

Otoendoscopic evaluation of the middle ear hidden areas in chronic suppurative otitis media

Abstract

Background: Chronic suppurative otitis media is a common complaint in E.N.T clinics and many of the patients underwent medical or surgical intervention or both.

Otoendoscopic evaluation of middle ear cleft hidden areas which are: (epitympanum, hypotympanum, supratubal recess, facial recess and sinus tympani) is of prime importance to discover any pathology which will change the plan for management.

Aim of the study: To evaluate the middle ear (hidden areas) in patients with chronic suppurative otitis media by mean of otoendoscope to discover any pathology in those areas which may change the management plan to eradicate the diseases and restoration of hearing function.

Patients and method: Hidden areas of the middle ear are evaluated with the help of 30 degree, 1.9 mm diameter and 18 cm shaft length otoendoscope through pre-existing tympanic membrane perforation with aid of 10% Xylocaine spray as a local anesthesia. Any patient with chronic suppurative otitis media regardless the age, type and sex were included in this study.

Results: Forty nine ears were included in current study and the age range was (12-76), male to female ratio was 1:1.5, and their common chief complaint was hearing impairment, surgery was done for 25 years (51%)

Endoscopic findings were accurate in 88% of them and compatible with surgical findings.

The commonest pathology was ossicular chain erosion 32 ears (65.3%) mostly involving the incus which was seen in 17 years (68%). Granulation tissue was seen in 15 years (30.6%), cholesteatoma was documented in 13 years (26.5%) and tympanosclerosis was reported in 10 years (20.4%).

Conclusion: 1. The rigid otoendoscope is important tool in evaluating hidden areas. 2. High accuracy and relative simplicity encourages the use of otoendoscope pre-operatively, however the lack of third dimension increase the liability for trauma.

Volume 10 Issue 3 - 2018

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Received: April 30, 2018 | **Published:** June 29, 2018

Introduction

Otoendoscopy is a surgical and a teaching tool increasingly being recognized because of its superior optical properties.¹ With its help the anatomy of middle ear details are being evaluated. Firstly used to visualize the ear in the late 1960s and introduced in parallel to sinus surgery in the 1990s.² Despite the characteristics offered by operating microscope, it has proved to have limitation because straight line view will produce blind areas, these limitations are overcome by the help of otoendoscope which allows viewing corners.³ Without a good knowledge of the anatomy is impossible to perform ear surgery, the epitympanum, the hypotympanum the supratubal recess, sinus tympani with facial recess are difficult to examine under microscope.⁴ Otoendoscopy provide a wide field of vision using direct and lateral vision, for which visualization is good and it is minimally invasive without external incision⁵ and decrease patient morbidity and cost with marked decrease in hospitalization without compromising the results⁶ it can be used in many surgical approaches, mostly useful in transaural approach.⁷

The retrotympanum is in the posterior aspect of the tympanic cavity.⁽⁸⁾ The sinus tympani lies medial to the pyramidal eminence, first described by Meckel.⁹ Steinbrugge¹⁰ later studied the depth of

the sinus tympani and was the first to describe its posterior extension. Donaldson et al.,¹¹ in the 1970s also stressed that sinus tympani can't be adequately cleaned with any known instruments using the microscope. On the basis of endoscopic intraoperative findings and anatomical variation of malleus, the morphology of sinus tympani can be classified.¹² The facial recess lie lateral to facial nerve, bounded by fossa incudis superiorly and by the chorda tympani nerve laterally. Ponticulus & Subiculum are useful landmarks for retrotympanum¹³ Epitympanum Pneumatized portion of the temporal bone superior to the mesotympanum. It is classified into two compartments: a larger (posterior epitympanic space: PES) and a (anterior epitympanic space: AES).¹⁴ The protympanic space is a pneumatic portion of the middle ear that lies anteriorly to the mesotympanum, inferiorly to the AES, and superiorly to the hypotympanum, it can be divided into two portions: the supratubal recess superiorly (hidden area), and the Eustachian tube orifice inferiorly.¹⁵ Supratubal recess is independent area of variable size vertical to the tensor fold. In some persons, when the tensor fold has a horizontal attachment to the tensor tympani canal, the supratubal recess is not present. The tympanic portion of the Eustachian tube starts from the protympanum and is usually 11 to 12 mm in diameter.

