

TEES – A New Horizon

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ABSTRACT

Background: Transcanal endoscopic ear surgery has many advantages over conventional microscopic ear surgery and is used as adjunct to microscope or is used independently. Precise large visual field and angular vision has edge over the clumsy, expensive, peeping tubular vision of microscopes. Moreover, it is a better teaching methodology for the undergraduates and postgraduates. Our study comprised of twenty-five patients who had safe ear and underwent transcanal endoscopic ear surgery (TEES). **Methods:** This prospective study was carried out between October 2014 to December 2015 at Hayaat hospital, Allahabad, Uttar Pradesh, India and Hind Institute of Medical Sciences, Safedabad, Barabanki. Twenty-five patients of age group more than fifteen years were selected. All the patients selected had dry and safe type of chronic suppurative otitis media (CSOM). **Results:** Of the twenty five people ten were females and fifteen males in the ratio of 2:3. All the patients selected had dry ear and safe type of chronic suppurative otitis media (CSOM). All had conductive hearing loss of variable decibels but not greater than fifty-five decibels. **Conclusions:** Further research is needed in the field of operative TEES. We all need to discuss and more research work is needed to prove its genuinity and practicality.

Key words: CSOM, TEES, cartilage.

INTRODUCTION

Medical sciences have technically advanced and have far reaching impact on the patient care. Doctors now work and get trained for minimal access surgery. This type of surgery facilitates precise approach and thereby decreases morbidity, hospital stay and financial accrument. The advent of endoscope in Otorhinolaryngological practice has revolutionized the surgical approaches to many unconquered areas of head and neck.

Endoscope use in rhinology and skull base is well documented but recent innovative use in ear surgery has added another feather in the cap of Otolaryngological medical sciences. Endoscopic otological surgeries have

many advantages over the traditional microscopic surgical approach. The hidden areas and bony overhangs are accessible with the endoscopes. Moreover, angled endoscopes have given a tremendous edge over the microscope.

Transcanal endoscopic ear surgery (TEES) is a current hot topic in our specialty, but it is not entirely correct to introduce TEES as “new.” Although not new, it is clear that during the last few years, endoscopes have proven to be safe and effective instruments to manage ear diseases in a minimally invasive way, preserving important anatomical structures, allowing functional approaches to well-known conditions. Moreover, endoscopes have provided a better view and understanding of traditional middle ear anatomy and physiology, allowing new landmarks, novel concepts of tissue preservation, ventilation routes, and management of other conditions within the middle ear and beyond.

The anterior epitympanum and the retrotympanum are anatomic sites that are difficult to access under otomicroscopy. Otoendoscopy offers a large field of vision using direct vision and lateral vision endoscopes, particularly in the supratubal recess and sinus tympani, for which visualization is excellent with reduced surgical approaches. The otoendoscopy is better in identifying residues of lesions after excision of the disease under otomicroscopy in the same stage of surgery.

Access this article online	
Website: www.iabcr.org	Quick Response code
DOI: 10.21276/iabcr.2017.3.2.4	

Received:08.12.16| Revised:22.12.16| Accepted:29.12.16

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METHODS

This prospective study was carried out between October 2014 to December 2015 at Hayaat hospital, Allahabad, Uttar Pradesh, India and Hind Institute of Medical Sciences, Safedabad, Barabanki. Twenty-five patients of age group more than fifteen years were selected. All the patients selected had dry and safe type of chronic suppurative otitis media (CSOM). All had conductive type of hearing loss. All the underlying disease conditions were cleared, whether it was nasal diseases, pharyngeal or simply URTI. The chronic systemic diseases were controlled which was present in six patients. Four had diabetes and two had hypertension. All patients underwent routine investigation and screening test for HIV, Hepatitis-B, Hepatitis-C, X-ray chest, ECG. Fitness level was ascertained by the anesthetists before going for surgery. Puretone audiometry (PTA) was done and the hearing loss was assessed.

