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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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Comparison of Endoscope assisted and Microscope assisted Type 1 Tympanoplasty

A META-ANALYSIS SUBMITTED FOR PARTIAL FULFILMENT OF MASTER DEGREE IN **Otorhinolaryngology**

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Kirolos Botros Mosaad Metry

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LIST OF ABBREVIATIONS

Item	Abbreviation / Acronym
ABG	Air-bone gap
AES	Anterior epitympanic space
BC	Bone conduction
CES	Canal endoscopic scale
CHL	Conductive hearing loss
CI	Confidence interval
COM	Chronic otitis media
EAC	External auditory canal
EES	Endoscopic ear surgery
ET	Endoscopic tympanoplasty
FEES	Functional endoscopic ear surgery
FGF	Fibroblast growth factor
HAFGM	Hyaluronic acid fat graft myringoplasty
IV	Inverse variance
M-H	Mantel-Haenszel
MT	Microscopic tympanoplasty
NM	Not mentioned
OR	Odds ratio
PES	Posterior epitympanic space
PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses
RCT	Randomized controlled trial
SD	Standard deviation
SE	Standard error
SMD	Standardized mean difference
ST	Sinus tympani
TEES	Transcanal endoscopic ear surgery
TM	Tympanic membrane
TMF	Tympanomeatal flap
TMJ	Temporomandibular joint

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ABSTRACT

Background: Tympanoplasty and myringoplasty are commonly used operations for treating patients suffering from chronic otitis media. Using the microscope in tympanoplasty has been the conventional procedure for repairing perforated tympanic membranes since the 1950s, but ear surgeons have increasingly practised endoscope-assisted tympanoplasty since the late 1990s.

Objective: to analyze and compare the available data about the outcomes of endoscopic and microscopic type I tympanoplasty.

Data Sources: PubMed, Cochrane library Ovid, Scopus, Google scholar, and ClinicalTrials.

Methods: We conducted a meta-analysis in accordance with the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines. We included comparative studies describing type I tympanoplasty, and comparing surgical outcomes of the endoscope with the microscope in terms of efficacy and safety. Efficacy was measured by standardized mean difference (SMD) with 95% confidence interval (CI) for operative time and postoperative air-bone gap (ABG) improvement; and odds ratio (OR) with 95% CI for graft uptake rate. Safety was measured by OR with 95% CI for additional maneuvers rate (i.e. canaloplasty and posterior wall curettage), postoperative pain rate and complications rate.

Results: Our systematic search yielded 22 studies (involving 1578 interventions; with 766 in the endoscopic group, and 812 in the microscopic group) meeting the inclusion criteria and eligible for analysis. The pooled graft uptake rates and hearing results of endoscopic and microscopic tympanoplasty showed non-significant

differences (OR: 0.95; 95% CI 0.68 to 1.34; p = 0.79; I^2 = 0%) (SMD of ABGs improvement: 0.03; 95% CI -0.33 to 0.39; p = 0.87; I^2 = 89%). In contrast, the endoscopic type I tympanoplasty outperforms the microscopic tympanoplasty regarding a highly significant decrease not only in pooled mean operative time but in the pooled rates of the additional maneuvers, postoperative pain and complications.

Conclusions: Based on our meta-analysis, the surgical outcomes of endoscope-assisted and microscope-assisted type I tympanoplasty in terms of postoperative hearing results and the graft uptake rate were comparable. Operative time, additional maneuvers rate, postoperative pain rate and complications rate, on the other hand, proved to be significantly reduced with using the endoscope compared to using the microscope. Hence, the endoscope is as efficient as the microscope in type I tympanoplasty but less invasive, fewer in complications and shorter in operative time.

Introduction & Objectives

INTRODUCTION

Perforation of the tympanic membrane (TM) is principally due to middle ear infections, trauma or iatrogenic injury.[1] Up to 80% of TM perforations heal spontaneously;[2] as for the remaining, surgical repair is usually required. In 1878, Berthold was the first one to introduce the term ‘‘myringoplasty’’, when he performed the first surgical closure of a TM perforation,[3] then myringoplasty was further developed by two German otologists Wullstein[4] and Zollner[5].

Chronic otitis media (COM) is a long-lasting infection of a part or whole of the middle ear cavity. Otorrhea, a permanent TM perforation and hearing loss characterize COM.[6] COM is a highly prevalent disease of the middle ear that may progress to serious complications in case of incorrect and inadequate treatment.[7]

Tympanoplasty is a surgical procedure aiming at eradicating infection, repairing the perforated TM, and rehabilitation of hearing in patients suffering from COM.[8] It is one of the most common otologic surgeries performed on the middle ear and even in the otorhinolaryngology practice. Over the last century, everywhere, ear surgeons have made continued efforts to achieve the perfect surgical result.[9]

Traditionally, ear surgeons operate on the middle ear using microscope-assisted techniques. Nevertheless, a microscope provides a straight-line vision that restricts visualization of the deep recesses in the middle ear. The presence of canal narrowing or bony overhangs may limit the surgical field, so the conventional microscopic technique demands a more invasive procedure for exposure and visualization of deeper structures beyond them.

Accordingly, ear surgeons have increasingly performed middle ear surgeries using otoendoscopy, and it has recently been suggested that otoendoscopy could substitute for otomicroscopy.

Endoscopes can provide a wide field of view with magnified images. Otologists can also rapidly change the view by inserting or withdrawing the endoscope to obtain a close-up view or a wide-angle view, while the microscope needs repeated adjustment. Furthermore, otologists can rotate an angled otoendoscope to obtain excellent all-round vision, thereby allowing visualization of the anterior margin of the TM perforation as well as the anterior canal wall, attic, and hypotympanum in the middle ear.[10]

Despite the well-known merits of endoscopic techniques, some concerns about their efficiency and safety are still present among some ear surgeons and hinder the transition from conventional microscopic tympanoplasty to endoscopic tympanoplasty for those surgeons.[11]

Therefore, there is a need for a meta-analysis comparing the outcomes of both endoscopy and microscopy techniques of type I tympanoplasty in terms of efficacy and safety.