Using a 30° endoscope to allow one to see the eustachian tube opening.¹⁶ The Hypotympanum it has the shape of an irregular bony groove which is surrounded by five walls. The outer wall is formed by the tympanic part of the temporal bone.

The inner wall is formed by part of the petrous bone. The lower wall corresponds to the juncture of its inner and outer walls. The front wall is formed by part of the petrous bone which extends from its floor towards the tympanic opening of the protympanum. On the front wall, a recess of the anterior hypotympanic sinus is found. The back wall is formed by elements of the styloid complex and sometimes a recess or posterior hypotympanic sinus is found on it.¹⁷

Aim of the study

To evaluate the middle ear (hidden areas) in patients with chronic suppurative otitis media by mean of otoendoscope to discover any pathology in those areas which may change the management plan to eradicate the diseases and restoration of hearing function.

Patients and method

Study design

This is a descriptive study designed to assess the value of otoendoscope in visualization of middle ear hidden areas in patients suffering from chronic suppurative otitis media. Patients were selected sequentially from those who visited the ENT department in Al-Yarmouk Teaching between April 2016 and October 2016 according to pre-designed criteria. History was taken and examination done. All data were recorded in predesigned questionnaire formula.

Otoendoscopic Examination

Otoendoscope examination was done with the help of 300 1.9 mm 18 cm shaft length Storz® scope under local anesthesia (xylocaine 10% spray), the patient were examined in different positions (sitting, supine and lateral)

Results

The study included 40 patients (49 ears) their age range was 12-76y, twenty four patients were females (60%) male to female ratio was 1.5:1

Left ear was affected in 27 patients. The main presenting complaint was hearing impairments (79.6%) followed by discharge 63.3% as shown in Table 4 and others as shown in the following Tables 1-4.

Table 1 Surgical confirmation percentages

	Yes	No	%
Confirmed by surgery (25 patients)	Yes	22	88%
	No	3	12%
Total	-----	25	100%

Table 2 Site of pathologies

Site of pathology for 25 Years	Granulation		Tympanosclerosis		Cholesteatoma		No	
	No	%	No	%	No	%	No	%
Hypotympanum	7	14.3	5	10.2	1	2	36	73.5
Epitympanum	5	10.2	4	8.2	5	10.2	35	71.4
Sinus tympani	2	4.1	0	0	3	6.1	44	89.8
Facial recess	1	2	1	2	4	8.2	43	87.8
Supratubal recess	0	0	0	0	0	0	49	100

Table 3 Status of ossicles

Ossicles (32 Years)	No.	%
Malleus	10	40
Incus	17	68
Stapes	5	20

Table 4 Complications & Disadvantages of otoendoscopy

Disadvantage (49 ears)	No.	%
Pain and discomfort	27	55.10%
Injury & bleeding	7	14.29%
Usage of both hands	3	6.12%

Discussion

In the current study 49 ears were examined by otoendoscopy and the age range was (12y-76y), this age range run parallel to results documented by Abtahi et al.¹⁸

Al-abbasy et al.,¹⁹ revealed that female to male ratio was 1.2:1 in contrary to our result which was 1.5:1. As shown in Table 1 surgery was done for 25 years (51%), surgical findings were identical to otoendoscopical examination in 22ears (88%), the remaining 3 ears (12%) then were different results during surgical intervention, these results were highly significant. In two of these 3 ears, polyps were hiding cholesteatoma and in the 3rd ear tympanosclerosis was hiding cholesteatoma.

The commonest site for the Cholesteatoma was the epitympanum, while the commonest site for the Granulation tissue & tympanosclerosis was the hypotympanum as shown in Table 2, the commonest pathology seen was ossicular erosion 32 ears (65.3%) followed by cholesteatoma and tympanosclerosis. The commonest ossicle eroded in the current study was the incus 34.7% and the least common eroded was stapes 10.2% as shown in Table 3.

Farhani et al.,²⁰ in their study also documented that the incus was the commonest ossicle eroded (44.8%) while the least ossicle involved was the malleus (19%). Incus involvement in erosion more frequently was due to poor blood supply.

Otoendoscopic evaluation during the current study was accompanied by some draw backs. Discomfort was suffered of in 27 years (55.1%), injury and bleeding occurred in 7 years (14.29%) and

in 3 years (6.12%) both hands was needed for better evaluation as shown in Table 4.

