under local anesthesia where necrosed bone was noticed. One ear remained wet after one year but the discharge was negligible. Three of the cases needed antibiotic ear drops for four months post operatively, after that they became dry and drops were discontinued.

Following four procedures were adopted during post operative care of mastoid cavities as and when required.

Suction of discharge, Removal of granulations with cup forceps, Cauterization of granulations using different strengths of silver nitrate, Drilling of dead bone.

Table: Parentages of dry cavities at different post operative intervals.

	2 months	4 months	6 months	1 year
Dry cavities	-	27 (47%)	49 (84%)	57 (98%)

both good aeration and ease of post-operative management. The aim was to create a smooth mastoid cavity of appropriate size relative to the degree of mastoid pneumatization along with low facial ridge. Postoperatively loose ribbon packs impregnated by bismuth iodide paraffin paste (BIPP) were placed in the cavity for two weeks. Post-operatively all patients were advised oral antibiotics (Tab Ciprofloxacin 500mg twice daily for four to six weeks) and antibiotic ear drops (Dexamethasone with tobramycin) after removal of BIPP pack. Patients were called initially weekly and later fortnightly for cavity care in OPD till the cavity was dry. Later on all patients were advised for follow-up after every 3 months. During follow-up visits results of achieving a dry and asymptomatic mastoid cavity were finalized.

RESULTS

Out of total 58 patients operated 11 were children and 47 adults. Age range was 11 to 67

DISCUSSION

There is almost no literature available on the use of cholesteatoma sac as the lining of mastoid cavity in canal wall down procedures. The most common post-operative sequelae of almost all mastoid procedures is a wet discharging cavity with accumulation of debris and keratin. A number of methods have been adopted to address these issues. All the methods are aimed at achieving a dry, smooth, self-cleansing cavity with a water tolerant surface⁶.

One of the requirements of healthy mastoid cavity is to have a smooth lining of mastoid cavity. To achieve this in our series the medial wall of cholesteatoma sac was used as a lining of mastoid cavity. Considering the fact that after removal of all matrix, the wall of cholesteatoma acts as an inactive lining. There is almost no or very little literature regarding this procedure. Lee has mentioned this option of leaving part of cholesteatoma wall, in his text book of Otolaryn-

gology⁷. Young studied the histopathological features of 159 mastoid cavities at revision surgeries, and one of the findings was that some of the discharging cavities were lined with respiratory epithelium, implying that retained mucosa in mastoid air cells is not a common cause of persistent otorrhoea⁸. In our 84% cases were having dry cavities six month after surgery. One patient required revision mastoidectomy while three patients required drilling out of bone under local anesthesia to remove residual bony overhang present usually at facial ridge site. All the cases required meticulous follow up with regular cleaning of the cavity under microscope. Topical antibiotics were used in all cases to control any residual infection keeping in view the humid and warm local conditions. Variations in the quality of healing of mastoid cavities have never been clearly understood. Young has experimented and elaborated the importance of functioning epithelial migration in dry mastoid cavities⁹. Rambo mentioned that factor responsible for the wide variation in healing, even though all chronic disease has been removed, is buried mucosa which leads to cystic formation¹⁰. According to him, over the past 20 years he has followed the principle of removing all mucosa from the mastoid segment and has been rewarded with dry ears routinely in open cavity surgery. For the past 12 years he has removed cholesteatoma through tympanoplasty and modified radical mastoidectomy. These cases, also have been consistently free of cavity problems.

A retrospective observational study was conducted to determine if mastoid obliteration with autologous cranial bone graft following mastoidectomy improves quality of life (QOL). Patients with cholesteatoma who had mastoidectomy with primary or secondary mastoid obliteration by a tertiary otologist were surveyed using the validated Glasgow Benefit Inventory (GBI), our primary outcome measure. A mastoid cavity resulting from a canal wall down mastoidectomy can result in major morbidity for patients due to chronic otorrhea and infection,

difficulty with hearing aids and vertigo with temperature changes. Mastoid obliteration with reconstruction of the bony external ear canal recreates the normal anatomy to avoid such morbidity¹¹. This study concluded that quality of life after mastoidectomy was better after improved lining of the cavity. Few have studied the quality of life benefit that this procedure confers.

