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Myringotomy and Ventilation Tube Insertion with Endoscopic or Microscopic Technique in Adults: A Pilot Study

Salvatore Martellucci, MD[1], Giulio Pagliuca, MD, PhD[1], Marco de Vincentiis, MD[2], Armando De Virgilio, MD[3], Massimo Fusconi, MD[2], Camilla Gallipoli, MD[1], Chiara Rosato, MD[1], and Andrea Gallo, MD, PhD[1]

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Abstract

The purpose of this study is to assess the feasibility of endoscopic-assisted myringotomy and ventilation tube insertion in adults affected by chronic otitis media with effusion, comparing the outcomes of this approach with those obtained with the traditional microscopic technique. Twenty-four patients were enrolled in this trial and alternately assigned to 2 groups of 12 subjects each. In group A, patients underwent myringotomy and ventilation tube insertion under endoscopic view, whereas in group B, the same procedure was performed traditionally using a microscope. All cases were evaluated 1 week after surgery and then monthly until tube extrusion. Type A tympanogram was achieved in 10 of 13 ears in both groups (76.92%). No significant difference in operative times or complication rates was observed ($P > .05$). Endoscopic technique could be a viable alternative to the microscopic approach for myringotomy and ventilation tube positioning in adults affected by chronic otitis media with effusion.

Keywords

myringotomy, ventilation tube, endoscopic ear surgery, pilot study

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Myringotomy and ventilation tube positioning (M&T) is a common operation. Since the reintroduction of middle ear ventilation tubes by Armstrong, this surgery has been performed using the operating microscope, as well as other otologic procedures.[1,2]

Since the 1990s, operative endoscopy was introduced in otologic surgery and significantly changed surgical concepts so that, currently, for many otolaryngologists, endoscopes have joined (and sometimes replaced) the microscope in middle ear surgery, despite the well-known disadvantages of this approach (1-handed surgical technique, loss of depth perception, and need for training). However, the endoscope also allows a transcanal all-encompassing view of the ear canal, tympanic membrane, and the tympanic ring, even in the presence of an anterior overhang.[3-6]

Despite these advantages, there are only 2 reports in the literature describing the use of the endoscope for the insertion of a transtympanic drainage.[7,8]

The aim of this study is to assess the feasibility of endoscopic M&T in patients affected by chronic otitis media with effusion (COME) by comparing the outcomes of endoscopic and microscopic approaches.

Materials and Methods

With the approval of the Institutional Review Board of the Department of Surgical Biotechnologies and Science of ''Sapienza'' University of Rome, 24 patients (mean age 47.29 ± 22.41 years) affected by unilateral or bilateral COME were enrolled in this prospective trial from May 2009 to September 2012.

Patients with endoscopic signs of endotympanic effusion, type B tympanogram, and any conductive hearing loss persisting for 3 months were considered positive for COME.

Two groups of 12 subjects each were formed by assigning the patients alternately. In group A, patients underwent M&T under endoscopic view, whereas in group B, the same procedure was performed using a surgical microscope. All

[1]Department of Surgical Biotechnologies and Science, ENT Section, "Sapienza" University of Rome, Italy
[2]Department of Sensorial Organs, ENT Section, "Sapienza" University of Rome, Italy
[3]Department of Sensorial Organs, ENT Section and Department of Surgical Science, "Sapienza" University of Rome, Italy

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Corresponding Author:
Salvatore Martellucci, MD, Department of Surgical Biotechnologies and Science, ENT Section, "Sapienza" University of Rome, Via Giulio Cesare 41\B, 04100 Latina, Italy.
Email: salvomartello@live.it

