



Microscopic to Endoscopic Ear Surgery (EES): Its History and is it the Right Step Towards the Future?

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Ear disease has plagued mankind since time immemorial. Formal description of opening mastoid was given by Jean Louis Petit (1674-1750), a French surgeon whose findings were published posthumously in 1774. Since then ear surgery has been performed with naked eyes and then with loopes. Although the first description of microscopes dates back to 17th century, it was not until 1921 when Carl Olof Nysten, a Swedish otologist used microscope in ear surgery. The monocular microscope was soon replaced by binocular microscope in 1922 by Gunner Holmgren. The rapid progress of microscopic ear surgery progressed when Littmann and Zeiss Co. introduced their version of microscope which has been perfected over the years [1]. In 1966, Harold Hopkins developed the Hopkins rod endoscope allowing precise otoendoscopic examination. Marquet in 1975 visualized middle ear hidden areas through a tympanic membrane perforation with help of a 1.7 mm diameter endoscope. Wullstein in 1984 popularized the use of angled endoscopes. In 1997 Tarabichi [2] published a series of 36 cases of transcanal endoscopic management of cholesteatoma. Endoscopes come in a wide array of lengths, diameters and angles of views. Each has its own advantages and disadvantages, but general rule is that the larger the diameter of the endoscope, the better the field of view and the better is the illumination. Initially endoscopic ear surgery was performed with 4mm diameter endoscope but now 3 mm diameter endoscope is gaining popularity as it provides near equal view of 4 mm with more instrumentation space. Endoscopic ear surgery (EES) started as a single handed technique and now it's two handed counterpart [3] is also gaining popularity across the world.

During the present decade, more otologists are exploring the potential benefits of endoscopic techniques in middle ear cavity and Cerebellopontine (CP) angle. Kapadia and Tarabishi in their study reported that number of publications showing pattern of utilization of endoscope in ear surgery raised many fold from 2011-2018. In this study it came to light that only 14.30 % surveyed surgeons had not attended any course in endoscopic ear surgery in 2018 whereas the same number was 80.90% in 2010 [4].

There have been debates over benefits of endoscopic technique over microscopic. Endoscopic view offers capability of wide field visualization with minimal exposure, assists to look beyond the overhangs or obstructions and helps peering into recesses with much less requirements for surgical exposure than demanded by conventional microscopic techniques. As most of otologists are being trained with microscopes in residency for ear surgery, it takes a learning curve to take up this new emerging way of surgical intervention. To overcome this initial hesitancy some surgeons now prefer doing combined approach or endoscope assisted microscopic surgery initially which eases the transition from microscope to endoscope. The initial problems faced by the surgeons include- lack of 3 dimensional vision due to which they have to rely on motion parallax to access depth perception, a good case selection with wide and relatively straighter canal in early practice as a tortuous or narrow canal hinders instrumentation due to narrow space and angulations, Heating issues because of heat generated by metallic endoscope in the canal and hardware issues as a good surgical view

depends on a good quality 3 chip camera system with a surgical grade HD monitor and a good quality endoscope.

The most important benefit of endoscopes in ear surgery lies in its ability to visualize the hidden areas like the sinus tympani, facial recess, hypotympanum, eustachian tube opening and supra tubal recess areas without disturbing the normal anatomy of middle ear. Also the various areas like anterior and posterior isthmus can be visualized and cleared with minimal handling and various folds of middle ear like tensor fold can be visualized helping in restoring the middle ear ventilation in many cases where disease progression can be halted or even reversed. Transcanal route of endoscopic ear surgery has helped patients get a nearly scarless surgery along with near same exposure of middle ear to otologist which was not possible with microscopic technique. It has also been routinely used for stapes surgery along with mastoid and tympanic membrane repair surgeries. Although the debate of endoscopic surgery versus microscopic surgery will go on for some time but we cannot forget how the face of Rhinology has been changed by advent and use of endoscopes with nearly all the intranasal surgeries now being performed with endoscopes leaving only a handful indications for open surgeries. Similarly we are living in a transition time and probably soon there will be a time when endoscopes will be used in majority of ear surgeries as well.

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