ORIGINAL RESEARCH

A clinical study of effectiveness of adenoidectomy in middle ear ventilation assessed by tympanometry

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ABSTRACT

Background: Whenever there is a focus of infection in and around the nasopharynx especially in the adenoids, it can cause concomitant infection of the eustachian tube giving rise to mucosal edema and congestion which in turn can cause anatomical and physiological malfunction of the Eustachian tube. As a result, the ventilation of middle ear is hampered. The benefit of adenoidectomy in the management of otitis media has traditionally been ascribed to the relief of anatomical obstruction of the eustachian tube. We analyzed the utility of adenoidectomy on middle ear ventilation, by analyzing the post-operative variations in tympanometry curves. **Method:** This study includes 50 patients fulfilling criteria's of inclusion. Those who required surgery and gave consent for the same were then taken up for adenoidectomy / adenotonsillectomy. Their pre-op & post-op tympanometry results were analysed to study the effectiveness of adenoidectomy on middle ear ventilation. **Result:** On preoperative tympanometry 28 (56%) patients had type B tympanogram while other 22 (44%) had type C tympanogram. One month after surgery, 32 (64%) patients had type Atympanogram, while 14 (28%) had type B and 4 (8%) patients had type C tympanogram. Six months after surgery, 41 patients had type Atympanogram, indicating success rate of 82%. **Conclusion:** Adenoidectomy is extremely effective in improving middle ear ventilation.

Keywords: adenoidectomy, secretory otitis media, Eustachian tube dysfunction

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INTRODUCTION

Eustachian tube plays a vital role in the maintenance of middle ear pressure. Whenever there is a focus of infection in and around the nasopharynx especially in the adenoids, it can cause concomitant infection of the eustachian tube giving rise to mucosal edema and congestion which in turn can cause anatomical and physiological malfunction of the Eustachian tube. As a result, the ventilation of middle ear is hampered and the air in middle ear gets absorbed giving rise to negative middle ear pressure which is the basic pathology for otitis media with effusion and squamous chronic otitis media.

The function of the lymphoid tissue of Waldeyer's ring is to produce antibodies. The adenoid produces B cells, which give rise to IgG and IgA plasma cells. Exposure to antigens via the nasal route is an important part of natural acquired immunity in early childhood. The adenoid appears to have an important

role in development of an "immunological memory" in younger children.¹

Adenoiditis is one of the most common conditions that are encountered in the paediatric age group and most of the patients present with associated finding of middle ear dysfunction.

The benefit of adenoid ectomy in the management of otitis media has traditionally been ascribed to the relief of an atomical obstruction of the eustachian tube.²

MATERIAL AND METHODS

Type of study: Observational study

This study includes 50 patients fulfilling criteria's of inclusion. Those who required surgery and gave consent for the same were then taken up for adenoidectomy / adenotonsillectomy.

Inclusion Criteria

RESULTS

- All the relevant patients in age group of 3 to 12 years.
- All patients complaining of hearing loss along with recurrent upper respiratory tract infection.

Exclusion criteria

- All patients below 3 year and above 12 years of age
- Post operative patients.
- Patients having perforation of tympanic membrane.
- Patients with severe sensorineural deafness

Table 1: Pre-operative tympanometry						
		Type A tympanogram	Type B tympanogram	Type C tympanogram		
	Number of patients	0	28	22		
	Percentage	0.0%	56.0%	44.0%		



Table 1 shows preoperative tympanogram

- There were 28 (56.0%) patients with type B tympanogram and there were 22 patients (44.0%) patients with type C tympanogram.
- Type C tympanogram is suggestive of Eustachian tube blockage.
 - Type B tympanogram is suggestive of fluid in middle ear. These patients had additional finding of secretory otitis media on otoendoscopy.

Table	2:	Posto	perative	tvm	panogram	after	1	month
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unogram arter i montin								
	Туре А	Type B	Type C					
No. of patients	32	14	4					
Percentage %	64%	28%	8%					

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Table 2 shows postoperative typanogram after 1 month:

- Out of 50 patients having 32 patients (64.0%) had type Atympanogram suggestive of normal middle ear ventilation.
- 14 patients (28%) had type B tympanogram and on otoendoscopy they had evidence of secretory otitis media. There was no evidence of remnant

or recurrence of adenoids on nasopharyngoscopy in these 14 patients.

- 4 patients (8%) had type C tympanogram.
- On nasopharyngeal examination 2 patients had tubal tonsil hypertrophy.
- 1 patient had scarring of torus tubarius probably due to surgical trauma.
- While 1 patient had a residual adenoid, this patient was posted for revision surgery.