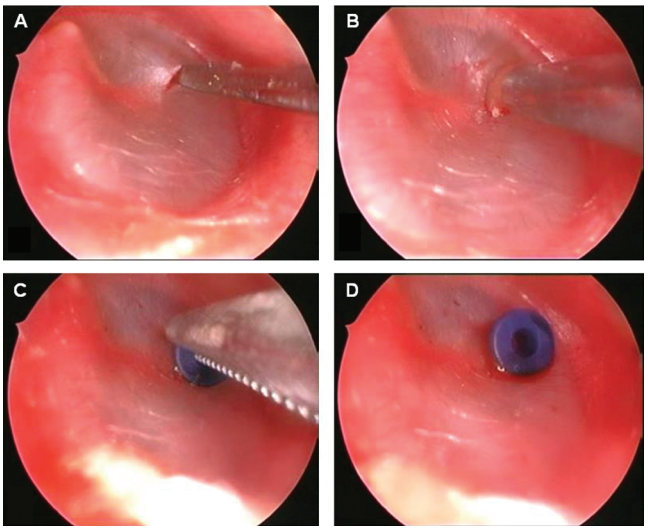

Figure 1. Myringotomy and ventilation tube positioning steps. **(**A) Myryngotomy. **(**B) Removal of fluid in the eardrum. (C) Insertion of ventilation tube. (D) Ventilation tube in place.

surgeries were carried out by the same surgeon (S.M). The time taken for each procedure was recorded. All cases were evaluated 1 week after surgery and then monthly until tube extrusion. The tubes that were not expelled spontaneously within 12 months were removed. Audiometric measurements were carried out 2 months after the extrusion of the tube.

All surgeries were performed under local anesthesia (topical 10% lidocaine). The surgeon operated in a sitting position, while the patient's head was turned 30° to the contralateral side of the operated ear. In group A, the surgeon held the endoscope with his left arm resting his elbow on a stable stand. This device enhanced the stability of the endoscope in order to avoid medialization.

In group A patients, we used an endoscopic set, originally used for endoscopic sinus surgery, that included a 3CCD camera, xenon light source, video monitor, and a 0° endoscope (Ø = 3 × 180 mm). In group B, patients we used a surgical microscope (OMPI 111, Carl Zeiss GmbH, Germany). The main steps of the procedure did not differ between the 2 groups (**Figure 1**).

Outcomes were compared with the χ^2 test and Student *t* test. Statistical analyses were run using the SAS statistical package.

Results

Data are summarized in **Table 1**. Type A tympanogram was restored in 10 of 13 ears (76.92%) in both groups. The

Table 1. Demographic Data, Complications, and Results.

Patient	Sex	Age	Ear	Group	Operative Time, min	Extrusion Time, mo	Complications	Postoperative Tympanogram
1	M	46	R	A	10	6	None	A
2	M	68	L	B	8	6	None	A
3	F	19	R	A	14	R	None	A
			L		10	3	Plugging	B
4	M	72	R	B	11	11	None	A
5	F	18	L	A	9	R	None	A
6	F	35	R	B	17	5	None	A
7	F	21	L	A	8	6	None	A
8	F	81	R	B	10	4	None	A
9	F	29	L	A	6	3	None	C
10	M	42	R	B	7	4	Plugging	C
11	F	63	L	A	8	8	None	A
12	F	30	L	B	12	7	None	A
13	M	21	R	A	10	R	None	A
			L		8	R	PP	—
14	M	50	R	B	10	R	None	A
15	M	81	L	A	7	10	None	A
16	F	28	R	B	11	8	None	C
			L		6	R	None	A
17	F	52	L	A	13	R	None	C
18	F	80	R	B	20	11	PP	—
19	M	43	L	A	10	4	TTO	A
20	F	27	R	B	9	5	None	A
21	F	71	L	A	18	6	None	A
22	F	62	L	B	10	7	None	A
23	F	21	L	A	11	R	None	A
24	M	75	R	B	15	8	None	A

Abbreviations: PP, persistent perforation; R, tube removed after 12 months from M&T; TTO, tympanostomy tube otorrhea.