Zero degree, 30 degree, and 70-degree rigid endoscopes with an outer diameter of 2.7 mm and 4 mm were used together with a high-definition video system of Stryker company. All the surgeries were done without any endoscopic stand or holder. We operated almost all patients using local anaesthesia giving periauricular block and used insulin syringe to inject in the external auditory canal at four points except for two apprehensive patients where general anaesthesia was given. Temporalis fascia, tragal perichondrium, tragal cartilage, and conchal cartilage was used to bridge the bony gap and as support wherever it was required. We used injection fortwin and phnergan preoperatively whenever required. Anxolytics, xlyocaine sensitivity was done a day before surgery.

RESULTS

Twenty-five patients in the age group of more than fifteen years were selected so that compliance for medical advice post operatively is easily met. Of the twenty-five people ten were females and fifteen males in the ratio of 2:3. All the patients selected had dry ear and safe type of chronic suppurative otitis media (CSOM). All had conductive hearing loss of variable decibels but not greater than fifty-five decibels. All the underlying disease conditions were cleared whether it was nasal diseases, pharyngeal or simply URTI. The chronic diseases were controlled which was present in six patients. Four had diabetes and two had hypertension. All patients underwent routine and screening test for HIV, Hepatitis-B, Hepatitis-C, X-ray chest, ECG. Fitness level was ascertained by anesthetist before going for surgery. Puretone audiometry (PTA) was done and the hearing loss was assessed.

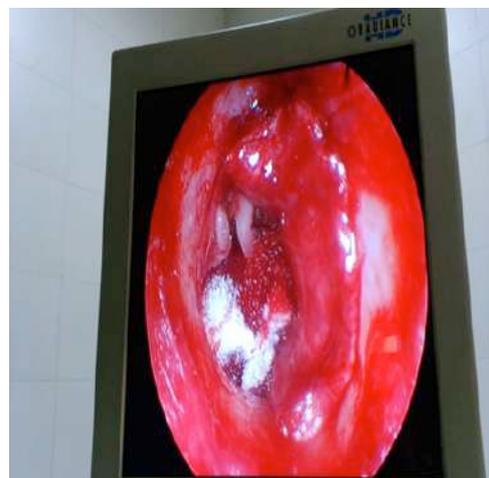
One-handed endoscopic procedures had limited the indications for transcanal endoscopic ear surgery (TEES) in cholesteatoma surgery. However, the development of electrically powered instruments has opened the door to such one-handed endoscopic procedures in restricted surgical spaces.



Stryker 1188 camera & monitor



Patient operative parameter



Tympanometal flap elevated

DISCUSSION

Endoscopic ear surgery was described for the first time in 1960s.^[1] Propagators of endoscopic visualization of chronic ear disease espouse panoramic, wide angle, and magnified view provided by endoscope as well as ability to easily negotiate through EAC, the ability to “look around corners”, and provide uninterrupted image overcomes most of the disadvantage of microscope.



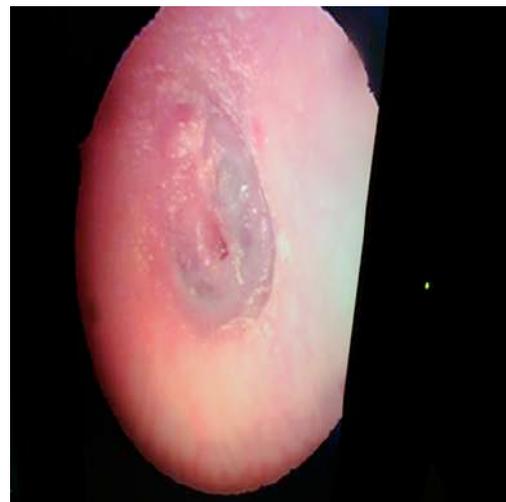
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Endoscopic view after twenty days



Endoscopic view after fifteen days



Endoscopic view after thirty days



Endoscopic view after fifteen days

Our study comprised of twenty-five patients both males and females in a ratio of 3:2. We selected all patients greater than fifteen years of age group. Migirov, Shapira et al^[3] studied thirty patients, aged 9 to 75 years and Kakehata, Watanabe T, Ito T et al^[4] performed TEES on 43 cases.

