

ORIGINAL ARTICLE

LASER AND INCISIONAL MYRINGOTOMY IN OTITIS MEDIA WITH EFFUSION-A COMPARATIVE STUDY

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Background: Otitis media with effusion (OME) or middle ear effusion (MEE) is a common cause of hearing difficulty in children. MEE must be detected early and managed properly to prevent conductive hearing loss in children. It was aimed to compare results of laser myringotomy and conventional myringotomy in terms of hearing improvement, recurrence of MEE and time to put ventilation tube. **Methods:** This randomized control trial was conducted from February 2012 to April 2014. Children of 4 years age or older with MEE were included in the study. These children were investigated with Pure tone audiometry (PTA) and tympanometry to confirm conductive hearing loss. X-Ray nasopharynx lateral view was performed for adenoids. Sixty-six patients were randomly assigned in to 2 groups, (1) treated with laser myringotomy and (2) treated with classical myringotomy. The ears were evaluated for MEE, for presence of perforation and level of hearing. **Results:** A total of 98 ears in 66 patients underwent intervention. Middle ear effusion cleared in 44 out of 48 ears with laser myringotomy (LM) as compared to 34 out of 50 ears with incisional myringotomy. The perforation was still patent in 36 ears treated with LM while it was found closed in all 50 ears with conventional myringotomy after 2 weeks. The hearing level improved with LM by 10–15 dB after first 3 months. **Conclusion:** The aim of management in otitis media with effusion is ventilation of tympanic cavity. Laser myringotomy is a best alternative to conventional one. It also has comparable results with ventilation tubes (VT). The ears with refractory or recurrent MEE should have VT insertion.

Keywords: otitis media with effusion, middle ear effusion, laser myringotomy, adenoids, ventilation tubes, tympanometry

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INTRODUCTION

Otitis media with effusion (OME) is the most common cause of hearing loss in the children.¹ Most cases of OME resolve spontaneously. Medical treatment is less effective. Tympanostomy tubes are highly effective in refractory and recurrent cases of otitis media with effusion. Laser myringotomy without tube has been attempted as an alternative treatment in OME. Incisional myringotomy is not much effective. Laser myringotomy has the advantage of patency for longer duration.² Laser myringotomy achieves the aim of middle ear ventilation.³ We compared results of LM with incisional myringotomy (IM) for 2 years.

MATERIAL AND METHODS

This randomized control trial was conducted from February 2012 to April 2014. Eighty patients who fulfilled the study criteria during this period were included in the study. The age of children varied from 4 to 8 years. Fourteen patients dropped out and 66 children were included in the study. Those patients having MEE for 3 months or more and needed adenoidectomy were included in the study. Every patient having hearing difficulty was examined with pneumatic otoscope for fluid level and tympanic

membrane (TM) mobility. These children were investigated with pure tone audiometry to determine hearing level and tympanometry to confirm middle ear fluid. Those children with OME having hearing level (HL) more than 25 dB and tympanometry type-B were included. X-Ray nasopharynx lateral view was done to confirm adenoids. These patients were randomly assigned to 2 groups. (1) 32 Patients with 48 affected ears treated with LM. (2) 34 patients with 50 ears having MEE treated with incisional myringotomy (IM). Adenoidectomy was performed with adenoid curette under general anaesthesia in both groups. Myringotomy was performed under operating microscope. Diode laser of 980- nm wavelength with a fiber-optic delivery system was used to perform the myringotomy in group-1. The myringotomy opening (MO) was made in anteroinferior quadrant of tympanic membrane with 0.6 mm bare diode fibre projecting 3 mm from the hand piece edge. The laser energy was delivered by 5 shots in a circular manner with power of 5 W in 0.5 s single-pulse mode. The size of MO varied from 2 to 2.5 mm. IM was created with a myringotomy lancet under the operating microscope in group-2. A radial incision of 2 mm was created in the anteroinferior portion of the tympanic membrane. Middle ear effusion was aspirated using a no. 5 French Frazier-

tipped suction. The patients were evaluated at 2 weeks and 4 weeks for presence of MO, MEE. The results were followed and compared in both groups at 2months, 6months and 12 months for closure of MO, recurrence of MEE, HL and tympanogram. They were assessed and compared for complications like otorrhoea, persistent perforation, thinning of healed tympanic membrane(TM) and prominent scar.

