



OTOENDOSCOPY: "A CRITICAL STUDY OF ITS DIAGNOSTIC AND THERAPEUTIC USES"

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ABSTRACT **Background:** The main objective of this study was to use of otoendoscope in diagnosis of various ear pathologies and its use in the surgery as an adjunct to microscopic surgery of the ear with advantages and disadvantages of this procedure. **Methods:** A hospital based prospective study was done in department of Oto- Rhino- Laryngology, R.N.T. medical college Udaipur (Rajasthan) over a period from August 2010 to February 2012. Total 100 patients were evaluated in the study with both Otoendoscope and Microscope. Surgery of selected patients were done. **Results:** Out of 100 patients, 46 patients were more benefited by Otoendoscope than microscope during surgery. Hidden areas were better visualized to eradicate diseases. **Conclusion:** otoendoscope extend the operative field for better visualization of hidden structures under microscope are sinus tympani, retrofacial area, hypotympanum, and anterior attic recess during middle ear exploration. Various OPD procedures and diagnosis are done in less time and more accurately in comparison to microscope.

KEYWORDS : Otoendoscope, Microscope, Procedures.

INTRODUCTION

Otoendoscopic diagnosis is superior to microscopy in many ways. When the endoscope is placed in the external auditory meatus, the entire tympanic membrane can be viewed in one field, and assessment can be made of the entire tympanic membrane, with the fibro cartilaginous ring and the tympanomeatal angle.^[1]

This wide angle effect of the endoscope is of great advantage. In addition, moving the endoscope forward creates the magnifying effect, making structural details more easily identifiable.^[1]

The use of angled endoscope provides visualization of anatomical structures which are concealed with microscopy.^[2]

In spite of the advantages of the microscope, many hidden areas in the ear cannot be visualized with the microscope. The introduction of The endoscope has enabled visualization of the hidden areas of the ear and is opening up new vistas in ear surgery.^[3]

30 degree fiber optic Hopkins rod telescope is used for the post-operative follow-up of the mastoid cavity with gratifying result successfully.^[4]

Endoscopic transcanal approach is the best way to find cholesteatoma within the mesotympanum, attic, facial recess, sinus tympani, hypotympanum, and eustachian tube because ear canal as the most logical, direct, and natural pathway.^[5]

The present study evaluates the ability and utility of otoendoscope to diagnose various ear pathologies during intra-operative, postoperative and outdoor as a helpful adjunct to microscope and otoscope.

MATERIAL AND METHOD

All patients were selected according to following criteria:-

Inclusion Criteria:

- (1) Patients with diagnostic dilemma presenting in ENT OPD.
- (2) Patients admitted in the ward for undergoing ear surgery, either primary or for revision purposes.

Exclusion Criteria:

Patient with more than 60 years

METHODS:

Each patient would be studied in the following manner:-

(2) Routine investigation will be done as follows: - Complete haemogram, Chest X-ray, ECG and Urine for albumin and sugar.

(3) Specific investigations may be done as follow- PT Audiogram (Preoperative and postoperative interval), Tympanometry, X-ray mastoid lateral oblique view and CT scan of temporal bone [if required].

(4) Most of the patients would not require any anaesthesia. Local anaesthesia is, however, necessary in young and apprehensive adult patients. The surgical procedure would necessitate G.A., if it warrants in that particular patient.

(5) We use SAVLON to moisten the lens of the endoscope. Before examination, the endoscope is disinfected with 4% CIDEX for 20 minutes.

(6) Preoperative Preparations: No special preparation other than for regular ear surgery is required.

(7) The endoscope used for the purpose would be Hawk's 0, 30, 70 degree Otoendoscopes of 4 mm diameter and Hawk's 30 degree of 2.7 diameter. We also used nasal endoscope 0, 30, 45 degree. The light source is of KARL STROZ / KALELKAR.

OBSERVATIONS AND RESULTS

The present study was conducted in total one hundred patients of various ear pathologies. The observations and results are tabulated as below.

Table 1 Procedure performed

S.No.	Procedure	No. of patients	%
1.	Grommet insertion	3	03.00
2.	Paper patching	7	07.00
3.	Suction clearance	6	06.00
4.	Tympanoplasty	13	13.00
5.	MRM	42	42.00
6.	CAT	4	04.00
7.	No procedures done	25	25.00

This table shows that MRM procedure was performed to eradicate disease in 42% patients where as Tympanoplasty was done in 13% patients. Otoendoscope was used as adjunct to microscope for ossicular status in tympanoplasty. Paper patching was done in 7% patients. Grommet insertion was done in 3% patients. Suction

clearance was done in 6% patients for otomycosis.