If the endoscopes can help us manage all the critical issues of otology, then the requirement of the costly microscope and extra investment in Otorhinolaryngological practice will be curtailed. The operation theatre too will look spacious as endoscope will serve the purpose for both the rhinology and otology. There are many advantages of video-endoscopic ear surgery and in our setup, we routinely do many a procedure on the outpatient department and daycare basis. Tympanostomy tube insertion, cleaning ear canal for otomycosis, wax removal, polypectomy etc have now become easy and comfortable.

We used traditional diamond burr for canaloplasty or if posterosuperior bone was to be removed to locate stapes. Sonopet UBC (Stryker) is used to cut bony tissue by few doctors. The non-rotational motion of the UBC prevents injury to the tympanomeatal flap and other soft tissue, which may result with standard drills but we used the diamond burr wherever cortical mastoidectomy with tympanoplasty (CMT) was planned. The transcanal endoscopic approach to the antrum using the UBC proved to be less invasive and more functional. The UBC contains both a suction and irrigation system in a single handpiece, and this UBC is an appropriate cutting tool that extends the indications for transcanal endoscopic ear surgery (TEES).

Table 1 Demographic details of patients

S.No	Age/sex	Diagnosis	Operative Procedure	Grafting material	Preop AB gap	Postop AB gap	Improvement
1	20/F	CSOM (R)	VES (R)	TF	40	<10	30
2	34/M	CSOM (R)	VES (R)	TF & C	55	<15	40
3	36/F	CSOM(L)	VES (L)	TF	35	<10	25
4	21/F	CSOM(R)	VES (R)	TF	35	<5	30
5	56/M	CSOM(B/L)	VES (L)	TF & C	45	<10	35
6	62/M	CSOM(R)	VES (R)	TF	35	FAIL/INFECTED	-
7	54/M	CSOM(R)	VES (R)	TF & C	50	<15	35
8	25/F	CSOM(B/L)	VES (L)	TF & C	45	<10	35
9	40/F	CSOM(R)	VES (R)	TF & C	55	<15	40
10	48/M	CSOM(R)	VES (R)	TF	40	<10	30
11	39/M	CSOM(R)	VES (R)	TF & C	45	<10	35
12	28/F	CSOM(B/L)	VES (R)	TF & C	50	<15	35
13	40/M	CSOM(R)	VES (R)	TF	50	<10	40
14	54/M	CSOM(B/L)	VES (L)	TF & C	40	<5	35
15	44/M	CSOM(R)	VES (R)	TF & C	45	<5	40
16	32/F	CSOM(L)	VES (L)	TF	35	<10	25
17	29/F	CSOM(R)	VES (R)	TF & C	45	<5	40
18	35/M	CSOM(R)	VES (R)	TF & C	45	<10	35
19	46/M	CSOM(B/L)	VES (L)	TF & C	50	<15	35
20	37/F	CSOM(L)	VES (L)	TF & C	45	FAIL/INFECTED	-
21	42/M	CSOM(R)	VES (R)	TF & C	50	<10	40
22	35/M	CSOM(R)	VES (R)	TF & C	40	<5	35
23	24/F	CSOM(L)	VES (L)	TF	35	<5	30
24	62/M	CSOM(L)	VES (L)	TF & C	50	<10	40
25	46/M	CSOM(R)	VES (R)	TF & C	45	<5	40

However, this study was done to highlight the uses of the otovideoendoscopy and the edge we have over classical microscopic surgery. This is the reason why we selected to operate the safe ears rather than to work upon the unsafe ears. The intricate disease process especially the unsafe ear needs precise instrumentation and taking risk of incomplete disease removal is not warranted.

