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Microscopic VS Endoscopic Myringotomy and Ventilation Tube Placement

Abstract

To achieve the aim of study, the researcher applied the cross-sectional approach where 40 patients were involved in the study. They were separated into two groups, the first 13 patients were assigned into (Group A), and the second 13 patients were assigned into (Group B). Group A went through myringotomy and ventilation surgery for tube insertion using endoscopic device, while Group B went through the same surgical procedure using traditional microscope. Both groups were assessed after one week of the surgery. After that, the patients were assessed on monthly basis.

It was found that both methods are safe and meet the purpose; however, there is a significant statistical difference in the time required for operations. The endoscopic method require less time compare to the traditional microscopic method.

Keywords

endoscopic ear surgery, ventilation tube, myringotomy

Myringotomy is a surgical operation through which doctors can incise the tympanic tissue and remove the accumulated infective or non-infective fluids in the middle ear. This is also done to correct a faulty Eustachian tube so that it receives air. The procedure is carried out mostly under general anesthesia. It is contraindicated in patient suffering from a glomus tumor within the tympanic membrane (Dhingra 2009, 355).

Since its reproduction by Armstrong, this surgical procedure has been executed by either operating microscope or by other appropriate otologic procedure (Hellström et al., 2011).

The operative endoscopy operations have been executed since the 1990s after being introduced in otologic surgeries. They have significantly changed the surgical concepts and, thus, various otolaryngologists, endoscopes joined/replaced the microscope during the surgeries on the middle ear level.

This type of surgeries have some advantages and disadvantages. It enables the doctors to have a transcanal all-encompassing view of the ear canal and all other parts of the ear i.e. the tympanic ring and tympanic membrane even in the existence of an anterior overhang. On the other hand, this approach has some disadvantages such as One

handed surgical method loss of depth perception as well as the need for intensive training (Presutti et al., 2014).

Despite its advantages, very little number of studies focused the light on this surgery. There are only 3 papers in the literature that describe using the endoscope for inserting transtympanic drainage. Moreover, none of these reports were conducted in an Arabic country.

In the light of the above-mentioned, the current study aimed to compare between the outcomes of myringotomy and ventilation tube insertion when performed using endoscopic-assisted devices compared to the outcomes of this surgery when performed using the traditional microscopic method.

Instruments of Study

For this study, the researcher used the following instruments (Figure 1):

- a) Aural speculum for aural toilet and examination; TB syringe with EMLA®; Kley (or sickle) knife; zero-degree rigid endoscope; Others: endoscopy unit, and phenol solution.
- b) Ventilation tube.
- c) Hartmann 1.2 mm ear forceps with 8-cm working length.

(Note: the medical instruments, disposables and materials may differ according to their availability and the surgeon's anatomical considerations and preferences)

Materials and Methods

Study Design

The current study was conducted following the prospective trial approach. It was conducted at Jeddah city in Saudi Arabia. The random sample method was applied to select a representative sample from the overall population. The population of the study included 26 patients.

Data Collection Methods

The researcher recognized two types of data, which are the primary and secondary data. Primary data include data that are collected by the researcher and for the first time and considered to be original in character. On the other hand, secondary data are those that have been passed through the statistical process (Yang, 2018).

who were suffering from bilateral or unilateral Chronic Otitis Media with Effusion (COME). the trial was conducted in the period between April, 2017 to December, 2018.

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The patients were divided into 2 groups:

- Group A: 13 patients had endoscopic bilateral myringotomy with tube placement.

- Group B: 13 patients had bilateral myringotomy with tube placement using traditional otomicroscope method.

The criteria for selecting patients for this study included:

- Patients who were scheduled for bilateral myringotomy with tube placement based on clinical history.
- Patients with COME lasting for more than 3 months despite the medical treatment.
- Patients who had tympanogram (Type B).

Operative Procedures

All operations were done in a sitting position where the patients' heads were turned 30 degrees to the contralateral side of the ear under operation. For the Group A, the operation was done using endoscope using his left arm while resting his elbow on a fixed stand to improve the stability of the endoscope to avoid any medialization.

To avoid endotracheal tube displacement, an anesthesiologist was assigned where the surgeries performed under local anesthesia (Topical 10% Lidocaine).

Group A

An endoscope (Figure 2) with 2.7mm zero-degree rigid endoscope connected to a camera transmitting to a display screen was carefully indulged into the canal of the external ear while ensuring not to contact

with the external skin of the external ear canal to avoid any bleeding (Figure 3).

In the antero-superior quadrant of the ear drum or antero-inferior myringotomy incision was made using a special myringotomy medical knife. The middle ear effusion was sucked out after enlarging the incision to accommodate the ventilation tube. As a final step, with the aid of a special medical needle/forceps, the ventilation tube was indulged and attuned to correct their position. The lens was cleaned frequently to have a clear view of all tympanic membrane parts.

For the group B, the traditional microscopic method was used to indulge and hold an ear speculum into the ear canal in order to avoid any bleeding, the microscope was sided around to have a good view of the tympanic membrane and put it in the central field of view and to obtain a clear magnified photo.

In the cases of inferior/anterior humps, the patients' heads were tilted more to the opposite side. After inserting the ventilation tube, the operation was finished (Figure 4).

The operation time for both methods was recorded along with the extrusion time. Besides, the researcher recorded any complications. After that, the data were analyzed to compare between the effectiveness of both methods using Mann-Whitney test and Chi-squared test. the P value ≤ 0.05 was considered statistically significant.

difference while it was highly statistically significant difference when $P \text{ value} \leq 0.0001$.

Results

The patients were classified into two groups according to the operation type; Group A – endoscopic myringotomy and Group B – traditional microscopic method.

12 patients of the 26 participated in the study were males (46.15%). While 14 of the patients were females (53.84%) (Figure 5). The average age of the patients was 9.2 years ranging between 2 and 16 years old.

A total 18 ears were operated using the endoscopic method and 18 ears were operated using the traditional microscopic method. In the endoscopic technique, the average time was 9.9 ± 3.7 minutes while the average time in the microscopic method was 10.3 ± 5.7 minutes. A statistically significant difference was found in the average operation time between the endoscopic and microscopic method. No complications were detected during the operations. Therefore, no statistically significant difference was found in the average complications between the endoscopic and microscopic method (Figure 6).

operation time in Group A and B

The average time of operation is in line with results of Nassif et al (2014) where there was a statically significant difference in the average of operation time between the endoscopic and microscopic method for myringotomy and placement of ventilation tube.

All in all, there was no complications in both techniques and this is due to the small number of patients under study. There was just significant difference in the time of operation.

Conclusion

The study has shown that the myringotomy and ventilation tube placement is safe for all age categories. Besides, the endoscopic technique requires time less than the traditional microscopic method. Moreover, the endoscopic method is more cost effective and enables the surgeons to visualize the entire ear canal and tympanic membrane and thus, better results could be achieved.

Research Limitations

There might be some limits in this study due to the small number of the research sample. Besides, some of the patients prefer to be operated using the traditional methods as they think it is better than the endoscopic one.