Journal of Guilan University of Medical Sciences

Autumn 2020. Vol 29. Num 3

Research Paper:

Comparing the Incidence of Residual Cholesteatoma Using two Canal Wall Down and Endoscopic-assisted Intact Canal Wall Tympanomastoidectomy Methods

*Pedram Borghei[1], Shadman Nemati[2], Suzan Adel[1], Mehdi Nikkhah[1]

1. Otorhinolaryngology Research Center, Tehran University of Medical Sciences, Tehran, Iran.
2. Department of Otorhinolaryngology, School of Medicine, Gilan University of Medical Sciences, Gilan, Iran.

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Citation Borghei P, Nemati Sh, Adel S, Nikkhah M. Comparing the Incidence of Residual Cholesteatoma Using two Canal Wall Down and Endoscopic-assisted Intact Canal Wall Tympanomastoidectomy Methods. Journal of Guilan University of Medical Sciences. 2020; 29(3):50-57. https://doi.org/10.32598/JGUMS.29.3.1

https://doi.org/10.32598/JGUMS.29.3.1

Received: 13 Jul 2019
Accepted: 18 Jul 2020
Available Online: 01 Oct 2020

Keywords:
Endoscopic ear surgery, Cholesteatoma, Mas toid surgery

ABSTRACT

Background For many years, Canal Wall Down (CWD) tympanomastoidectomy has been the gold standard for treatment of cholesteatoma; however, this method has long-term complications for the patients. The Intact Canal Wall (ICW) tympanomastoidectomy has relatively lower complications, but access to the middle-ear recesses is difficult in this method. Therefore, endoscopy is used to visualize the underexposed recesses.

Objective This study aims to compare the incidence of residual cholesteatoma using the two methods of CWD and endoscopic-assisted ICW.

Materials and Methods In this prospective randomized clinical trial, participants were 40 patients with cholesteatoma in the middle ear and mastoid who were candidates for tympanomastoidectomy. They were randomly divided into two groups. In the first group, ICW was performed with endoscopic assisted visualization, while in the second group, conventional CWD technique was performed without ossicular reconstruction. All the patients were microscopically examined at 3, 6, 9 and 12 months after surgery. Revision middle ear surgery and possible ossicular reconstruction under local anesthesia were performed one year after the surgery. The presence of cholesteatoma pearl in the middle-ear, evaluated by using a 2.7mm 30° endoscope, was recorded as the sign of residual cholesteatoma. Fisher's exact test and Mann-Whitney U test were used for statistical analysis. Significance level for the tests was set at 5%.

Results The incidence of residual cholesteatoma was not statistically significant between the two groups (P>0.05). In each group, 20% (n=4) had residual cholesteatoma. The difference in time interval from the first to second surgery was not statistically significant between the study groups (P>0.05).

Conclusion Endoscopic-assisted ICW tympanomastoidectomy is comparable with CWD tympanomastoidectomy in eradication of cholesteatoma, having possibly fewer complications. It is recommended that more studies be conducted with a larger sample size and longer follow-up period.

* *Corresponding Author:*
Pedram Borghei, PhD.
Address: Otorhinolaryngology Research Center, Tehran University of Medical Sciences, Tehran, Iran.
Tel: +98 (21) 66349253
E-Mail: pborghei@yahoo.com

Extended Abstract

1. Introduction

Tympanomastoidectomy for cholesteatoma is used for eliminating the disease and keeping the ear dry to prevent the recurrence of the disease by optimal cleaning and monitoring of the ear [1]. For many years, Canal Wall Down (CWD) tympanomastoidectomy has been the gold standard of cholesteatoma treatment [2]. This method, which causes a good exposure for disease eradication, has long-term complications on the patients. Intact Canal Wall (ICW) tympanomastoidectomy, on the other hand, is thought to have less morbidities and less exposure for disease eradication from the middle-ear recesses. The use of endoscopy during an ICW may help to visualize the underexposed recesses and reduce residual cholesteatoma [3-5]. Residual cholesteatoma can cause pearl formation in the middle ear or mastoid during a postoperative period or at the second stage of surgery, while recurrent cholesteatoma indicates the formation of adhesive atelectasis or retraction pocket that leads to keratin debris collection. The purpose of this study is to compare the incidence of residual cholesteatoma by using two methods of CWD and endoscopic-assisted ICW tympanomastoidectomy in patients with cholesteatoma.

