In Saving the Canal Wall, can MERI and Otoendoscopes Help Take a Call?

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ABSTRACT

Introduction

The study was aimed to find out whether any correlation exists between Middle Ear Risk Index (MERI) and the diagnostic ability of otoendoscopes to help in the decision making to preserve the posterior canal wall in management of cases of chronic otitis media(COM) squamous type.

Materials and Methods

Patients of chronic otitis media squamous active type were subjected to tympanomastoid surgery under the microscope and adjunctive use of otoendoscope. After proper disease clearance under microscope, otoendoscopes were taken as an adjunct to find out whether any residual disease was being left behind and to confirm whether the posterior canal wall could be preserved. Dubious cases in which the canal wall could be saved due to conclusive evidence of disease removal through the endoscope were taken as the ones being influenced by otoendoscopic decision-making.

Results

Patients having moderate MERI score were likely to have their canal walls spared by endoscopic evaluation.

Discussion

The percentage of residual disease detected with otoendoscopes were concurrent with other studies reporting similar figures.

Conclusion

The otoendoscope is decidedly more helpful in conclusive decision making in preserving the posterior canal wall in a case of chronic otitis media.

Keywords

Endoscopy; Mastoidectomy; Cholesteatoma, Middle Ear; Decision Making

A huge number of tympanomastoid surgeries are performed every year all over the world, for the treatment of chronic otitis media. The operating microscope is the accepted standard for these surgeries. It has conventionally been the binocular vision microscope that helps in delineating the middle ear structures, presence of disease in the middle ear, and to decide pre and intra operatively, the extent to which a surgeon will make his manoeuvres within the restricted space of the middle ear cleft to make it disease free. But due to the intricate anatomy, along with numerous anatomical variations within this minute space, many structures cannot be seen at all, or, necessitates another instrument that can help to 'look around corners'. The availability of otoendoscope has broadened the surgeon's repertoire, helping him take a closer look at the middle ear, by various degrees of vision. But it is not routinely used by otosurgeons despite coming into existence in 1967.[1] Otoendoscope is used in 25% of ear surgery cases in Japan (2016).[2] A Canadian survey (2016) had shown 42% of surgeons use otoendoscope as an adjunct in cholesteatoma surgery.[3]

Chronic otitis media active squamous type can

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present with or without frank cholesteatoma and tympanomastoidectomy remains the treatment of choice. The surgery can be broadly classified as canal wall up and canal wall down surgery. The problems of a canal wall down surgery are well known and they include perpetually discharging ear, cosmetically unacceptable, doctor dependency, water sports prohibition and difficulty in fitting hearing aids. Although several techniques have been described in literature to reconstruct the posterior canal wall, physiologically the best possible result is obtained when the posterior canal wall is kept intact. In the present study, we tried to analyse the utility of otoendoscopes in saving the posterior canal wall in patients of chronic otitis media squamous active type and to gauge the disease severity at which otoendoscope usage was likely to be the most beneficial in taking the decision to save the wall.

The aims of this study were to find out whether otoendoscopes can be used for decision making to preserve the posterior canal wall and also to find out the disease severity (using the MERI score) in cases where otoendoscopes are likely to be the most decisive to save the posterior canal wall. Middle Ear Risk Index[4] (MERI) was devised by Kartush in 1994 to prognosticate the severity of disease affecting the middle ear and was later modified by adding smoking as a risk factor by Becvarovski & Kartush[5] (2001). (Fig.1) The highest possible score is 16. MERI can be categorised into mild MERI (0-3), moderate MERI (4-6), severe MERI (≥7). [6]

Risk factor	Risk value
Otorhhea (Belucci)	
I- Dry	0
II- Occasionally wet	1
III- Persistently wet	2
IV- Wet, cleft palate	3
Perforation	
None	0
Present	1
Cholesteatoma	
None	0
Present	2
Ossicular status (Austin/Kartush)	
M+I+S+	0
M+S+	1
M+S-	2
M-S+	3
M-S-	4
Ossicular head fixation	2
Stapes fixation	3
Middle ear granulations or effusion	
No	0
Yes	2
Previous surgery	
None	0
Staged	1
Revision	2
Smoker	
No	0
Yes	2

Fig. 1. MERI score

Materials and Methods

A prospective analytical study was conducted at a tertiary care centre for 18 months with a study population of 42 patients. Minimum age of the patients was 10 years while the maximum was 60 years. (Mean - 33.9 ± 14.04 years)

All patients diagnosed having chronic otitis media squamous active type undergoing tympanomastoid surgery were included in the study, while patients with known complications of COM, and those undergoing revision surgeries were excluded.