Table 2 Visualization of Granulation/Cholesteatoma/Polypoid mucosa during intraoperative procedures in various spaces and recess of Tympanic and Mastoid cavity (Total no. of patients=46)

S.No.	Location	Under microscopic examination	Under otoendoscopic examination
		No. of patients	No. of patients
1.	Antr. attic recess	11	17
2.	Sinodural angle	4	7
3.	Sinus tympani	3	29
4.	Tegmen tympani	7	10
5.	Antr. buttress & postr buttress	4	11
6.	Hypotympanum	5	11
7.	Retrofacial area	5	23
	facial canal or recess		
8.	Eustachian tube	1	5
9.	Semicircular canal	3	4
10.	Ossicles (a) Normal (malleus, incus and foot plate of stapes)	15	17
	(b) Necrosis eroded/absent (malleus, incus and foot plate of stapes)	18	20
11.	Mastoid tip	2	3

According to this table, better visualization of following areas of middle ear by otoendoscope with comparison to microscope are anterior and posterior part of sinus tympani, retrofacial areas, sinodural angle, ossicles status, hypotympanum, anterior & posterior buttress, Eustachian tube, anterior attic recess and mastoid tip. This may help to take decision in selection of procedure during operation.

Table 3 Findings of patients during follow up examination

S. No.	Findings	1 month	2 months	6 months
1.	Pericondritis	1	-	-
2.	EAC stenosis	-	1	-
3.	Epithelial debris and wax in the cavity	7	2	3
4.	Infection/discharge (after mastoidectomy of unsafe ear)	1	5	4
	(a) Unhealthy granulation in the cavity	-	3	2
	(b) Foreign body in the cavity (fly, mosquito, cotton plug, etc.)	1	-	--
	(c) Adhesions partitioning in the cavity	-	-	1
	(d) Granulation over exposed dura & sinus plate	-	2	1
5.	Condition of graft:(after tympanoplasty and CAT)	--	15	16
	(a) Taken up	--	2	1
	(b)Rejected/residual perforation			
6.	Grommet extrusion		1	2
7.	Condition of tympanic membrane after paper patching			
	(a) Healed TM	7	-	-
	(b) Residual perforation in TM	-	-	-

This table shows that during follow-up of 1 month, discharging cavity, epithelial debris and wax present in 7 patients, only one had pericondritis where as after 2 month follow-up unhealthy granulation, discharging cavities and wax present in 7 patients. One patient has

stenosis of EAC. 88% patients have taken up graft and improvement in hearing. After 6 months of follow-up, 94% patients have taken up graft with improvement in hearing and 6% had failure. 4 patients present with discharging cavities. 3 patients have epithelial debris and wax.

DISCUSSION

Our study is based on use of endoscope for diagnostic and therapeutic purposes. It is also useful to illustrate the findings to the patient and to explain the disease process to the patient. The patient can visualize the findings in the monitor in the doctor's office.

During our study, we found that 14% patients had Ac.SOM. In Chr.SOM, 13% patients were of tubotympanic type and 43% patients had unsafe type of Chr.SOM. 7% patients had secretory otitis media. 7% patients had traumatic perforation. 6% patients had otomycosis. 4% patients had tympanosclerosis. 3% patients had granular myringitis bullosa. 2% patients had polypoidal mass in EAC with unsafe ear and 1% patient had F.B. in EAC with Chr.SOM.

In our study on microscopic examination, 11 patients had disease at antr. attic recess but on otoendoscopic examination 17 patients were found having disease i.e (13.0%) increase in disease which entailed further clearance. 3 patients had disease at sinus tympani, but on otoendoscopic examination 29 patients were found having disease i.e (57.0%) increase in disease which entailed further extent of surgery. 5 patients had disease in hypotympanum which on otoendoscopic examination increased to 11 patients i.e (13.0%) increase in disease which entailed further clearance. 5 patients had disease at retrofacial area but on otoendoscopic examination 23 patients were found having disease i.e (39.0%) increase in disease which required further clearance. These observations prove that otoendoscope offers better visualization of disease in difficult to look areas in tympanic cleft. In our study the following areas of middle ear i.e. sinus tympani, retrofacial areas, anterior and posterior buttress, hypotympanum, sinodural angle, and anterior attic recess was better seen by otoendoscope in comparison to microscope intraoperatively. Eustachian tube, semicircular canal and mastoid tip were better visualized by otoendoscope. Intraoperatively, decision of extent of surgery was changed by using otoendoscope.

In the present study tympanoplasty was done in 13% patients. Otoendoscope was used as an adjunct to the microscope. Graft was taken-up in 94% patients after 6 month follow-up. This is case in point which underscores the importance of otoendoscope in the management of ear pathology.

In our study grommet insertion was done in 3 (3%) of patients with the help of otoendoscope.

The postoperative mastoid cavity problems are still a great concern both for patients and surgeons. In the present study, during 1 month follow up perichondritis was present in one patient, 7 patients had epithelial debris and wax in their cavities, one patient presented with discharging cavity in which one patient had foreign body in his cavity. 2 months of follow up examination revealed 29% patients having epithelial debris and wax in their cavities. One patient developed stenosis of EAC. After 6 months follow up examination revealed that graft was taken-up in 94% patients.