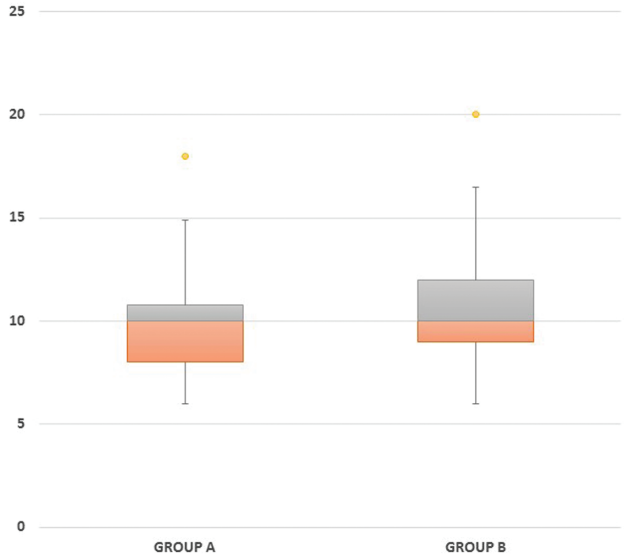

Figure 2. Box plots illustrating the mean operative time in the 2 groups.

mean operative time was 10.14 ± 3.13 minutes in group A and 10.92 ± 3.99 minutes in group B ($P > .05$; **Figure 2**). No statistical difference was observed in complication rates ($P > .05$).

Discussion

M&T may be defined as a simple surgical procedure routinely performed under microscopic visualization. Since the introduction of the binocular operating microscope and despite the continuous technical improvements in ear surgery, the basic principles of M&T have remained the same over the past decades.

In the literature, there are few reports describing the use of the endoscope for the insertion of a transtympanic drainage.[7,8] Our experience suggests that there may be no significant differences in performing this procedure using the endoscope or the microscope regarding peri- or postoperative complications or operative times and that both techniques may be applied by the surgeon accustomed to using both instruments.

Approaching endoscopic ear surgery may not be easy. Once the theoretical basis has been acquired, the major difficulty is the development of the necessary hand-eye coordination and manual skills. Several authors believe that clinical experience with endoscopic sinus surgery and the resulting confidence with the use of endoscopes can be very valuable to abbreviate the learning curve.[3-6,9] For the same reason, the use of the endoscope in the diagnosis and in some routine otologic procedures (such as earwax removal) may be useful in acquiring manual skills in endoscopic procedures of the middle ear.[10]

M&T may be considered one of the first steps in the learning curve of ear surgeons. Therefore, the use of the endoscope during this simple procedure may be useful for surgeons who would like to approach endoscopic ear surgery.[9] However, although significant bleeding during M&T is rare, bleeding could be more difficult to manage when using a 1-handed technique. This aspect may represent a limit of the endoscopic approach.

Finally, the possibility of seeing a magnified view of the operative field on a monitor enables better teaching for residents who can be carefully guided by their tutors, particularly during initial experience with this procedure.

Since our study is underpowered, we performed a retrospective power analysis (80% power, 5% alpha value) on our samples. To exclude type 1 or type 2 errors with a sample ratio = 1, we would need sample sizes varying from 113 to 188,765 patients (113 for the operative time evaluation, 260 for the extrusion time, 188,765 for the complications rate). These results demonstrate the need for a larger, possibly multicentric, study.

Author Contributions

Salvatore Martellucci, writer, study design, drafting the article, acquisition of data, final approval, agreement to be accountable for all aspects of the work; **Giulio Pagliuca**, writer, study design, drafting the article, acquisition of data, final approval, agreement to be accountable for all aspects of the work; **Marco de Vincentiis**, interpretation of data, article revision and final approval, agreement to be accountable for all aspects of the work; **Armando De Virgilio**, data acquisition, data analysis, statistical analysis, article revision, final approval, agreement to be accountable for all aspects of the work; **Massimo Fusconi**, interpretation of data, critical review of manuscript, final approval, agreement to be accountable for all aspects of the work; **Camilla Gallipoli**, data acquisition, data analysis, drafting, final approval, agreement to be accountable for all aspects of the work; **Chiara Rosato**, data acquisition, data analysis, drafting, final approval, agreement to be accountable for all aspects of the work; **Andrea Gallo**, study design, article drafting and revision, final approval, agreement to be accountable for all aspects of the work.

Disclosures

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