After a thorough history taking and clinical examination, patients were subjected to tympanomastoid surgery. All the surgeries were conducted by the same team of surgeons. MERI score of all patients were recorded. All cases were proceeded with a postauricular incision and a cortical mastoidectomy (posterior-to-anterior bony approach). The patients were operated primarily under the microscope. Adjunctive otoendoscopic evaluation was done when disease removal/surgical dissection was deemed complete under the microscope (0 & 30 degree endoscopes used as per need). Main areas where

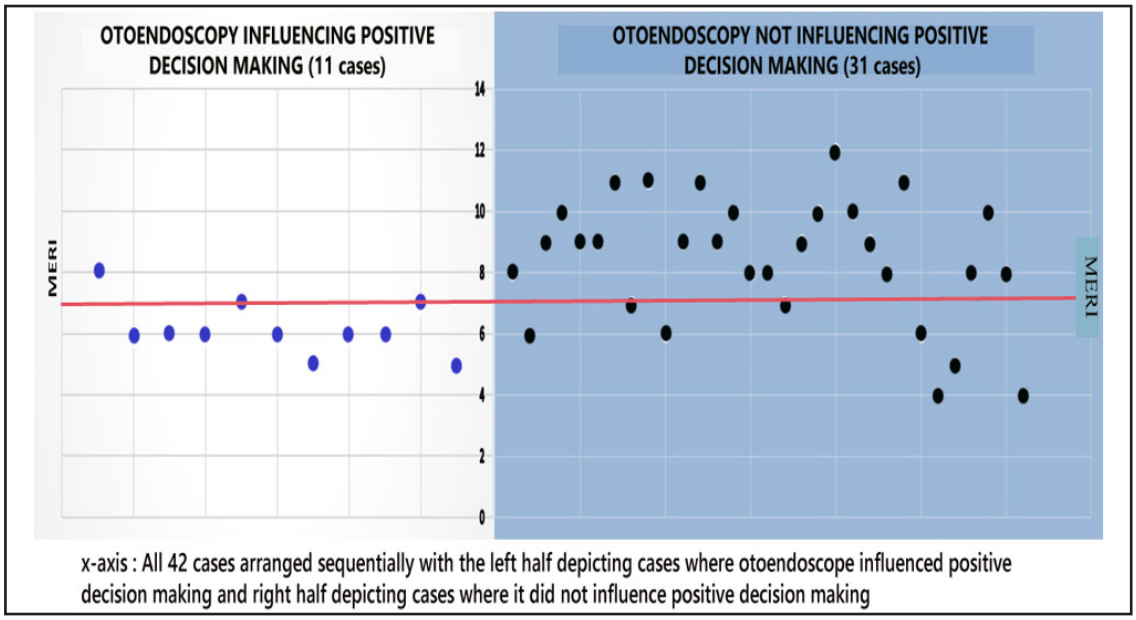

Fig. 2. All 42 cases plotted against their MERI scores. x-axis represents the 42 cases arranged serially, y-axis represents the MERI score. Left side of the chart has the cases where otoendoscopy helped in positive decision making. Right side of chart shows cases where otoendoscopy did not help positive decision making. Red line through MERI score 7 demonstrates that most cases where otoendoscopy had a positive influence in decision making had MERI<7.

otoendoscopes were utilized were aditus ad antrum, anterior epitympanum, sinus tympani, facial recess, eustachian tube opening and supratubal recess. (Fig. 3 & 4) Otoendoscopy influencing the definitive decision making positively were the cases where the posterior canal wall could be spared after visualization through the otoendoscope, which would not have been done/or would have been done differently, if the evaluation was made under the microscope only. This was decided by looking at the extent of canal wall erosion, presence of

