

Autoinflation treatment of otitis media with effusion: a quasi-experimental study

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Objective: To analyze the efficacy of Otovent auto-inflation to treat otitis media with effusion.

Methodology: This Quasi Experimental Study was conducted at Sir Ganga Ram University Hospital and Continental Medical College, Lahore from July 1, 2017 to June 31, 2019. One hundred cases of persistent bilateral otitis media with effusion, of both genders, aged 4 to 12 years, were recruited using purposive non probability sampling. Basic demographic sheet and tympanometry was used for data collection. Intervention included autoinflation using Otovent device thrice daily over one month.

Results: Intervention improved the 80 type B

graphs of right ear to type A in 70 and to type C in 10 ears, while the remaining type C graphs improved to type A. For the left Ear, 80 type B graph improved to type A in 40 ears and type C in remaining 40 ears, while the 20 pre-intervention type C graphs, improved to type A. A significant improvement between pre and post-intervention middle ear pressures with reduced middle ear pressures after intervention was present.

Conclusion: Auto-inflation with Otovent improved OME with one month intervention. (Rawal Med J 202;45:419-422).

Keywords: Otitis media with effusion, auto-inflation, Valsalva maneuver, Otovent®.

INTRODUCTION

Otitis media with effusion (OME) is the commonest middle ear (ME) problem among young children with 90% having at least one episode of OME by 10th Birthday¹ with a prevalence of 12.2%.² It is commonly seen at 1-6 years age and characterized by sterile fluid in the middle ear.³ OME is commonly seen in children with craniofacial anomalies, respiratory allergies⁴ and infection, nasal obstruction and frequently exposed to pathogens.⁵ Otoscopy may reveal a loss of light reflex, a dull, retraction or bulging Tympanic Membrane (TM) and fluid level behind the TM.³ OME is confirmed by tympanometry with type B tympanograms in majority⁶ and type C in some.^{7,8} Cases in which OME continues for 3 months, language delay and learning issues should undergo hearing tests.⁹

Though most cases of OME resolve spontaneously, untreated OME may result in development of tympanosclerosis, retraction pockets, adhesive otitis media, hearing and speech impairments⁶ and delayed language development along with poor school performance.⁷ Medical treatment including antibiotics, anti-histamines, steroids, mucolytics

and nasal decongestants are frequently used, however they are not reliably effective and ultimately surgical options like myringotomy and/or adenoidectomy may be needed.⁴

Mechanical methods like retrograde catheterization and auto-inflation are options to open the pharyngeal opening of Eustachian tube (ET) and equalize ME pressure. Retrograde catheterization has good results but it is not without complications.¹⁰ Auto-inflation of ET seems to be of benefit with low risk and cost.¹¹ It can be performed with closed mouth and Valsalva as well as blowing against pressure in a chamber (balloon) against closed glottis resulting in intermittent aeration of ME to improve abnormal ET function.¹² Auto-inflation is cost effective and without adverse effects, hence should be considered for treating OME and recommended further research.¹³ Auto-inflation with Otovent has not been researched in the region especially in children, compounded by insufficient evidence regarding its efficacy prompted us to conduct this study to analyze the effectiveness of Otovent auto-inflation to treat OME.

METHODOLOGY

Following institutional research board approval, this interventional study recruited 100 diagnosed cases of persistent bilateral OME, using purposive non probability sampling over a period of 2 years from July 1, 2017 to June 31, 2019. Informed consent was taken from all patients. The study was conducted at ENT departments of Sir Ganga Ram University Hospital and Continental Medical College, Lahore, Pakistan. Patients had persistent bilateral OME of at least 2 months duration and were being considered for ventilation tube insertion, of both genders, aged 4 to 12 years. Patients with persistent nasal obstruction; mental retardation, immune deficiency, upper respiratory tract infection, systemic disease like cystic fibrosis and kartagener syndrome, congenital anomalies of ears and lip/palate, first arch syndrome, cases with first attack of OME and uncooperative children were excluded from the study.

Diagnosis of OME was made by a specialist with otoscopy, hearing assessment and tympanometry. Basic demographic data were recorded and pre-intervention tympanometry was performed. All patients were given Oto-vent (device including specially designed PVC nose tube attached with latex balloons) for auto-inflation of ME. Patients were demonstrated its use in presence of parent, followed by demonstration by the parent and then the child. Intervention involved 10 inflation and deflation cycles with the Otovent balloon 3 times daily for one month. This was followed by post-intervention tympanometry.

Statistical Analysis: Data were analyzed using SPSS version 23.

