Ventilation Tube Insertion: Oto-Endoscopy versus Surgical Microscopy (Comparative Study)

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ABSTRACT:

BACKGROUND:

At the last years, oto-endoscopy have been used for ventilation tubes insertion procedure in cases of otitis media with effusion.

OBJECTIVE:

The purpose of the study to evaluate the endoscopic myringotomy and ventilation tube insertion as a valid alternative of using the surgical microscope regarding: safety and time.

PATIENTS AND METHODS:

This study involved (42) patients diagnosed with chronic otitis media with effusion, divided in to tow groups regarding type of procedure was performed. The first group consist of (23) patients, ventilation tube was inserted by using oto-endoscopy, while the second one involved of (19) patients operated by using Surgical microscopy.

RESULTS:

Patients that participate in this study were (42 patients) with otitis media with effusion. The oto-endoscopy procedure group consists of (16 patients) were males (69.56%), and (7 patients) were females (30.43%), the group consists of 20 right ears and 23 left ears. Time varied from (2.43-11.54) minutes, mean time ± (SD) 5.55 ± 2.48 minutes. The microscopic procedure group consists of (11 patients) were males (57.89%), and (8patients) were females (42.1%), the group consists of 18 right ears and 18 left ears. Time varied from (4.21-17.02) minutes, mean time ± (SD) 10.92 ± 4.04 minutes. We found statistical significant difference observed in the average operative time between the endoscopic and the usual microscopic procedure for myringotomy and ventilation tube insertion operation at p value < 0.05. (p value 0.008). Regarding the operation related complications between the endoscopic and usual microscopic procedure for myringotomy and ventilation tube insertion there was no significant difference noticed between both operations.

CONCLUSION:

We conclude that the endoscopic procedure of myringotomy and ventilation tube insertion operation is a valid alternative to surgical microscope regarding: safety and time.

KEYWORDS: Otitis media with effusion, myringotomy, ventilation tube insertion, Oto-ndoscopy.

INTRODUCTION:

Otitis media with effusion is the accumulation of mucus within the middle ear and sometimes the mastoid air cell system. Persistence of the fluid for the condition to be described as chronic is normally taken as 3 months or longer. [1] Myringotomy and ventilation tube insertion is a common operation, is a surgical procedure in which a small incision is created in the tympanic membrane to relieve pressure caused by excessive accumulation of fluid, or to drain pus from the middle ear.

A tympanostomy tube is inserted into the eardrum to keep the middle ear aerated for a prolonged time and to prevent re-accumulation of fluid.[2] Myringotomy and ventilation tube insertion was first described by Viennese otologist Politzer in 1868 for the treatment of 'otitis media catarrhalis' and popularized by Armstrong in 1954. [3]

Endoscopes have been used in otologic surgery since the 1990s and recent developments in endoscopic equipment have permitted an all-encompassing view of the anatomy of the middle ear, even in the presence of an anterior overhang.[4]

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The purpose of the study is to evaluate the endoscopic myringotomy and ventilation tube insertion as a valid alternative of using the surgical microscope regarding: safety and time.

PATIENTS AND METHODS:

The study was involved (42) patients with (79) ears in Medical City - Martyr Ghazi Al-Hariri Hospital for surgical specialties – ENT Department, during the period from the 1st of May 2017 to 1st of July 2018. The sample of this study was subdivided in to two groups: The first was operated endoscopically and the other operated microscopically.The diagnosis was done by: history, clinical examination of otoscopic findings (with pneumatic otoscopy), nasal examination, pure tone audiometry, tympanometric assessment (flat curve, Type B) and operative aspiration under general anesthesia with by each the two procedures.

The operation of myringotomy and ventilation tube insertion was done under general anesthesia, for both endoscopic and microscopic procedure.For more details regarding the time that is required to complete the two procedures, we do a scale for the time of each procedure for each ear operated, divided in to three categories as a scale reflecting the ease of the procedures, this is staged on a scale of three:

- Short duration: Surgery was done in five minutes or less.
- Intermediate duration: Surgery was done in more than 5 to 10 minutes.
- Long duration: Surgery ten minutes or more to complete Grommet insertion kit consist of: Aural speculums, Sucker in different gauges, Crocodile forceps, Politzer myringotomy knife, probe for adjustment.

Fig.1: 0-degree rigid endoscope (2.7 mm x 107.5 mm)

Shepard grommet ventilation tube (1.14 mm ID) made from fluoroplastic.

Zeiss surgical microscope with (lens 250) and side view for teaching purposes.

Video-Otoscopic system consist of: 0-degree Hopkins rod rigid endoscope (2.7 mm x 107.5 mm) connected to video camera and display screen all manufactured by Karl STORZ, (Fig.1).The endoscopic system placed behind the head of the patient in order to minimize the time and manipulation when we operate both ears.

