

Surgical Techniques and Results in Cholesteatoma Surgery

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- ✓ A review of 349 patients with cholesteatoma operated between 1980 and 1995 was done. Of 349 patients, 272 cases had documented follow-up for 1 year or longer and were included in the study which consists of the incidence of residual and recurrent cholesteatoma. The most appropriate surgical technique was performed for each individual case. The surgical techniques were placed in two groups. Open cavity technique: 120 radical mastoidectomy, 26 modified radical mastoidectomy; closed technique: 113 intact canal wall tympanoplasty with mastoidectomy, 13 planned two stage procedure. Recurrence rates were 7.5% with open technique and 11.1% with closed technique. Residive rates were 9.6% with open technique and 5.5% with closed technique. Total failure rate was 17% with open technique and 16.6% with closed technique. The mean follow-up period was 30 months. In our series, there was no significant difference in the incidence and total failure rate of recurrent and residual cholesteatoma between open cavity and closed cavity techniques ($p > 0.05$).

Key words: Cholesteatoma, open and closed techniques, recurrence and residue

- ✓ **Kolesteatoma Cerrahisinde Cerrahi Teknikler ve Sonuçlarımız**
1980-1995 yılları arasında kolesteatoma tanısıyla opere edilen 349 hasta incelendi. 349 hastadan 272'si bir yıldan fazla takip edilmişti. Bu hastalar çalışmaya alınarak rezidiv ve rekürrens yönünden değerlendirildi. Her hasta için en uygun cerrahi yöntem seçildi. Cerrahi teknikler iki gruba ayrıldı. Açık teknik: 120 radikal mastoidektomi, 26 modifiye radikal mastoidektomi; kapalı teknik, 113 intakt kanal wall timpanoplasti ve mastoidektomi, 13 iki aşamalı timpanoplasti idi. Rekürrens oranları açık teknik için %7.5 ve kapalı teknik için %11.1 olarak bulundu. Rezidiv oranları açık teknik için %9.6 ve kapalı teknik için %5.5 bulundu. Toplam başarısızlık oranı açık teknik için %17, kapalı teknik için %16.6 bulundu. Ortalama takip süresi 30 ay idi. Bu seride iki grup arasında rekürrens ve rezidiv yönünden anlamlı fark bulunamamıştır.

Anahtar kelimeler: Kolestatoma, açık ve kapalı teknik, rekürrens ve rezidiv

INTRODUCTION

Cholesteatoma is characterized by a bone-eroding skin lined cavity filled with concentric layers of desquamated squamous epithelium. Acquired cholesteatoma is one of the types of cholesteatoma and results from an acute or chronic suppurative otitis media where a perforation occurs. The perforation

can be occurred in the attic or in the pars flaccida and in the pars tensa. The stratified squamous epithelium invades the margin of the perforation and collects in the epitympanum and antrum in concentric onion-like layers⁽¹⁾.

The treatment of cholesteatoma is surgery and the primary goal of surgery is either

the complete elimination and control of the disease process. To return the ear to near normal function is another aim. Today, two opposed opinions exist regarding the excision of cholesteatoma. One of the opinions is to exteriorize the cholesteatoma by the open technique; radical or modified radical mastoidectomy and the other is to excise the cholesteatoma safely by the closed technique; intact canal wall tympanoplasty with mastoidectomy and planned two stage procedure⁽²⁾. With the development of microscopic ear surgery, improved otologic instrumentation, computed tomography and endoscopies, it was hoped that great improvement in the treatment of cholesteatoma would be achieved⁽³⁻⁵⁾. However, unsuccessful and unjustifiable surgery for cholesteatoma may result in residual or recurrent disease. This can be considered the failure of the treatment.

This study presents the results of cholesteatoma surgery performed in our clinic and compares with previous published results.

MATERIALS AND METHODS

We have carried out a retrospective study of all cases of cholesteatoma who underwent surgical treatment in Ondokuz Mayıs University, University Hospital, Otolaryngology Department, Samsun.