The endoscope offers the following advantages:

- (i) It visualizes the whole tympanic membrane and the ear canal without having to manipulate the patient's head or the microscope.
- (ii) To visualize structures from multiple angles as opposed
- (iii) To the microscope's single axis along the ear canal.
- (iv) It provides extremely sharp image with high resolution.
- (v) Anatomical variations (tortuous or stenotic ear canal, anterior meatal overhang etc.) that hamper the view of entire tympanic membrane during ear surgery are overcome by otoendoscopy.
- (vi) Minimal pain, swelling or bleeding and less auricular displacement and numbness present at incision site.
- (vii) Reduced operative time: The procedure averages 20 to 30 minutes.

Beyond the advantages of otoendoscope following disadvantages are also noted as follows:

- (i) The endoscopic technique requires new and costly instruments.
- (ii) Accidental patient movement with secondary direct trauma by the tip of the endoscope can occur.

- (iii) The endoscopy includes the one-handed surgical technique, a loss of depth perception, limited magnification and need for training.
- (iv) The tip of endoscope requires continuous cleaning with antifog solution, which probably helps in cooling the endoscope.
- (v) Second-look procedures to rule out residual cholesteatoma in the middle ear cannot be performed using this technique alone.

Indeed, otoendoscope is a revolutionary new tool in the hand of otologist. With more and more experience, it is possible to improve our diagnostic as well as operative skills with its uses.

SUMMARY AND CONCLUSION

A study of 100 patients of various ear pathologies was subjected to examination by microscope and otoendoscope. The main points of interest can follow:-

1. Various outdoor procedures performed with help of otoendoscope may be done in less time in comparison to microscope.
2. By the use of otoendoscope following areas of middle ear are seen more clearly than microscopic examination. They are sinus tympani, retrofacial area, hypotympanum, anterior attic recess.
3. Chances of graft taken up and improvement in hearing and dry cavities increased by using otoendoscope.

REFERENCES

- (1) Prof. R. Muthukumar and Dr. Sundharkrishnan 'ENDOSCOPIC EAR SURGERY' ISOCON 2011 AIMS, KOCHI, KERLA, NOVEMBER 11, 12, 13.
- (2) McKenna KX. Endoscopic "Second look" mastoidoscopy to rule out residual epitympanic/mastoid cholesteatoma. *Laryngoscope* 1993; 103:810-4.
- (3) Des Raj Bhagat 'Oto- Endoscopy-An Advancement in otology' Vol.5 No.3 July-Sept-2003.
- (4) Ahmad R.F.J *Otolaryngol Head Neck Surg* 1994; 3(2):101-03.
- (5) Muaz Tarabichi. Endoscopic middle ear surgery. *Ann Otol Rhinol Laryngol* 1999; 108:39-46.
- (6) Badr-el-Dine, M. "Value of Ear Endoscopy in Cholesteatoma Surgery" *Otology & Neurotology* Sept.2002-Vol.23-Issue 5-pp 631-635.
- (7) Anoop R. endoscopic transcanal myringoplasty. *Ind J Otolaryngol Head and Neck Surg* 2001; 53(1):47-49.
- (8) A practical Manual on Endoscopic Ear Surgery, Krishna Eye & ENT Hospital.
- (9) Ayache S, Tramier B, Strunskiv. Otoendoscopy in cholesteatoma surgery of the middle ear: What benefits can be expected? *Otol Neurotol* 2008.
- (10) Ahmed El-Guindy. Endoscopic transcanal myringoplasty. *The Journal of Laryngology and Otology* 1993; 106:493-495.
- (11) Bowdler DA, Walsh RM. *Clin Otolaryngol* 1995; 20:418-22.
- (12) Drew M Horibeck, Clinical Associate Professor, Department of otolaryngology, University of Texas Health Science Center.
- (13) Garth M. Good and Glenn Isaacson. Otoendoscopy for improved ediatric cholesteatoma removal. *Ann otol Rhinol Laryngol* 1999; 108:893-896.
- (14) Kimura H, Yamagushi H, Cheng S, Funasaka S. Direct observation of the tympanic cavity by the superfine fiberscope. *Nippon Jibiinkoka Gakkai Kaiho* 1989; 92:223-238.
- (15) Muaz Tarabichi. Endoscopic middle ear surgery. *Ann Otol Rhinol Laryngol* 1999; 108:39-46.
- (16) McKenna KX. Endoscopic transcutaneous mastoidoscopy for evaluation of residual epitympanic/mastoid cholesteatoma. *Am J Otol* 1993; 14:369-72.
- (17) McKenna KX. Endoscopic "Second look" mastoidoscopy to rule out residual epitympanic/mastoid cholesteatoma. *Laryngoscope* 1993; 103:810-4.
- (18) Mer SB, Derbyshire AJ, Brushenko A, Pontarelli DA. *Arch Otolaryngol* 1967; 85:387-93.
- (19) Medical requirement for design of endoscope for otolaryngology by Parekh, Jai, Pankratov, Michali.
- (20) Nomura Y. Effective photography in otolaryngology- head and neck surgery: endoscopic photography of the middle ear. *Otolaryngol Head Neck Surgery* 1982; 90:395-8.
- (21) Prof. Jean Marc Thomassin. Endoscopically Assisted Diagnostics and Surgery in Otolaryngology, Vol.1 Technique, Equipment and Indications.