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Endoscopic Myringotomy and Ventilation Tube Placement: A Valuable Otolaryngologic Procedure under Topical Anesthesia

Dear Editor:

Time has proven that endoscopy is generally a safe and effective tool in the diagnosis and treatment of various conditions. It offers superior visualization with markedly decreased morbidity and mortality. In Otolaryngology, otoendoscopy has been gaining acceptance in providing improved otoscopic visualization and video recording of the tympanic membrane. We describe a technique of myringotomy and ventilation tube insertion under endoscopic visualization using a rigid Hopkins rod scope previously described by other authors based on their accepted clinical guidelines for myringotomy.^{1,2} The use of rigid endoscopes provides visualization of the entire tympanic membrane with excellent resolution, better fidelity of color with a well-angled or side-to-side vision. The procedure is generally safe, convenient and can be performed in an out-patient setting. Correspondingly, the video recordings could improve disease documentation for baseline and post-myringotomy evaluation. They can also be a tool to enable better understanding for patients.³

METHODS:

A total of seven patients with symptomatic and non-resolving otitis media with effusion (OME) previously managed conservatively for 3-6 months from October 2009 to March 2010 were included in the study. The patients also had disabling otalgia with four of the subjects having more than 30 dB hearing loss. Subjects who had poor pain threshold, were deemed non-cooperative and those in the pediatric age group were excluded from the study. Informed consent with strict compliance to institutional ethical standards was signed by all patients. The procedures were all performed by the junior author at the E.N.T Diagnostic Unit of a private tertiary university hospital. Materials used for the procedure were the same as with conventional myringotomy (eg. aural speculum, Kley or sickle knife, Hartmann ear forceps and ventilation tube/s). The anesthetic used was an Eutectic Mixture of Local Anesthesia (EMLA[®]) cream 5 % (Astra-Zeneca, Sodertalje, Sweden) in a 1 cc tuberculin syringe, and 20-25% aqueous form of phenol solution. A 0 degree 4 mm x 107.5 mm rigid endoscope (KARL STORZ GmbH & Co. KG Mittelstr., Tuttlingen, Germany) was used. (Figure 1)

First an otoendoscopy was performed and the clinical indications and risks for myringotomy were thoroughly discussed with each patient. EMLA[®] cream was applied to the ear canal and to the external surface of the tympanic membrane using a 1 cc tuberculin syringe. After 60 minutes, the external ear canal was cleared for complete visualization of the tympanic membrane. (Figure 2) The patient was then positioned seated on the examining chair with head tilted to the opposite side. Using a 0 degree 4 mm x 107.5 mm rigid endoscope, the posterior third of the external auditory canal and the tympanic membrane was visualized. The scope was held with the left hand only up to the anterior portion of the cartilaginous canal to avoid involuntary activation of the Xth cranial nerve and to allow further advancement of other instruments to the posterior canal. A shorter rigid otoendoscope (4 mm x 45 mm) or a smaller diameter pediatric rigid endoscope (2.7 mm x 107.5 mm) may be used if available. A Kley knife or myringotomy knife was dipped lightly in phenol solution and carefully advanced to the tympanic membrane for the preferred myringotomy stab incision. (Figure 3)

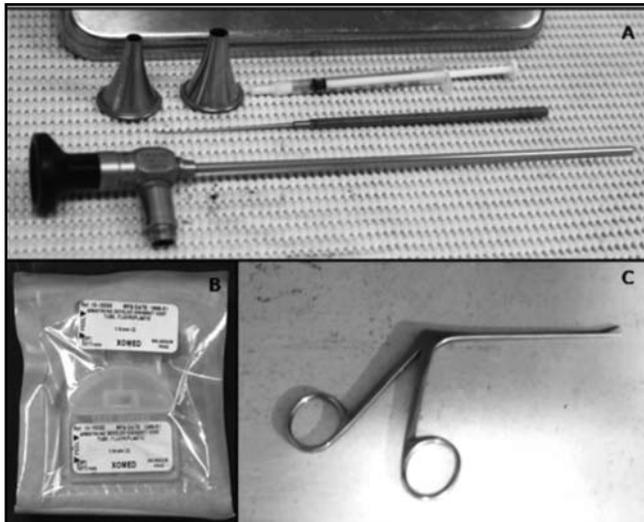


Figure 1. Instruments and Materials for Endoscopic Myringotomy. A. Aural speculum for aural toilet and examination; TB syringe with EMLA; Kley (or sickle) knife; 0-degree rigid endoscope; Others: phenol solution and endoscopy unit; B. Ventilation tube; C. Hartmann 1.2 mm ear forceps with 8 cm working length. (Note: materials and instruments may vary based on surgeon's preference, anatomical considerations and availability)