The patient placed in supine position with head ring, head tilted to the other side of the ear operated and proper sterilization by antiseptic solution done with proper draping around the auricle.Steps of Endoscopic Myringotomy and grommet insertion described in (Fig. 2). Time calculation started after full preparation of the patient in both endoscopic and microscopic procedures, because setting time different between surgical microscope and the endoscopic system.

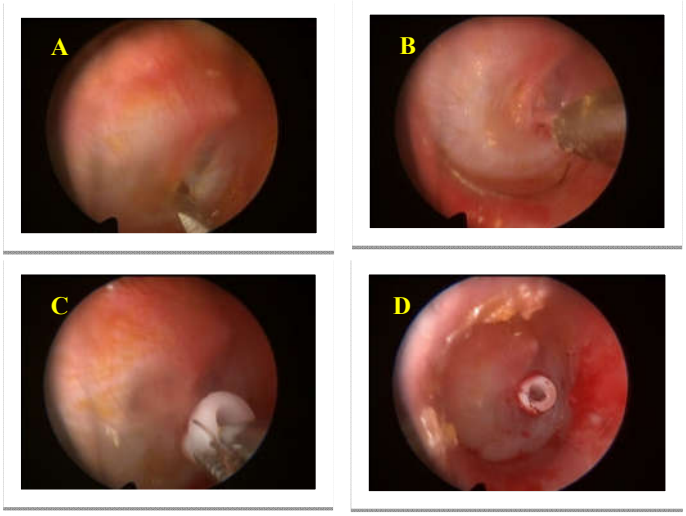

Fig.2: Steps of Endoscopic Myringotomy and grommet insertion:
A- Doing an incision,
B- B- Suctioning of M.E.E.,
C- Insertion of grommet by forceps,
D- Final position of grommet after adjustment by probe.

RESULTS:

Patients that participate in this study were (42 patients) with otitis media with effusion. There were 27 (64.3%) males and 15 (35.7%) females, with male : female ratio 1.8:1, age varied from 3-48 years with a mean ± (SD) of 12.24± 10.81 years.

This study was grouped the patients into two categories: The first one involved 23 patients, 16 patients (38.09%) were males and 7 patients (16.67%) were females who managed by endoscopic M&T, varied from 3-48 years with mean ± (SD) of age was 13.6 ± 12.11years.

The other one contains 19 patients, 11 patients (26.19%) were males and 8 patients (19.05%) were females who managed by microscopic M&T, varied from 4-47 years mean ± (SD) of age was 10.61 ± 8.91 years.

A- Regarding the details of endoscopic procedure of (23 patients):

This group consists of (16 patients) were males (69.56%), and (7 patients) were females (30.43%), the group consists of 20 right ears and 23 left ears. Time varied from (2.43-11.54) minutes, mean time ± (SD) 5.55 ± 2.48 minutes.

Table 1: Patient distribution regarding the endoscopic procedure.

Gender	No.	Ears	Percent of ears %
Male	16	32	74.42%
Female	7	11	25.58%
Total	**23**	**43**	**100%**

The difference in time between right and left was not significant at p value < 0.05.

The insertion of grommet was successful in rate of 100%, antero-inferior of the tympanic membrane.

B- Regarding the details of microscopic procedure of (19 patients):

This group consists of (11 patients) were males (57.89%), and (8patients) were females (42.1%), the group consists of 18 right ears and 18 left ears.

Table 2: Patient distribution regarding the microscopic procedure.

Gender	No.	Ears	Percent %
Male	11	21	58.33%
Female	8	15	41.67%
Total	19	36	100%

Time varied from (4.21-17.02) minutes, mean time ± (SD) 10.92 ± 4.04 minutes.

The difference in time between right and left was not significant at p value < 0.05.

The insertion of grommet was successful in rate of 100%, antero-inferior of the tympanic membrane.

After application of T test for analysis, there was statistically significant difference noted in the mean operative time between the endoscopic and traditionally microscopic procedure for M&T at p value < 0.05. (p value 0.008)

Regarding the ease of the procedure scale, the endoscopic procedure in 43 ears, the Short duration cases were 24 ears, the Intermediate duration were 15 ears and the Long duration were 4 ears.

While the microscopic procedure records of 36 ears were: The Short duration cases were 3 ears, the Intermediate duration were 14 ears and the Long duration were 19 ears, as shown in (Fig.3).