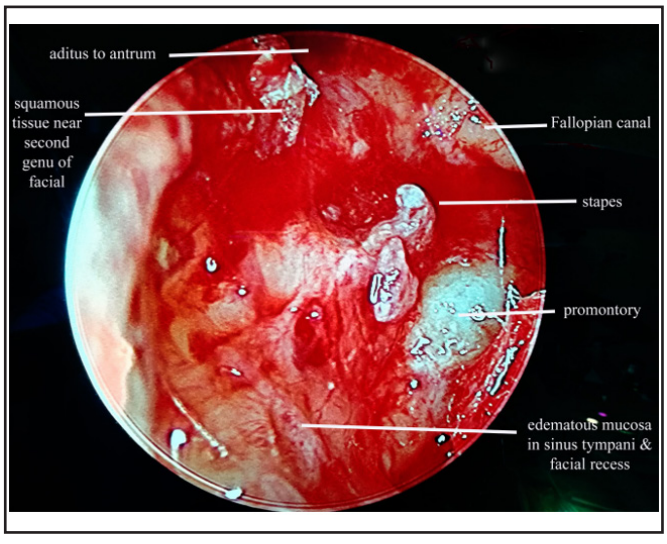

Fig. 3. Retrotympanum with an angled scope

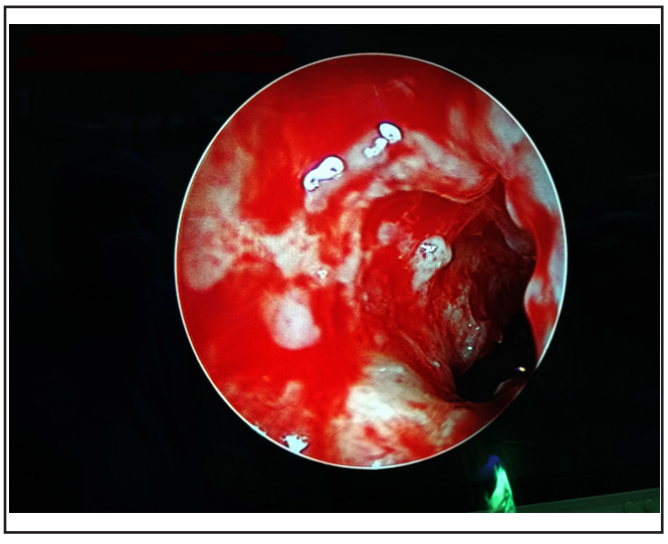

Fig. 4. View of the aditus from the mastoid cavity side

Table I : MERI scores and the number of canal wall up and canal wall down surgeries (CWU= Canal wall up, CWD= Canal wall down)

MERI SCORE	CWU MASTOIDECTOMY (N1 = 16)	CWD MASTOIDECTOMY (N2 = 26)	TOTAL (N = 42)
04-Jun	12	1	13
≥7	4	25	29
Total	16 (38%)	26 (62%)	42(100%)

squamous epithelium in hidden areas which could be removed after being detected with the endoscopes but were not seen by the microscope.

Despite the use of otoendoscopes, in many of the cases, the canal wall was already eroded to a large extent which precluded any canal wall preservation surgery. Hence, these cases were considered in the group where otoendoscopy did not help save the canal wall. In some cases, the extent of disease was such that despite otoendoscopic evaluation, complete disease exenteration could not be guaranteed with a canal wall in place as instrumentation was too difficult in those narrow confines. In these cases, otoendoscopy made us decide to remove the canal wall, but those cases were not considered as positive decision making in terms of canal preservation in this study.

Results

Out of total 42 patients, 13 patients had a moderate MERI score (MERI 4-6), while 29 patients had a severe MERI score (MERI (≥7). (Table I) Among all the patients, 16 patients had a canal wall up mastoidectomy while 26 patients had a canal wall down mastoidectomy, which was determined by the extent of complete disease removal under the microscope and confirmed by the otoendoscope.