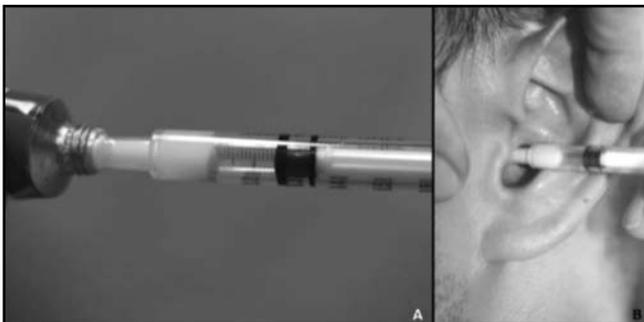


Figure 2. Topical Anesthetization. A. Aspiration of EMLA[®] cream with a TB syringe; B. Application of EMLA to the outer surface of the tympanic membrane and the external auditory canal wall.



Figure 3. Instrumentation. One hand instrumentation with direct endoscopic visualization of the posterior external auditory canal and the tympanic membrane.

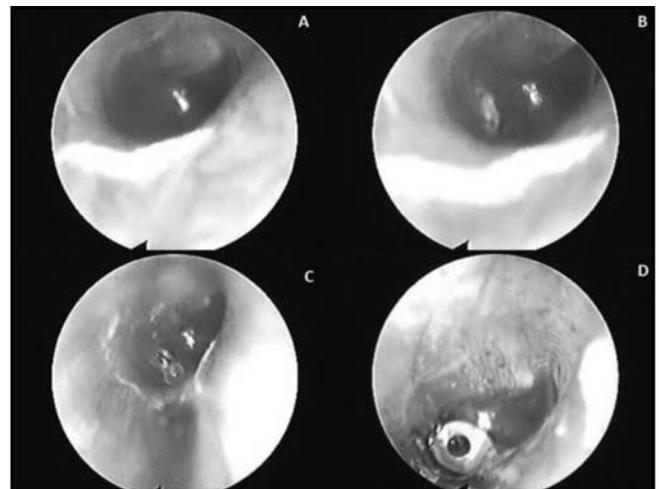
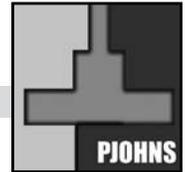


Figure 4. Endoscopic Myringotomy and Ventilation Tube Insertion. A. Endoscopic view of the bulging and non-mobile right tympanic membrane with middle ear effusion; B. Myringotomy incision with a Kley aural knife (with phenol) at the postero-inferior tympanic membrane quadrant; C. Drainage and suctioning of middle ear fluid; D. Bi-flanged ventilating tube in-place.

Care was taken to avoid contact of the phenol and knife tip with the canal wall to avoid stimulating unnecessary movement, canal abrasion or dermal irritation from the phenol solution during the entire procedure. (Figure 3) The myringotomy incisions were made at the posterior-inferior tympanic membrane quadrant for ease of access and drainage. (Figure 4) Evacuation of middle ear fluid was performed using a 2 and 3 mm Frazer middle ear suction tip. The myringotomy incision was made large enough to admit the ventilation tube in four subjects with copious effusions. In these four, the tube was introduced and adjusted using a 1 mm x 8 cm (working length) Hartmann ear forceps. A 1.14 mm I.D. Armstrong beveled fluoroplastic grommet ventilation tube (Xomed, Jacksonville, FL) was used in three subjects while a Sheehy collar button tube without wire (Micromedics Inc, St. Paul, Minnesota, USA) was used in one. The choice of tube depended mainly on the authors' preference, taking tube designs available for specific ear conditions into consideration. (Figure 4) All subjects were instructed to avoid vigorous activities for the first 48 hours post-myringotomy with strict water precautions. Ofloxacin otic drops were then prescribed.