Each patient had essentially the same work-up: history, examination of the ears, nose and throat, microscopic examination of the ears, if required culture and sensitivity and audiological evaluation. Each patient had mastoid x-rays and also computed tomography of the mastoid, if indicated. However, the most important adjunct for the diagnosis of the disease and cholesteatoma was with the use of the operating microscope and later on examination. The operating micro-

scope and x-rays gave a great deal of information as to nature and extent of the disease.

If there were no signs of any urgency such as labyrinthitis, meningitis, facial palsy, we had time to prepare the patient: treatment of the respiratory tract diseases, control of the general conditions such as allergic disorders; and local suction-clearance under the surgical microscope, with adequate antibiotics, anti-inflammatory and antiseptic instillations. If the inflammatory tendency and infection were sufficiently cured by the time of operation, the technique chosen could be more sophisticated from a functional point of view. In the open technique, the operation utilized was radical and modified radical mastoidectomy. In radical mastoidectomy; mastoid cavity, epitympanum, middle ear, and external auditory canal were converted into a common cavity exteriorized through the external meatus. Modified radical mastoidectomy differs from the radical mastoidectomy in that tympanic membrane, or, remnants thereof, and ossicular remnants were retained to preserve hearing. No grafting or reconstructive procedure was involved. If the epitympanum, antrum, mastoid process were involved with the cholesteatoma, and if there were marked disease of the mucosa of the middle ear with sclerotic mastoid, marked destruction of the ossicle, tympanic membrane and posterior ear canal and if the patient had a labyrinthine fistula and hearing ear with cholesteatoma only, then the operation of choice was open technique. In the closed technique, if the cholesteatoma was localized and not extensive then the operation utilized was intact canal wall tympanoplasty with mastoidectomy. In the intact canal wall tympanoplasty with mastoidectomy cortical mastoidectomy leaving an intact canal wall together with tympanoplasty was used. Os-

sicular chain reconstruction was performed using autologous ossicle or cortical bone. Temporal muscle fascia was used for reconstruction of the tympanic membrane. In some cases, planned two-stage operation was utilized in order to detect disease left behind at the first operation. The planned two-stage operation differs from the intact canal wall tympanoplasty with mastoidectomy in that reconstruction of the tympanic membrane and ossicular chain were left to the second stage.

The patients have been seen, where possible, on an average two-three times a year. At each visit, particular attention has been paid to the presence of residual and recurrent cholesteatoma. Residual cholesteatoma has been defined as recurrence from a fragment usually unintentionally left by the surgeon during primary cholesteatoma eradication. In our study, it was usually found in poor control areas such as the epitympanic space with the supratubal recess and the posterior region of the tympanic cavity that were difficult to reach with an operating microscope. It was seen either as well-encapsulated pearl or in some cases, much more complicated configuration in the form of an epidermization, with undefined limits promoting recurrence.

Recurrent cholesteatoma has been assessed as a disease arising from a retraction pocket or failure of the original operation to establish aeration of the continuous middle ear- epitympanum- mastoid structures. It was found primarily in the epitympanum and mastoid antrum. In these cases evidence of poor eustachian tube function was found at the time of surgery. However, clinically defining the difference between residual and recurrent disease was usually not easy in the presence of extensive cholesteatoma. Therefore, the sum of residual and recurrent di-

sease was assessed as total failure of the operation.

Statistical analysis was made according to comparison of proportion in independent samples.

RESULTS

From 1980 to 1995, 349 cases with cholesteatoma were operated. The age of the study group ranged 6 to 58 years with a mean age of 29.3 years. There were 188 (51%) males and 161 (49%) females. The most common presenting symptoms were otorrhea, hearing loss, otalgia, headache, vertigo and tinnitus (Table I). Twenty one (1.6%) of the patients presented with an intracranial complication. Examination of the ear revealed intact membrane in 1.8% of the patients and central perforation in 46.2%, total perforation