One of explanation for drawback of otoendoscopy was caused by loss of perception of depth during examination of the middle ear because of the monocular vision of the otoendoscope as documented by Pothier et al.²⁰

Conclusion

The rigid otoendoscope is important tool in the evaluation of the middle ear pathology.

The high accuracy and relatively simplicity of rigid otoendoscope , make it very important to be used as pre surgical interference

The otoendoscopy offer a portable and low cost tool that can pass through some pre-existing tympanic membrane perforation in patients with chronic suppurative otitis media.

The endoscope lacks the third dimension and this may predispose to trauma and injury.

References

1. Livio Presutti, Daniele Marchioni. Endoscopic ear surgery principles, indications, and techniques. Otolaryngology: Stuttgart: Thieme Publishers. 2016;37(7):819.
2. Kozin D E, Lee JD. Basic principles of endoscopic ear surgery. *Operative techn In otolaryngology*. 2017;28(1):2–10.
3. Marchioni D, Alicandri Ciufelli M, Villari D, et al. Endoscopic Transcanal Middle Ear Anatomy & Dissection. *J Otolary Clinics of North America*. 2013;46(2):131–154.
4. Marchioni D, Molteni G, Pressutti L. Endoscopic anatomy of the middle ear ; *Indian J Otolaryngol Head Neck Surg*. 2011;63(2):101–113.
5. Preyer S. Endoscopic ear surgery—acomplement to microscopic ear surgery. *HNO*. 2017;65(Suppl 1):29–34.
6. Horlbeck MD, Roland SP, Meyers DA, et al. Middle Ear Endoscopy. *Medscape*. 2018.
7. Karchier BE, Niemczyk K, Orłowski A. Comparison of visualization of the middle ear by microscope of 300 and 450 through posterior tympanotomy. *Wideochir Inne Tech Maloinwazyjne*. 2014; 9(2):276–281.
8. Nogueira FJ, Mattioli F, Presutti L, et al. Endoscopic anatomy of the retrotympaanum. *Otolaryngol Clin North Am*. 2013;46(2):179–188.
9. Marchioni D, Mattioli F, Alicandri Ciufelli M, et al. Transcanal endoscopic approach to the sinus tympani: a clinical report. *Otol Neurotol*. 2009;30(6):758–765.
10. Steinbrugge H. On sinus tympani. *Arch Otolaryngol*. 1889;8:53–57.
11. Donaldson JA, Anson BJ, Warpeha RL, et al. The surgical anatomy of the sinus tympani. *Arch Otolaryngol*. 1970;91(3):219–227.
12. Mansour S, Magan J, Haider H, et al. Copenhensive and clinical anatomy of the middle ear. *Springer-verlag Berlin Heidelberg*. 2013;93–102.
13. Marchioni D, Alicandri Ciufelli M, Piccinini A, et al. Inferior retrotympaanum revisited: an endoscopic anatomic study. *Laryngoscope*. 2010;120(9):1880–1886.
14. Marchioni D, Alicandri Ciufelli M, Grammatica A, et al. Lateral endoscopic approach to epitympanic diaphragm and Prussak's space: a dissection study. *Surg Radiol Anat*. 2010;32(9):843–852.
15. Marchioni D, Alicandri Ciufelli M, Grammatica A, et al. Pyramidal eminence and subpyramidal space: an endoscopic anatomical study. *Laryngoscope*. 2010;120(3):557–564.
16. Savić D, Djerić D. Anatomical variations and relations in the medial wall of the bony portion of the eustachian tube. *Acta Otolaryngol*. 1985;99(5-6):551–556.
17. Savić D, Djerić D. Surgical anatomy of the hypotympanum. *J Laryngol Otol*. 1987;101(5):419–425.
18. Abtahi SH, Abootalebian F, Rogha M, et al. The value of otoendoscope in the management of middle ear cholesteatoma. *J Res Med Sci*. 2015;20(12):1182–1185.
19. Ahmed Alabbasi M, Ihsan Alsaimary E, Jassim Najim M, Prevalence and patterns of chronic suppurative otitis media and hearing impairment in Basrah city. *Journal of Medicine and Medical Sciences*. 2010;1(4):129–133.
20. Pothier DD. Endoscopic ear surgery: an introduction ENT and Audiology News. 2012;21(3):36.