

Transcanal Endoscopic Ear Surgery: a new era of Otologic Surgery

The speciality of otolaryngology/Head and Neck Surgery, commonly called as ENT Surgery is one of the oldest medical speciality in United States. The otolaryngology has advanced in a dramatic and rapid manner in last few decades and this advancement is shown in all aspects i.e. diagnostic, radiological, audiovestibular and surgical of this field, be it rhinology (nasal and paranasal sinus surgery), laryngology (Laryngeal), otology (Ear surgery) or head and neck surgery.

A new era in treatment of head and neck cancers started after incorporation of free flaps in reconstruction, the ear surgery showed tremendous advancement in terms of refinement in microsurgical techniques after the advent of binocular microscope and above all, a whole new game changing era started after the introduction and incorporation of Rod Hopkins Telescopes in Nasal/Paranasal sinus surgery that revolutionized the concepts in understanding of pathology and treatment of sinus disease and surgery. Incidentally same is happening in ear surgery now.

If we talk of the Ear surgery, the binocular microscope is considered essential for modern otologic surgery. It provides excellent illumination of structures, good depth perception and magnification, the ability to work with both hands, and, more recently, the capacity to capture high-definition images and video.

The microscope revolutionized ear surgery but offers a limited view through the ear canal, especially when (1) the ear canal is small in diameter, or there is a prominent anterior bony overhang, or (2) disease of the middle ear extends to the attic (uppermost part of middle ear cavity), retrotympanum, or other “difficult to reach” recesses. A wide-field view of the middle ear often requires a skin incision behind the ear, retraction of soft tissue flaps, and bony drilling of the ear canal or mastoid (mastoidectomy) to assess and address complex disease such as a cholesteatoma (a disease of the middle ear and mastoid leading to bone erosion and destruction) adequately.

This problem to a greater extent has now being resolved by using telescopes/Endoscopes in ear surgery. After successful incorporation of endoscopes in nasal/paranasal sinus surgery, people started thinking to use them in ear surgery. In contrast to the binocular microscope, the endoscope allows for improved visualization of the middle ear because of its wide angle, various angulations and location of the light source at the distal tip of the instrument. With the introduction of three-chip camera systems and high definition (HD) monitors, endoscopes now provide ultra-high-resolution images of the middle ear never previously seen. Pioneers of endoscopic ear surgery (EES) espouse its high resolution and magnification, and the new found ability to “look around the corners”.

This technique of surgery has been termed as Endoscopic Ear Surgery (EES).

Transcanal endoscopic ear surgery allows the external auditory canal to become a minimally invasive surgical portal for complex middle ear surgery. Initially, endoscopes were used in the ear only for diagnostic purposes.^{1,2} Over the past decade; otologists have refined operative techniques and begun utilizing the endoscope as the sole instrument for visualization during dissection. Investigations have demonstrated the technique’s utility³ and safety.^{3,4,5}

Some cases previously requiring use of an operative microscope may now regularly be performed with an endoscope placed through the ear canal. As with all new technologies and surgical approaches, the application of an endoscope for visualization of the tympanic cavity is currently under debate, and indications are being refined.

Studies have begun to examine patient outcomes following endoscopic ear surgery and compared them with the conventional microscopic techniques. Marchioni and Persutti concluded that endoscopic ear surgery represents a feasible, minimally invasive, conservative technique for the manage-

ment of pediatric and adult cholesteatoma with favourable outcome comparable or superior to the use of microscopic surgery.⁶

Drawbacks of endoscopic ear surgery include a steep learning curve, the necessity of operating with only one hand (the other hand must hold the endoscope), the lack of true depth perception (the user must rely on parallax to assess depth), and the limited instrumentation.

The studies done recently do highlight a critical aspect of EES: the endoscope is not meant to replace the microscope in all patients but may “serve a specialized purpose” in select cases. In certain patients with extensive disease, transcanal endoscopic ear surgery is not tenable for complete extirpation. At this point in EES, only bony drilling via a mastoidectomy will enable eradication of disease if there is extension of the cholesteatoma into the antrum.

The indications of endoscopic ear surgery has now been advanced and Dr. Marchioni and colleagues has taken this novel transcanal endoscopic approaches to the lateral skull base and internal auditory canal.⁷ to treat numerous conditions that involve the lateral skull base include vestibular schwannoma (acoustic neuroma), facial nerve schwannoma, meningioma, and glomus tumors. These approaches enabled surgeons to access the fundus of internal auditory canal, cochlea, and geniculate ganglion/facial nerve without external incision or craniotomy and avoiding significant drilling, hence increasing improved outcome and decreasing morbidity to patients. The use of endoscopy to access the lateral skull base although need to be refined and further improved but, opens up the door to new surgical techniques.^{7,8}

Ear endoscopy is gaining momentum in the otologic community worldwide, enabling exciting new developments in otologic surgery using minimally invasive approaches. With the increased development of EES-specific instruments and angulated drills, refinement of surgical approaches, availability of educational courses, and conduct of long-term prospective studies, endoscopic ear surgery will likely be incorporated into widespread practice.

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