RESULTS

A total of 66 patients were divided in 2 groups. Group-1 had 32 patients (48 ears) with OME. They were treated with LM and adenoidectomy. Group-2 had 34 patients (50) ears with OME. These children were treated with IM and adenoidectomy. In LM group, 44 (91.7%) out of 48 ears had clearance of MEE at first follow up after 14 days while 4 (8.3%) ears had effusion present in middle ear. MO was patent in 36 (75%) ears and was found closed in 12 (25%) ears after 14 days. In group-2, we performed IM in 50 ears and 40 (80%) showed no MEE while 10 (20%) ears had persistent effusion after 14 days. The MO was found closed in 46 (92%) ears and only 4 (8%) were patent after 2 weeks. Intra-operative bleeding occurred in no ear operated with LM in group-1 as against 8 (16%) ears treated with IM. One ear (2.08%) in LM group and 4 (8%) ears in IM group developed ear discharge. In LM group, MO was patent in 20 (41.6%) ears and got closed in 28 (58.4%) ears after 4 weeks. The same number of 44 ears (91.7%) was free of MEE. All these 44 ears (91.7%) had improvement of hearing by 10–12 dB. In group-2 with IM, 20 (40%) ears showed MEE and 30 (60%) ears were free of MEE after 4 weeks. At 3rd follow up, in group-1 (LM) MO was found closed in 47 ears and 18 (37.7%) ears showed MEE while 30 (62.3%) ears were free of effusion after 2 months. Twelve ears had thinning and retraction before LM and in 6 (50%) ears it got resolved. In group-2 (IM), 32 (64%) ears showed MEE and 18 (36%) ears were free of MEE after 2 months. After 6 months, 22 (45.8%) ears had recurrence of MEE in group-1 treated with LM while 26 (54.2%) ears were free of OME. These 26 ears (54.2%) had hearing level of 10 dB or better as measured with PTA and had type-A curve on tympanometry. Two ears (4.16%) had atrophic scar and 1 ear (2.08%) had persistent perforation. The 22 (45.8%) ears with recurrence of MEE had hearing level of 25 dB or above and type-B curve as was preoperatively. In group-2 treated with IM, 38 (76%) ears had recurrence of OME and 12(24%) ears were free of MEE. The 38 (76%) ears with MEE had hearing level of 20–40 dB on PTA and type B curve on tympanometry. Ten ears (20%) had retraction of TM. Two ears (4%) had persistent perforation which had developed otorrhoea

postoperatively. Two ears (4%) had hypertrophic scar due to delayed healing having ear discharge. Total of 54 ears (22 LM+32 IM) developing recurrence of OME were subjected to medical treatment. The MEE resolved in 12 ears in LM and 18 eras in IM group as these patients had adenoidectomy already. The remaining 24 ears with recurrent and refractory OME were treated with ventilation tubes (VT) after 12 months.

Table-1: Results: Comparison of LM and IM

Follow up	2 weeks		4 weeks		2 months		6 months	
	LM %	IM %	LM %	IM %	LM %	IM %	LM %	IM %
Myringotomy	75	8	42	8	2	8	0	0
Patency. ears	92	80	92	60	62	36	54	24
OME clearance	8	20	8	40	38	64	46	76
MEE recurrence	92	80	92	60	62	36	54	24
Hearing improvement								

Table-2: Complications: LM versus IM

Complications	LM. Ears	IM, ears
Bleeding	0/0	8/16
Otorrhea	1/2	4/8
Persistent perforation	1/2	2/4
Atrophic scar	2/4.1	10/20

DISCUSSION

Otitis media with effusion is the most common cause of hearing loss in the children and 20% of children more than 2 year develop MEE that persists for more than 3 months.^{1,4} Hearing loss due to OME may have adverse effect on cognitive, linguistic and communicative skills development and aim of surgical treatment should be reversing of hearing loss.² The main objective of laser myringotomy is to achieve middle ear ventilation by means of MO in tympanic membrane (TM) with a longer patency than IM. The advantages of diode laser over CO2 laser are that it is of small size and easily handled. It takes short time and by the use of contact modality the surgeon has more control on the place and power of the energy on the TM to avoid injury to surrounding structures.^{5,6} We performed LM and adenoidectomy under GA though it can be performed with LA in older children if adenoidectomy is not required.⁷The LM is also an option as office based procedure for families where anaesthesia is concern⁸

Adenoidectomy and myringotomy is an effective procedure for refractory OME in children but most of the children have recurrence of MEE. Our study showed that LM provide longer patency of MO helping in resolution of MEE and less chance of recurrence.^{2,9} Diode laser MO remains patent for an average of 3 weeks as against 7- days in IM.⁵ Other studies state that LM provides middle ear ventilation for not long enough time to clear glue ear in chronic OME.^{5,10} We created MO in anterior and inferior quadrant of TM which longer patency and healed without any visible damage as suggested by other studies.^{3,11} we found that LM can improve hearing for several weeks as compared

with IM. It may obviate the need of VT insertion except a few cases, avoid the need for water restriction, possibility of infection and persistent perforation.⁵ It is a useful alternative in surgical management of OME.^{11,13} Other study shows that LM is less effective than VT in the treatment of OME.¹² In our study, the average patency time of LM was 19 days as compared with IM when mean patency time was 7 days.¹³ In our study, improvement of hearing was immediate and was recorded by 10–12 dB in 90% of ears treated with LM but this improvement dropped to 60% of ears after 6 months.^{5,10} In group-2 treated with IM, 10–12 dB improvement was in 80% of ears after 2 weeks and this dropped to 36% of ears at 6 months.^{14,15}

Laser myringotomy provides blood less and clear surgical field. We had no intra-operative bleeding during any LM and had bleeding in 8 ears during IM.³ At 6 months of follow up one ear had atrophic scar and one ear had persistent perforation due to otorrhoea in LM while 20% ears had retraction of TM, 2 ears with persistent

perforation due to otorrhoea and one ear with hypertrophic scar due to delayed healing in ears treated with IM. The recurrence of OME was comparatively low (40%) with LM than IM (63%).^{11,15}

CONCLUSION

The main objective in treating OME is ventilation of the middle ear cavity. Laser myringotomy is a new modality to ventilate and drain the middle ear. It is quicker, less painful and remains patent longer than incisional myringotomy. Diode laser is an easy and simple procedure with thin fibre optic cable and contact application hand piece. It is much effective than myringotomy alone and competes with ventilation tube insertion. But as its patency is shorter than tubes insertion, it may not be effective in clearance of mucoid effusion in long standing and refractory OME.

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