Migirow, Shapira et al^[3] studied thirty patients, aged 9 to 75 years who underwent the exclusive endoscopic transmeatal cholesteatoma eradication. There were no incidents of iatrogenic injuries to the facial nerve or ossicles. Two patients had SNHL and one had labyrinthitis. Our preliminary results in this study indicated that the minimally invasive endoscopic ear surgery did not cause any damage to important structures, with minimal morbidity and good functional results.

Hammed Sajjadi^[6] study exhibited that middle ear and mastoid endoscopy is a safe and highly effective adjunctive technique to the standard microsurgical dissection. Endoscopic ear surgery requires extra training and effort. Surgeons need to develop the ability to operate one handed, and to differentiate between granulation tissue, tympanosclerotic plaques and true cholesteatoma as seen on endoscopes. Proper use of endoscopes, video cameras, and endoscopic instrumentations are essential in achieving successful outcomes. Furthermore, surgeons interested in performing endoscopic ear surgery need to make ear endoscopy a routine part of all otologic cases in order to increase efficiency and familiarization of the entire surgical team with this approach. The learning curve to master endoscopic ear surgery is rather steep. Surgeons are encouraged to take hands-on dissection courses and start

slow and gradually increase their reliance on endoscopes. All the basic principles of otologic surgery remain valid and must be adhered to while using endoscopes to augment surgical techniques. The best way to learn is to start otovideoendoscopy in outpatient department same as nasal endoscopy to carry out small procedures. Pothier D D^[4] presented in his study the selection of the endoscopes, how to approach the first fully endoscopic procedure, patient selection, preoperative planning, setting up the operating room, pitfalls typically encountered, and how to gain skills to perform endoscopic procedure successfully.

Karchier, Morawski K et al^[7] also studied endoscopic use the middle ear surgery for above twenty years when decrease of cholesteatoma recurrence due to employment of endoscope was revealed in comparison to standard microscopic only visualization. Application of endoscopy during the middle ear surgery results in decrease in frequency of cholesteatoma recurrence and increase in the effectiveness of the ossiculoplasty. In our practice, we too performed many otovideoendoscopic procedures with excellent results and the current study proves it with more than ninety percent results.

The results we had obtained were excellent in respect to the morbidity, operating time which ranged from forty-five to ninety minutes and outcome of the surgery was more than ninety percent when we compared we the traditional post-auricular approach. Frequent change of angle, adjustment to overcome anterior bony overhang and approaching the anterior perforation and clumsy handling of the heavy microscope hinders quick and smooth operation. But few doctors haven't found any significant difference in outcome as reported by Jaimin Patel et al.^[12]

The handling of the instruments is comfortable and the vision is wide angled and clear. The problem of engagement of the hand can be countered by taking the help of well-trained assistant who facilitates in surgery if required. Many of our otologist face this problem and if synchronized help is taken by the assistants just as the laproscopic surgeons do, the procedure will be a trouble free. Hala, Jagdeep et al^[10] in their study on endoscopic ear surgery concluded that it can be safely performed in a range of otological procedures. This has the potential to become a well-established surgical option for middle ear surgery in the near future. Tarabichi M^[2] too highlighted in his study the advantages of endoscope in ear surgery. The endoscope holds the greatest promise in tympanoplasty and cholesteatoma surgery and should increase the utilization of transcanal over post-auricular procedures. Kojima H et al^[9] highlighted how endoscopic surgery is also suitable for education: The surgical anatomy can be understood easily and both the surgeon and assistants can observe the procedure on the same monitor. Moreover, it is a good tool for teaching undergraduates.

But as said earlier the constraints too should be discussed as high magnification and depth perception are two important drawbacks which need to be addressed. If peeping into the nooks and corner is easy by endoscope, clearing the cholestaetomatous sac from eroded fallopian canal is cumbersome. Similarly, depth perception is impeded if you wish to separate the layers of the tympanic membrane for interlay technique.