Table I. Clinical Profile of the Patients

Symptoms	No	%
Hearing loss	84	24.2
Otorrhea	157	45.1
Otalgia	52	15
Tinnitus	20	5.8
Vertigo	8	3.4
Headache	13	3.7
Others	15	3.9
Signs		
Perforation		
Intact	6	1.8
Total	64	18.3
Marginal	43	12.3
Central	161	46.2
Attic	55	15.8
Site of cholesteatoma		
Middle ear	187	30.7
Attic	127	20.9
Aditus	115	18.9
Antrum	179	29.5

in 18.3%, attic perforation in 15.8%, and marginal perforation in 2.3%. All patients with cholesteatoma were surgically managed by the authors in the Otolaryngology Department, University Hospital. Of these patients, 20 (5.8%) ears were operated on for continuing problems after a previously operation by other surgeons. Eighty five percent of the 20 ears had had radical mastoidectomy and 15% had already had tympanoplasty.

All the 349 cases were reviewed retrospectively, and 272 cases with documented follow-up for 1 year or longer were included in the study. The remaining 77 (22%) cases had less than 1 year follow-up and were excluded from this study.

The 146 of the 272 patents were operated on using open technique. Of this group, 120 (82.2%) had radical and 26 (17.8%) had mod-

ified radical mastoidectomy. The 126 (46.4%) patients with closed technique group consisted of 113 (89.7%) intact canal wall tympanoplasty with mastoidectomy and 13 (10.3%) planned two stage procedure (Table II). The incidence and failure rates of recurrence and residual disease regarding each surgical technique performed on the 272 patients are given in the table III. Recurrence rates were 7.5% with the open technique and 11.1% with the closed technique. Residive rates were 9.6% with open technique and 5.5% with closed technique. Failure rate was calculated by adding the incidence of recurrence and residive for each surgical technique. There was no statistically significant difference either between the failure rates of the patients with radical and modified radical mastoidectomy and the patients with intact

Table II. Type of Surgical Techniques Performed

Type of surgery	No. Of cases		Type of surgery	No. Of cases	
	No.	%		No.	%
Open techniques			Closed techniques		
RM	120	82.2	ICWT&M	113	89.7
MRM	26	17.8	TSP	13	10.3
Total	146	100	Total	126	100

p.s: RM: Radical mastoidectomy. MRM: Modified radical mastoidectomy.

ICWT&M: Intact canal wall tympanoplasty and mastoidectomy.

TSP: Two-stage procedure.

Table III. Rates of Recurrent and Residual Disease

	Open Techniques					Closed Techniques				
	RM		MRM		Total	ICWT&M		TSP		Total
	No.	%	No.	%	%	No.	%	No.	%	%
Recurrence	9	7.1	2	8	7.5	12	10.6	2	15.2	11.1
Residive	10	8.3	4	15.4	9.6	6	5.3	1	7.6	5.5
Failure	19	15.4	6	23.4		18	15.9	3	22.8	

p>0.05

p>0.05

canal wall tympanoplasty with mastoidectomy and planned two stage procedure ($p>0.05$). For open and closed technique total failure rate was calculated by adding the failure rates for each surgical technique and found to be 17% and 16.6% for open and closed technique respectively. There was no significant difference in the total failure rate between open and closed technique ($p>0.05$) (Table IV).

Table IV. Total Failure Rate

Open technique		Closed technique	
No.	%	No.	%
25	17	21	16.6

$p > 0.05$

The average time of follow-up before cholesteatoma was rediagnosed was 13 months for residue and 37 months for recurrence. The average length of follow-up was 36, 35, 26 and 18 months for radical mastoidectomy, modified radical mastoidectomy, intact canal wall tympanoplasty with mastoidectomy and planned two stage procedure respectively. In our cases, recurrences were still presenting 10 years after the first surgery, and in fact one patient had recurrent cholesteatoma after 11 years. In 13 ears in which a planned two stage procedure was previously performed; 1 underwent modified radical mastoidectomy after 3 years, 2 underwent radical mastoidectomy after 1 and 3 years from first operations. The rest of the patients have not come to clinic regularly and when they come to the clinic had with chronic infection.