In our study, all the 26 patients of canal wall down mastoidectomy were considered to be the ones where otoendoscope did not have a positive decision making role to spare the canal wall. Out of the remaining 16 cases of canal wall up surgery, in 5 cases, the canal wall would have been spared even without the use of otoendoscopes. In the remaining 11 cases, there were doubts regarding the feasibility of keeping the posterior canal wall intact as adequate disease removal could not be ensured under the microscope. This is because, squamous epithelium remained in the sinus tympani or facial recess or on the medial aspect of the aditus despite adequate bone removal and rectilinear vision under microscope could not afford adequate visibility even after rotating the microscope or the patients' head in various angulations.

These are the cases where the otoendoscope played the positive decision making role, as the canal wall could be spared conclusively after endoscopic evaluation. Thus, in 11(26%) of 42 patients, otoendoscopy helped in positive decision making to save the canal wall, while in the remaining 31 cases, it did not help. Plotting the cases on a chart showed that in 8 of the 11 cases where the otoendoscope had a positive decision making role to save the canal wall, the MERI score was between 4 and 6 (moderate MERI). (Fig. 2)

Applying Fisher's exact test, p-value was calculated as 0.0012, which was a statistically significant figure. (Table II) So, it was observed that patients with moderate MERI score are the ones in which otoendoscope helps in decision making to preserve the posterior canal wall.

Amongst the areas where residual cholesteatoma was found after extensive dissection and disease clearance under the operating microscope, sinus tympani harboured the most (12 cases-29%), followed by facial recess (6 cases- 14%) and anterior epitympanum (4 cases- 10%).

The patients were followed up for an average of 6 months. Out of the 16 cases of canal wall up mastoidectomy, 1 case each had graft medialisation and prosthesis extrusion. Out of 26 patients of canal wall down mastoidectomy, disease recurrence occurred in 1 case, which could be confirmed by examination under microscope and otoendoscopy.

Table II : MERI scores and the number of cases where otoendoscope helped to preserve the canal wall. In 11 cases, otoendoscope helped to preserve the canal wall. The 31 cases where otoendoscopy did not help in positive decision making included the 26 cases of canal wall down surgery as well as 5 cases of canal wall up surgery which could have been decided with microscope only.

MERI SCORE	OTOENDOSCOPY INFLUENCING DECISION MAKING TO PRESERVE THE CANAL WALL		P- VALUE
	YES	NO	
04-06	8	6	0.0012
≥7	3	25	
Total	11	31	

Discussion

Otoendoscope is a tool which is sparingly used globally despite its advantages being well known globally. It can be helpful in taking the decision to spare the posterior canal wall in case of chronic otitis media squamous active type, as was evident in our study where in 11 (26%) cases, the canal wall could be spared after endoscopic assessment of the surgical field after disease clearance under the microscope. Residual disease clearance can be done with the help of otoendoscopes. The figures of residual disease detected in our study concur with those by figures reported by other workers, namely El Meselaty,[7] Presutti,[8] Ayubi,[9] Ayache,[10] Elfeky,[11] le Nobel.[13]

Our study had a few limitations. Firstly, it was a relatively small study sample of 42 patients. We proceeded with a canal wall up mastoidectomy in all patients, thus keeping the bony approach from posterior to anterior. The anterior to posterior bony approach, i.e. inside out mastoidectomy technique was not explored in this study. No mild MERI score patients were there in our study. Hearing mechanism reconstruction was not assessed, as keeping the posterior canal wall intact and complete disease removal was the prerogative of this study. Minimally invasive second look surgery not performed. However, a study by Shelton et al.[12] showed that due to better quality excision of disease under the endoscope in the initial surgery, residual lesions appeared as small pearls in the second look surgery which were easy to manage and need not be removed. Additionally, Ayache et al. had stated that better endoscopic clearance at the first surgery can reduce the requirement of a second look surgery.[11]

Conclusion

Adjunctive use of otoendoscopes in mastoid surgery should be considered. Otoendoscopes can be decisive in preserving the posterior canal wall in a case of chronic otitis media. Cases with moderate MERI score are the ones most likely to benefit from otoendoscopic decision making to preserve the canal wall (more specifically, patients with MERI score 6-7 were found to be the ones where otoendoscopy was most decisive). Finally, where they are not helping in the decision making, otoendoscopes still allow residual disease removal from hidden recesses of middle ear and enable the surgeon have more confidence in complete disease clearance.

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