RESULTS

Out of 100 patients, 60% were males and 40% females with a mean age of 6.08 ± 1.25 years. Otoscopy of right ear revealed a dull TM in majority i.e. 50, followed by retracted TM in 30 ears, while left ear revealed a dull TM in 50 and retracted and fluid behind TM in 20 ears each (Table 1).

Pre-Intervention Jerger Graph of Right Ear were type B in 80 and type C in 20 ears. Type B improved to type A in 70 and type C in 10 ears, while the 20

type C graphs improved to type A one month post-intervention. In the left Ear Pre-Intervention graph were type B in 80 and type C in 20. 40 type B improved to type A and 40 to type C. while all type C graphs i.e. 20, improved to type A, one month post-intervention (Table 2).

Table 1. Demographic and Clinical characteristics of study population (n=100)

Gender		Male	60
		Female	40
Age (Years)		Mean	6.08
		Standard Deviation	1.25
		Minimum	4
		Maximum	8
Otoscopy Findings		Right Ear	Left Ear
	Dull TM	50	50
	Retracted TM	30	20
	Bulging TM	10	10
	Fluid Behind TM	10	20
	Total	100	100

Table 2. Diagnoses (Tympanometric Jerger graph) Pre-Intervention and post-Intervention.

Jerger Graphs				Post Intervention		Chi-Square Test	
Pre-Intervention				A	C	Value	P-Value
	Right Ear	B	80	70	10	2.778	0.096
		C	20	20	0		
		Total	100	90	10		
	Left Ear	B	80	40	40	16.667	0.001
		C	20	20	0		
		Total	100	60	40		

Table 3. Middle Ear Pressure (daPa) Pre-Intervention (1 Day) and Post-Intervention.

Ear	Category	Middle Ear Pressure		Paired Sample T-Test
		DaPaPT*	DaPaPT**	T (Sig.2 tailed)
Right	Mean	-29.7	.50	-7.14 (.000)***
	Std. Deviation	45.07	6.63	
	Std. Error Mean	4.51	.65	
Left	Mean	-33.85	-6.50	-7.31 (.000)***
	Std. Deviation	42.133	8.12	
	Std. Error Mean	4.21	.81	

Note: * MEP Pre-Treatment,

** MEP Post-Treatment,

*** At 95% confidence interval. Paired Sample T-Test used.

The pre-intervention Mean MEP was -29.7 ± 45.07 and -33.85 ± 42.13 in the right and left ear respectively, while it was 0.50 ± 6.63 and -6.50 ± 8.12 in the right and left ear one month post-intervention. The pre and post-intervention difference in both ears was statistically significant with P-value of 0.000 (Table 3). No adverse event took place following use of otovent in the current study.

DISCUSSION

Conservative treatment improves OME in majority.¹⁴ Autoinflation being one of the conservative treatment strategies with surgical options proceeded for those with more persistent disease.¹⁵ This is also the case in primary care settings¹⁴ and is an feasible and acceptable technique in children.¹⁶ In the current study, use of Otovent resulted in significant improvement in both ears at one month post-intervention. Of the 80 type B graphs before intervention only 10 were noted as type C at one month post-intervention in the right ear, while in the left ear out of 80 type B graphs pre-intervention 40 were of type C remaining became normal. Also significant improvement occurred in the Mean MEP with intervention, with no case requiring grommet insertion.

Williamson et al reported significant improved tympanograms at one month¹⁷ and Bidarian-Moniri showed that use of otovent resulted in 47.3% normal tympanograms at one month and 49.6% at three month¹⁸ and also resulted in significant improvement in MEP and hearing threshold.¹⁹ However, symptoms improvement was not significant at one month ($P=0.08$), but at three month significant improvement ($P=0.02$) was seen.¹⁶ Also in a study by Ercan et al with the use of Otovent reported improvement in OME to the extent of reduction in need of insertion of grommets to the tune of 42%.²⁰

Post myringotomy auto-inflation of ME by balloon blowing with noise may be beneficial.²¹ Perera et al in their review article noted that the pooled results were in favor of intervention, however the changes in tympanometry results were not significant except for Politzer device where significant positive effect were noted and recommended auto-inflation treatment due to its cost effectiveness and safety.¹³ A

study by Arick & Silman politizerization was effective in reducing the air-bone gap in 70% of cases.¹² However, our results showed significant improvement with Otovent treatment at one month. Limitation to the study were faced due to the fact that patients who visited the hospital for grommet insertions had to be convinced for inclusion in this study and also otovent were not freely available, thus limiting sample size.

CONCLUSION

Auto-inflation with Otovent improves OME with one month intervention

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