All this problem can be mitigated if both the microscope and endoscope are clubbed together i.e. COMET (combined otomicroscopic and endoscopic technique) and this combined therapy will overcome the shortcomings of the individual techniques. The role of endoscope in ear surgery is well documented by many otologists, but to what extent is a debatable issue. Elliott Kozin D et al^[11] in their study detected that endoscopes in middle ear surgery are predominately employed as an adjunct to the microscope and enabled improved visualization of the tympanic cavity.

CONCLUSION

Recently, reports illustrate utilization of the endoscope during surgical dissection; however, patient outcomes

comparing the operative endoscope versus the microscope are lacking. Further research is needed in the field of operative TEES. We all need to discuss and more research work is needed to prove its genuinity and practicality.

REFERENCES

1. Mer S, Derbyshire J, Brushenko A, Pontarelli D. Fiberoptic Endoscope for Examing the Middle Ear. Arch Otolaryngol. 1967;85:61-67.
2. Tarabichi M. Endoscopic middle ear surgery. Ann Otol Rhinol Laryngol. 1999 Jan;108(1):39-46.
3. Migirov L, Shapira Y, Horowitz Z, Wolf M. Exclusive endoscopic ear surgery for acquired cholesteatoma: preliminary results. Otol Nuerotol 2011 Apr;32(3):433-6.
4. Pothier DD. Introducing endoscopic ear surgery into practice. Otolaryngol Clin North Am. 2013 Apr;46(2):245-55.
5. Kakehata, Watanabe T, Ito T, Kubota T, Furukawa T. Extension of indications for transcanal endoscopic ear surgery using an ultrasonic bone curette for cholesteatomas. Otol Nuerotol 2014 Jan;35(1):101-7.
6. Hamed Sajjadi. Endoscopic Middle Ear and Mastoid Surgery for Cholesteatoma Iran J Otorhinolaryngol. 2013 Spring; 25(71): 63-70.
7. Karchier E, Morawski K, Bartoszewicz R, Niemczyk K. Application of the endoscopy in the middle ear surgery. Otolaryngol 2012 May-Jun;66(3):191-5.
8. Ayache S¹, Tramier B, Strunski V. Otoendoscopy in cholesteatoma surgery of the middle ear: what benefits can be expected? Otol . 2008 Dec;29(8):1085-90.
9. Kojima H, Komori M, Chikazawa S, Yaguchi Y, Yamamoto K, Chujo K, Moriyama H. Comparison between endoscopic and microscopic stapes surgery. Laryngoscope. 2014 Jan;124(1):266-71. doi: 10.1002/lary.24144. Epub 2013 May 13.
10. Hala Kanona, Jagdeep Singh Virk, and Anthony Owa. Endoscopic ear surgery: A case series and first United Kingdom experience. World J Clin Cases. 2015 Mar 16; 3(3): 310-317.
11. Elliott D. Kozin, M.D., Shawn Gulati, B.S., Ashton Lehmann, M.D., Aaron K. Remenschneider, M.D., MPH., Alyson Kaplan, B.A., Lukas D. Landegger, M.D., Michael S. Cohen, M.D., and Daniel J. Lee, M.D. Systematic Review of Endoscopic Middle Ear Surgery Outcomes. Laryngoscope. 2015 May; 125(5): 1205-1214.
12. Jaimin Patel, Ranjan G. Aiyer, Yogesh Gajjar, Rahul Gupta, Jayman Raval, Pokhraj P. Suthar. Endoscopic tympanoplasty vs microscopic tympanoplasty in tubotympanic csom: a comparative study of 44 cases. Int J Res Med Sci. 2015; 3(8): 1953-1957.

How to cite this article: Ashraf M, Ashraf S, Jabr IA. TEES-A New Horizon. Int Arch BioMed Clin Res. 2017;3(2):15-19. DOI:10.21276/iabcr.2017.3.2.4

Source of Support: Nil, **Conflict of Interest:** None