DISCUSSION

The management of cholesteatoma has remained virtually the same for many years and also the controversy regarding the ideal

surgical method has yet to be resolved. The status of posterior canal wall is important and has received much attention regarding the technique chosen in surgery. Radical and modified radical mastoidectomy which are procedures consisting of removal of the posterior canal wall have been used for many years for cholesteatoma surgery. In procedures such as intact canal wall tympanoplasty with mastoidectomy and planned two-stage procedure the posterior canal wall is left intact with the reconstruction of the ear. These last procedures have received more attention in the recent years⁽⁶⁾.

As noted previously, the primary goal of cholesteatoma surgery is to eliminate the disease and to prevent residue and recurrence of cholesteatoma. The technique chosen in cholesteatoma surgery can be important regarding incidence of the residue and recurrent cholesteatoma. However, the extent of disease, the configuration of the eustachian tube function must be taken into consideration in choosing the surgical technique.

In 1980, Smith and Sullivan⁽⁷⁾ stated the operation of choice to be the modified radical mastoidectomy in the sclerotic mastoid with the presence of massive cholesteatoma. The perforation of the posterior wall in these cases is not only unnecessary, but makes little difference in the hearing results. Reconstruction of the middle ear has quieted down and is considered to be safe for reconstructive surgery. However, radical and modified radical mastoidectomy procedures have been out of favor with some otologists because of the fear the procedure that will create a cavity prone to repeated infection, will prevent postoperative swimming, and will require continued otologic care for the rest of the patient's life^(8,9). Parisier⁽¹⁰⁾ and Cole⁽¹¹⁾ pointed out that patients with extensive cho-

lesteatoma, poor eustachian tube function and sclerotic mastoids generally should be treated with canal wall down mastoidectomies and mastoid cavities would be seldom a problem when good surgery has been carried out.

From the anatomical point of view, the closed technique is undoubtedly preferable, as it is the surest way to restore hearing; but with a closed technique the risk of recurrence is greater. In 1963, House and Sheehy⁽¹²⁾ advocated the removal of the cholesteatomatous sac without creating a radical cavity by leaving the posterior wall intact and thus eliminating the need for postoperative care. Shambaugh⁽¹³⁾ pointed out that this technically difficult procedure should be reserved for those cholesteatomas which are small, with a well defined sac without the finger-like projections into bone which make complete removal of large cholesteatomas difficult.

There are many reports regarding the incidence of recidive and recurrent cholesteatoma. Cody⁽¹⁴⁾ analysed the result of 423 mastoidectomies for acquired cholesteatoma and found 19%; overall failure rate for the open cavity group, 66% for the intact-canal wall group. He mentioned that open cavity mastoidectomies were judged to be the operations of choice in treating acquired cholesteatoma and intact canal wall mastoidectomy should be used only for the patient who is more than 20 years old and who has a small cholesteatoma and a pneumatized mastoid process. Moss⁽¹⁵⁾ reported the recurrence rates were 18% with canal wall down procedures and 43% with canal wall up techniques. Hearing results have been reported by several authors to be better following intact canal wall tympanoplasty than after radical mastoidectomy. In contrast, Fikentscher et al¹⁶ in their series of 1620 chronic ears found no differences in

hearing results between various surgical methods. Weiss⁽¹⁷⁾ treated 116 ears with recurrent and residual cholesteatoma and found those 66% had undergone wall down mastoidectomy at the previous surgery.