RESULTS

There were a total of seven patients, three males and four females, with age ranging from 25 to 65 years (mean=50). All of them tolerated the procedure well. Ventilation tubes were inserted in four subjects with copious middle ear effusions. All had minimal intra-operative (PAS 2-5) and post-operative pain (PAS 0-2). The procedures were done on an out-patient basis. Co-morbid conditions were likewise treated. (Table 1) Six of the seven subjects experienced immediate subjective relief of otalgia and hearing loss after myringotomy while one subject had persistent complaint of ear fullness. The main indication for the procedure was otitis media with effusion with significant hearing loss, otalgia and ear fullness non-responsive to three months conservative



management. All patients had significant contributing factors for OME such as frequent infectious rhinitis or chronic persistent allergic rhinitis. Six of the seven subjects had markedly improved hearing. Four subjects with a preoperative pure-tone evaluation of >30-40 dB hearing loss had pure-tone average improvement to 10-15 dB after subsequent hearing examinations. All subjects were evaluated post-operatively with otoendoscopy. One case was unresponsive and subsequently diagnosed with adhesive otitis media and advised to undergo myringoplasty.

DISCUSSION

Endoscopic myringotomy under topical anesthesia is a generally safe and practical procedure. Its indications are the same with conventional myringotomy with or without ventilation tube insertion such as Otitis Media with Effusion persisting beyond three months with associated significant hearing loss, impending mastoiditis or intracranial complications, recurrent episodes of acute otitis media (> 3 episodes in 6 months or > 4 episodes in 12 months), chronic tympanic membrane or pars flaccida, barotrauma, autophony (hearing body sounds; eg. breathing) due to patulous or widely open eustachean tube, craniofacial anomalies predisposing to middle ear dysfunction (e.g. cleft palate), and middle ear dysfunction due to head and neck radiation and skull base surgery.⁴

Endoscopic visualization of the tympanic membrane enables better patient understanding of their ear conditions. Such has been the basis for the procedure along with the use of 5% EMLA[®] to decrease the pain and discomfort of patients undergoing out-patient myringotomy procedures.⁵ Phenol, on the other hand, aids in faster creation of tympanic membrane incision and decreases post-operative bleeding through its tissue vaporizing chemical cauterization effect with negligible toxicity if given in minute amount.⁶ Furthermore, for post-operative cases of middle ear surgeries, it can be used for surveillance

and middle ear cleaning. This can improve post-operative follow-up and possibly decrease the need for second look surgery.⁷

Generally, endoscopic myringotomy provides a complete and enhanced visualization of the tympanic membrane and some middle ear structures that only appear as silhouettes with conventional otoscopy. Rigid endoscopes may have less illumination and magnification compared to an operating microscope traditionally used in myringotomy procedures but it can provide an angled or "off line-of-site" visualization of the tympanic membrane and canal wall advantageous in trans-canal visualization of the tympanic membrane. Just like the conventional out-patient myringotomy, endoscopic myringotomy under topical anesthesia is less costly than performing the procedure under general anesthesia or through sedation requiring a more controlled clinical setting. Smaller diameter and shorter endoscopes may be more feasible for diagnostic otoendoscopy but a rigid 4 mm endoscope is more widely available in most local clinics. The major disadvantage of this procedure is the instrumentation in very young or uncooperative patients with a narrow external auditory canal. One-handed instrumentation and lens fogging may also be encountered but can be reduced with familiarity with the procedure.

The indications for endoscopic myringotomy as with those for traditional myringotomy remain suggestions and do not represent the standard of care. Clinicians can modify them when medically necessary as treatment options should always be individualized to meet each patient's need. Failure to improve hearing may suggest another middle ear condition that necessitates further evaluation. Some cases may need myringotomy tube replacement while surgery is reserved for failed tympanic membrane healing. Lastly, like any other surgical technique and instrumentation, the major key to a successful endoscopic myringotomy is still good patient selection.

Table 1. Description of patients who underwent myringotomy and/or ventilation tube insertion.

Subjects' Age & Sex	Indications	Other related conditions	Myringotomy +/- Ventilation Tube (VT)	Pre-operative PTA
50/F	Chronic OME, AU;	Infectious Rhinitis	+ VT, AU	40 dB Hearing Loss
25/F	Recurrent OME, AU	Infectious Rhinitis, Allergic Rhinitis	-VT	
60/M	Recurrent OME, AU	Infectious Rhinitis	+VT, AU	30 dB Hearing Loss
27/M	Chronic OME, AU; unresponsive to medical management x 2 yrs	Allergic Rhinitis; Subsequently diagnosed w/ Adhesive otitis media, AS	-VT, AS	30 dB Hearing Loss
29/F	Chronic OME, AS	Allergic rhinitis	-VT, AS	
65/M	OME, AU; Severe hearing loss and otalgia	Infectious Rhinitis	+VT, AD	
45/M	OME, AU	Infectious Rhinitis	+VT, AD	40 dB hearing loss

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