There are proponents of canal wall reconstruction at the first mastoidectomy but this can also be performed later. Walker performed a study to evaluate the long-term results using the technique of canal wall reconstruction (CWR) tympanomastoidectomy with mastoid obliteration in the treatment of chronic otitis media with cholesteatoma¹². He found that CWR tympanomastoidectomy provides excellent intraoperative exposure of the middle ear and mastoid without the long-term disadvantages of a canal wall down mastoidectomy. Long-term follow-up demonstrates that there were only 2.6% failures requiring conversion to an open cavity or subtotal petrosectomy.

Diom analyzed the epidemiology, diagnosis, management and the prognosis of cholesteatoma of the middle ear in children. This was a retrospective study of 15 years (from 01 January 1995 to 31 December 2009) for patients aged 0-15 years admitted in ENT ward of FANN hospital for chronic otitis media complicated with cholesteatoma¹³. Results showed that radical mastoidectomy was performed in 66.7% and modified radical mastoidectomy in 33.3% of cases. Mean follow-up was 6 months. Recurrence of cholesteatoma was noted in 13% of cases. The reason for this in their setting include insufficient human and manpower resources necessary for prompt management of the disease and also lack of awareness among the population. In these settings they advocate canal wall down mastoidectomy (radical or modified radical) as the treatment of choice. Our developing country is also having same settings and because of late presentations and also poor follow up trends of non-affording population, we also follow the

same protocol of canal wall down mastoidectomies.

Yung examined the reasons for discharging mastoid cavities, the operative findings during revision surgery, and the medium-term outcome¹⁴. The mastoid cavities were troublesome because of large cavity size, bony overhang, residual infected mastoid cells, the presence of cholesteatoma or perforations, and/or inadequate meatoplasty. We are also following same guidelines by making larger meatoplasty, removing all the infected cells. Leaving part of cholesteatoma in very well aerated and exteriorized cavity has given good results in our study. Larger meatoplasty is the key to post op follow-up check-ups and cavity care.

Latest developments in the form of minimally invasive endoscopic approaches are now widely used. The endoscope may aid in visualization of difficult middle ear recesses when used to complement microscopy¹⁵. Endoscopes enhance surgical access to tympanomastoid recesses. In conjunction with the availability of the operating microscope, angled instruments, and KTP laser, endoscope-guided dissection provides a small incremental benefit for prevention of residual cholesteatoma, and facilitates a minimally invasive approach¹⁶.

Various authors have compared traditional microscopic approach to endoscopic approach for removal of cholesteatomas. According to Tarabichi the transcanal endoscopic approach allows minimally invasive removal of Cholesteatoma with results that compare well to traditional postauricular tympanomastoidectomy¹⁷. Another study claims that surgical outcomes of endoscopic ear surgery are comparable to those of the conventional approach in terms postoperative air-conduction, graft success rate and taste sensation. However analysis of postoperative pain and healing times showed better results for Endoscopic Ear Surgery¹⁸. Likewise Jacob *et al* concluded that similar hearing outcomes, rates of recurrence, residual disease and complication rates were seen in pediatric endoscopic

cholesteatoma surgery as compared to traditional microscopic techniques¹⁹. Bae declared endoscopic approach for the management of attic cholesteatoma as useful as the microscopic approach²⁰. While Park found that pediatric congenital cholesteatoma limited to the middle ear cavity could be safely and effectively removed using TEES²¹. Another study of 242 patients with middle ear cholesteatoma managed by otoendoscopic surgery proved it as a safe alternate²².

We are planning to further follow our patients if possible so that long term efficacy can be established. Under same settings and surgical hands we are also planning to conduct a comparative study between this technique of leaving part of cholesteatoma with complete removal of cholesteatoma. Extensive use of antibiotics full of side effects, in wet mastoid cavities emphasize the requirement of better surgical techniques. Further studies are also required to see the healing mastoid cavities microscopically, this way the role of cholesteatoma wall may further be confirmed.

CONCLUSION

At 12 month follow up, 98% percent of mastoid cavities were dry and asymptomatic with our technique of leaving part of cholesteatoma wall. However longer follow-up and larger sample is required for better outcome assessment.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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