The rate of residual disease and recurrence experienced by the patients in this study is comparable to that of other studies of cholesteatoma. Our failure rate is the same as the results of the series of most authors for open technique, but is lower for closed technique. Perhaps this can be due to a philosophy of treating each cholesteatoma individually, selecting the most appropriate procedure will assure the eradication of the disease completely and assessing the socio-economical status of the patients. We take the patient as a whole and some conditions into account such as his or her way of life, hygiene, the opportunity to follow the patient up. We use both closed and open techniques, with or without functional reconstruction, each in about 50 percent of cholesteatoma cases. The lack of adequate follow-up is a contraindication for any two-stage procedure. If it is not possible to see the patient again, probably a large open technique with a very wide meatochoncchoplasty is preferable, because it will be easier for a local practitioner to clean and inspect the cavity. If the cholesteatoma has destroyed a significant portion of the posterior canal wall preoperatively, and mastoid has been very contracted unsuspected canal wall destruction intraoperatively we do not hesitate to take the canal wall down. We think that the open technique is superior to the closed technique in the treatment of large cholesteatoma. However, we would prefer not to create an unnecessary cavity and when we encounter small cholesteatoma confined to middle ear we prefer the intact canal wall technique.

It is impossible to advise a single stan-

standard approach for any cholesteatoma. It is important to remove all the disease and to follow-up all cases of cholesteatoma regardless of the method of surgery.

CONCLUSION

We have reviewed our results of surgical therapy for cholesteatoma. Two hundred seventy two patients with 1 year or longer follow-up were included in the study. We treated each cholesteatoma individually selecting the most appropriate procedure using either open and closed technique. There was no significant difference between two techniques regarding the total failure rate. Long-term follow-up of cholesteatoma patients is required.

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REFERENCES

1. Brown JS. A ten years statistical follow-up of 1142 consecutive cases of cholesteatoma; the closed vs the open technique. *Laryngoscope* 1982; 92: 390-6.
2. Schuring AG. Validating the excision of cholesteatoma. *Otolaryngol Clin North Am* 1988; 22: 1041-53.
3. Edelstein OR, Parisier SC. Surgical techniques and residivism in cholesteatoma. *Otolaryngol Clin North Am* 1989; 22: 1029-39.
4. Thomassin JM, Korchia D, Doris J MD. Endoscopic-guided otosurgery in the presentation of residual cholesteatomas. *Laryngoscope* 1993; 103: 939-43.
5. McKennan KX. Endoscopic "second look" mastoidectomy to rule out residual epitympanic / mastoid cholesteatoma. *Laryngoscope* 1993; 103: 810-14.
6. Hirsch BE, Kamerer DB, Doshi S. Single-stage management of cholesteatoma. *Otolaryngol Head Neck Surg* 1992; 106: 351-4.
7. Smith JB, Sullivan JA. The modified radical mastoidectomy. *J Otolaryngol* 1980;154: 9.
8. Phill RP, Padgham ND. Management of childhood cholesteatoma. *J Laryngol Otol* 1991; 105: 343-5.
9. Kinney SE. Five years experience using the intact canal wall tympanoplasty with mastoidectomy for cholesteatoma. *Laryngoscope* 1982; 92: 1395-400.
10. Parisier SC. Management of cholesteatoma. *Otolaryngol Clin North Am* 1989; 22: 927-40.
11. Cole JM, Reams CL. Tympanomastoidectomy, A 25 years experience. *Ann Otol Rhinol Laryngol* 1983; 92: 577-81.
12. House WF, Sheehy JL. Functional restoration in tympanoplasty. *Arch Otolaryngol* 1963; 78: 304.
13. Shambaugh GE. Surgery of the ear. Second Edition. Vol. 10 WB. Saunders Company Philadelphia. PA. 1992: 284.
14. Cody DTR, McDonald TS. Mastoidectomy for acquired cholesteatoma; Follow-up to 20 years. *Laryngoscope* 1984; 94: 1027-30.
15. Moss R, Lucente FE. Results in resident cholesteatoma surgery, A review of 85 cases. *Laryngoscope* 1987; 97: 212-4.
16. Fikentscher R, Rosenburg B, Sinar H. Hörvermögen nach sanierenden Mittelohroperationen mit Tympanoplastik. *Arch Otorhinolaryngol* 1978; 218: 269-276.
17. Weiss M, Parisier SC, Han SC, Edelstein DR. Surgery for recurrent and residual cholesteatoma. *Laryngoscope* 1992; 102: 145-51.