 Table 3: Postoperative tympanogram after 6 months of surgery

Table 3 shows postoperative tympanogram after 6 months of surgery:

- 41 patients (82%) had type Atympanogram which indicates normal middle ear ventilation.
- 8 patients (16%) had type B tympanogram; these patients had evidence of secretory otitis media otoendoscopy.
- On nasopharyngeal examination 2 patients had recurrence of adenoids. Other 6 patients having otitis media with effusion with co-existent Eustachian tube catarrh.
- 1 patient (2%) with type C tympanogram had scarring of torus tubarius due to surgical trauma.

DISCUSION

Pre-operative tympanometry

In our study, 28 patients had type B tympanogram, out of these 20 patients had negative middle ear pressure. 22 patients had type C tympanogram and all these patients had negative middle ear pressure.

Sandooja D et al in 1995 conducted a study on effect of adenotonsillectomy on hearing threshold and middle ear pressure. This study concluded that out of 50 children (100 ears) undergoing adenotonsillectomy 32 ears showed negative middle ear pressure of 100 to 400 mm H2O (100 mm H2O is normal).³

Post-operative tympanometry after 1 month

In our study, one month after the surgery 32 patients (64.0%) had type Atympanogram suggestive of normal middle ear ventilation.

This was because the eustachian tube function was improved and middle ear ventilation was restored back to normal.

14 patients (28%) had type B tympanogram and on otoendoscopy they had evidence of secretory otitis media. There was no evidence of remnant or recurrence of adenoids or trauma to torus tubarius on nasopharyngoscopy in these 14 patients. This may be because of the inflammation of Eustachian tube.

Four patients (8%) had type C tympanogram. On nasopharyngeal examination 2 patients had tubal tonsil hypertrophy. One patient had a residual adenoid, this patient was posted for revision surgery and the adenoid was removed. One patient had scarring of torus tubarius due to surgical trauma as adenoidectomy with curette is a blind procedure, surgeon should be careful while performing adenoidectomy.

Postoperative tympanometry after 6 months of surgery

In our study 41 patients (82%) had type Atympanogram which indicates normal middle ear ventilation and normal eustachian tube function.

Eight patients (16%) had type B tympanogram; these patients had evidence of secretory otitis media on otoendoscopy and tympanometry. On nasopharyngeal examination 2 patients had recurrence of adenoids.

These patients were having recurrent attacks of upper respiratory tract infection. Other six patients having otitis media with effusion were probably having aneustachian tube catarrh because of long standing inflammation of Eustachian tube. One atient (2%) with type C tympanogram had scarring of torus tubarius due to surgical trauma.

In the study done by Sandooja D et al, postoperatively out of 32, 7 ears had hearing threshold of 20-30 dB and negative middle ear pressure of 100 to 200 mm H2O.2 Austin in 1989 got 90% positive results in a study done on 53 patients who were subjected to adenoidectomy without grommet insertion.⁴

Maw AR in 1983 conducted a prospective study on the effects of adenoidectomy and adenotonsillectomy on established otitis media with effusion unresponsive to medical treatment. There was resolution of 36-46% of chronic effusions as a result of adenoidectomy.⁵

Khadim AL et al in 2007 did a study and concluded that having adenoidectomy or adenotonsillectomy surgery at time of first or subsequent (myringotomy plus ventilation tube insertion) MVTI was associated with reduced risk of further MVTI surgery.⁶

Hammarén-Malmi S et al in 2005 conducted a study and concluded that adenoidectomy does not significantly reduce the incidence of acute otitis media in otitis prone children who are younger than 4 years and receive grommet tubes.⁷

Cheong KH al in 2012 conducted a study on management of recurrent acute otitis media in children. This study concluded that adenoidectomy reduces otitis media recurrence.⁸

CONCLUSION

Based on the results of our study, we conclude that adenoidectomy improves middle ear ventilation: A physiological obstruction by hypertrophied adenoid and inflammation of eustachian tube mucosa compromises middle ear ventilation. Improper technique of adenoidectomy may leave residual adenoid tissue which can compromise the end result. Adenoidectomy is a blind surgery, any exaggerated attempt to remove adenoids laterally may cause trauma to torus tubarius and lead to scarring of eustachian tube opening. It is lymphoid tissue and it may recur if patient continues to have recurrent attacks of upper respiratory tract infection subsequently. Adenoidectomy not just only improves middle ear ventilation, but also resolves middle ear effusion.

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