2. Materials and Methods

This is prospective randomized clinical trial (Code: IRCT20191123045472N1) conducted after obtaining ethical approval (Code: 85-01-48-3531-394758-85) from Tehran University of Medical Sciences. Participants were 40 patients with cholesteatoma in the middle ear and mastoid, who were candidates for tympanomastoidectomy. They were randomly divided into two groups. Patients with destructed posterior canal wall, revision patients, those having complications prior to the first surgery (e.g. facial nerve palsy, Semi-circular canal erosion, sensorineural hearing loss, or any intracranial complications like abscess, meningitis and venous sinus thrombosis), graft surgery failure, and not referring for follow-up examinations were excluded from the study. In the first group, ICW with endoscopic assisted visualization and clearing of the middle-ear recesses, was performed using a 2.7 mm 30° endoscope. In the second group, conventional CWD technique was done. In both groups, a 0.13-mm thick silicone sheet was placed in middle ear cavity and no middle ear ossicular reconstruction was performed. All surgeries were performed by a single surgeon. All patients were microscopically examined at 3, 6, 9 and 12 months after surgery. Middle ear exploration and possible ossicular reconstruction under local anesthesia was performed one year after the surgery, during which the middle ear and mastoid was evaluated using a 2.7 mm 30° endoscope. Presence of cholesteatoma pearl in the middle ear was recorded as a sign of residual cholesteatoma. Statistical analysis was performed in SPSS software using Fisher's exact test for comparing quantitative data and Mann-Whitney U test for qualitative data. Significance level for the tests was set at 0.05.

3. Results

In each ICW and CWD group, there were 20 patients (12 male and 8 female). Their mean age was 45.28±41.10 years. The most common sites of cholesteatoma involvement in the ICW group were medial Attic and medial Incus. For the second stage of surgery in the ICW group, Total Ossicular Replacement Prosthesis (TORP) was performed on 9 patients; Incus Interposition for 6 patients; 3 patients needed no ossicular reconstruction; and 2 patients received no ossicular reconstruction. In the CWD group, TORP was performed on 11 patients; Incus Interposition on 3 patients; myringostapediopexy on one patient; one patient needed no ossicular reconstruction; and 4 received no ossicular reconstruction. The results showed that the incidence of residual cholesteatoma was not statistically significant between the two groups. In each group, 20% (n=4) had residual cholesteatoma. The difference in time interval from the first to second surgery was not statistically significant between the study groups (P>0.05) (Table 1).

Table 1. Results of comparing the mean time interval (month) from first to second surgery between the study groups

Group	N	Mean±SD Time Interval (Month)	Z	P
CWD	20	16±9.125	0.259	0.799
ICW	20	12.55±3.236		

SD: Standard Deviation.

4. Conclusion

Endoscopic-assisted ICW tympanomastoidectomy method is comparable with CWD tympanomastoidectomy in eradication of cholesteatoma, having possibly fewer complications. It prevents the patients from having a long-term open cavity and the need for regular lifelong follow-up and visits to an otologist. Further studies with a larger sample size are recommended to be able to come up with better evidence, and more experience with using an endoscope during otologic surgeries is needed to decrease the incidence of residual cholesteatoma.

Ethical Considerations

Compliance with ethical guidelines

This study ethically approved by the Research Ethics Committee of Tehran University of Medical Sciences (Code: 85-01-48-3531-394758).

Funding

This study has been funded by Tehran University of Medical Sciences (TUMS); (Grant No: 85-01-48-3531).

Authors' contributions

Conceptualization, supervision, writing – original draft: Pedram Borghei and Suzan Adel; Data collection: Mehdi Nikkhah; Data analysis: Shadman Nemati.

Conflicts of interest

The authors declared no conflicts of interest.

Acknowledgements

We would like to thank the otorhinolaryngology Research Center of Tehran University of Medical Sciences for their support.