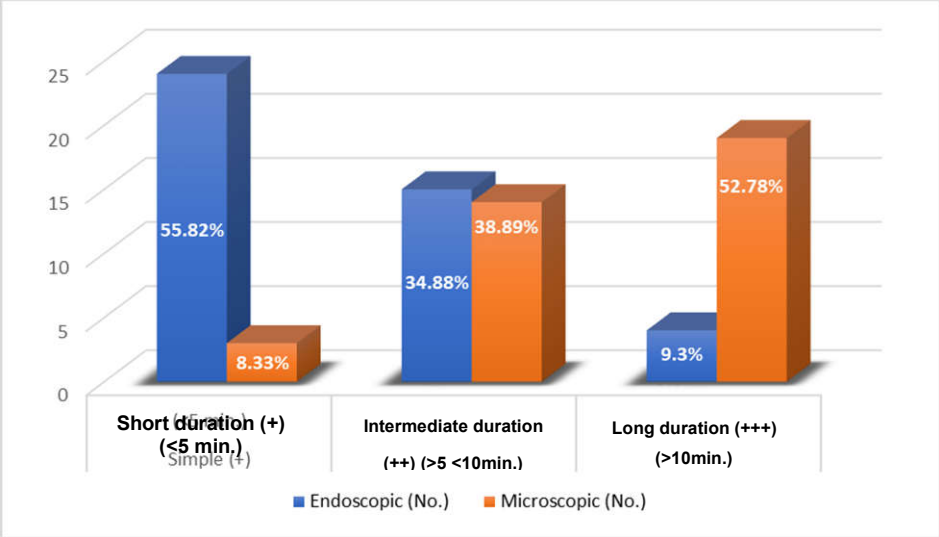

Fig 3: Ease of the procedure.

DISCUSSION:

O.M.E. is defined as the presence of fluid in the M.E. without signs or symptoms of acute ear infection. [5]

If O.M.E. has continued in both ears for 3 months or even longer, resolution is unlikely: only 20% of these resolve within 3 months, 25% after 6 months and 30% after a one year of observation. [6]

In chronic O.M.E., the benefits of tympanostomy tube include a 30% reduction of M.E.E. with an associated 5 to 12 dB improvement in hearing in the first 6 to 9 months after tube insertion. [7]

The analysis of data that were collected revealed that regarding the ears that operated by endoscopic procedure, the time varied from (2.43-11.54) minutes with mean time ± (SD) 5.55 ± 2.48 minutes, these results were less than that recorded by Reyad K. Alalem and Osama J. Essaket (2015) with mean operative time was mean time ± (SD) 5.71 ± 2.27 min in endoscopic procedure (3.0-14.0) min. [8]

Regarding the data of microscopic procedure the time varied from (4.21-17.02) minutes, mean time ± (SD) 10.92 ± 4.04 minutes, these results were more than that recorded by Reyad K. Alalem and Osama J. Essaket (2015) with mean operative time was mean time ± (SD) 7.10 ± 2.36 min in microscopic procedure (4.0-15.0) min. [8]

In other study done by FEI-PENG LEE (2005), also suggest that the operation can be accomplished shorter in endoscopic procedure compared with the time that elapsed by surgical microscope with mean time seven minutes. [9]

So in comparison between the two procedures we found that there was statistically significant difference distinguished in the mean operative time between the endoscopic and traditional microscopic procedures for M&T at p value < 0.05 (p value 0.008), and the endoscopic procedure was shorter time in comparison to the microscopic procedure.

This is because of the optimum resolution that we can get by using endoscopic procedure compared with microscopic one that will allow the surgeon to identify the precise anatomy of the E.A.C. and T.M., overcome the stenosed segments of the E.A.C. and proper suctioning of the M.E.E. from the site of ventilation tube insertion with easy M&T insertion.

Regarding the side of the operated ear, first for endoscopic procedure: the right ears the time varied from (2.43-11.54) minutes, mean time ± (SD) 5.8 ± 2.7 minutes, the time varied from (3.08-10.23) minutes, mean time ± (SD) 5.33 ± 2.21 minutes for the left ears, the difference in time between right and left was not significant at p value < 0.05. This agreed with Aso Nuri Jalizada et al (2015), with mean time (2.5 minutes) for the right side and (2.2 minutes) for the left ear. [10]

This is because of the same hand handled the endoscope and the other hand used for instrumentation for both ears and the endoscopic system remains in the same position at the side of the head of the patient.

Regarding the ease scale of the procedures, the data of this study in total of this scale agreed with Balasubramanian Thiagarajan et al (2012) who conclude in study that 30.77% of the patients who underwent endoscopic grommet insertion was finished within five minutes or less and the rest 69.23% of the patients had their surgery performed endoscopically within ten minutes with no case exceeded the limit of ten minutes. [11]

While the microscopic records in the same study revealed that no case had been done within five minutes or less, 24.6% of the patients had their surgery performed endoscopically within ten minutes and 75.4% of case exceeded the limit of ten minutes, So the total results of the scale confirm that the endoscopic procedure more easier and short duration procedure in comparison to the microscopic one. [11]

There was statistically no significant difference noticed in the percent of procedure related complications between all age groups in comparing the endoscopic and traditional microscopic procedure for M&T, these results are agreed with the results of Reyad K. Alalem and Osama J. Essaket (2015), Martellucci et al. (2015), Nassif N. et al. (2014), Seyra Erbek et al (2018) and Aso Nuri Jalizada et al (2015). [8] [12] [13] [14] [10]

CONCLUSIONS:

We conclude that the endoscopic procedure of myringotomy and ventilation tube insertion operation is a valid alternative to surgical microscope regarding: safety and time.

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