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Research Article

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The Effect of Desloratadine on Chronic Otitis Media with Effusion in Children Requiring Grommet

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Abstract

Objectives: Otitis media with effusion is the most common cause of acquired hearing loss in the pediatric population, however best medical treatment is unknown. The main objective of this article is to assess the role of desloratadine in avoiding the need for grommets in children with chronic otitis media with effusion (COME), in relieving the effusion and its associated hearing loss.

Study design: Study design involved retrospective review of case series of children with COME referred for grommets. Age, gender, presenting signs and symptoms were recorded. Pre, post treatment and Audiological results were performed in most of the cases. Response to treatment was measured as clinical and or audiological improvement, along with this the effect of co-existing recurrent otitis media (ROM) and the use of nasal steroids also assessed. Children not responding to a 4-week course underwent were grommets' insertion. Those responding received a longer treatment until the resolution of the signs and symptoms, up to 3 months.

Results: We included 138 children (1-13y, mean 3.6y, 127 <7 yo) among 34.8% had coexisting ROM, 18.1% nasal obstruction, and 34.1% significant hearing loss. All received desloratadine; 63% received intranasal steroids. Grommets were not needed anymore in 52.2%, one month after initiating the treatment. None of the studied variables affected the outcome. No benefit from adding intranasal steroids to the treatment.

Conclusion: Desloratadine seems to be effective in treating children with COME, accelerating the resolution of effusion and its associated hearing loss, sparing a good number of children the need for grommets. It would be important in the future to conduct placebo controlled trials to confirm these results.

Keywords

Otitis media with effusion; Middle ear effusion; Otitis media; Antihistamine; Desloratadine

Introduction

Otitis media with effusion (OME) is one of the most common findings in patients visiting pediatric otolaryngology clinics. It is the most common cause of acquired hearing loss in the pediatric population. The global estimation of COME incidence rate is 4.76 per thousand people accounting for 31 million cases annually [1]. In the United States, it is diagnosed in 2.2 million children per year, costing almost 3-5 billion dollars per year. It occurs most commonly in children between one and three years of age [2,3].

Otitis media with effusion is characterized by the presence of fluid in the middle ear without acute inflammatory signs [3]. The risk factors for OME are mainly including Eustachian tube dysfunction and allergy [4]. The latter has been reported in 42% of patients with OME [4]. The gold standard for diagnosis of OME is pneumatic otoscopy (sensitivity 94%), which is a strong recommendation set by 2004 guidelines of the American Academy of Pediatrics (AAP) [5]. The tympanometry comes as a complimentary study to confirm this diagnosis (sensitivity 81%) [2,5].

According to the AAP guidelines, the child presenting with bilateral OME should be managed with watchful waiting for three months from the date of effusion or from the date of the diagnosis, and for six months if OME is unilateral as the natural history of the disease is spontaneous resolution in a good percentage of the affected children. This applies to children without risk of developing speech or learning delays [2]. If OME persists, then the patient should undergo tympanostomy with tube insertion [5,6]. Several medical treatment options have been proposed for OME including: antibiotics, decongestants, antihistamine, nasal and systemic corticosteroids [2,3,5,7-9]. All have been shown ineffective, with the antihistamine and decongestants causing more harm compared to no treatment [2]. However, most of the studied antihistamines belong to the first generation antihistamines. On the other hand, several other studies have shown a role of histamine in the presence of middle ear effusion [4,7]. Therefore, second or third generation antihistamines may be promising in accelerating the resolution of effusion in children with OME thus preventing speech delays and surgical intervention. Desloratadine is a third generation antihistamine that has a high safety profile and has been well studied in the treatment of allergy specifically allergic rhinitis [6,10,11].

The objectives of this study are to assess the role of desloratadine in avoiding the need for grommets in children with COME and in relieving the effusion and the accompanying conductive hearing loss.

Materials and Methods

All children with COME referred for grommets insertion, to the senior author's clinic (MAB) between July 2002 and July 2012 were included in this case series study; that was approved by the institutional review board. We excluded children older than 13 years and those with bilateral OME for less than 3 months and/or with unilateral OME for less than 6 months. We also excluded children with moderate to severe or persistent allergic rhinitis, craniofacial anomalies, immunodefiency and ciliary dyskinesia. The diagnosis was made based on the finding of middle ear effusion on physical examination by pneumatic otoscopy along with a B or C curve on tympanometry, with or without conductive hearing loss documented by audiometry.

All patients were given desloratadine for four weeks according

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to their age group, where children between the age of 1 and 6 years received 1.25 mg orally once daily, children between the age of 6 and 11 years received 2.5 mg orally once daily, and children older than 12 years received 5 mg orally once daily.

Age, gender, presenting signs and symptoms were recorded. Physical examination including pneumatic otoscopy and tympanometry were performed pre and post-treatment to assess the presence of effusion. Audiological testing was performed prior and after treatment in most cases. Response to treatment was measured as a clinical and or an audiological improvement. The effect of co-existing recurrent otitis media (ROM) and the use of intranasal steroids on the resolution of OME were also assessed. Children not responding to a 4-week course of desloratadine were advised to undergo grommets' insertion. Those responding received a longer treatment up to 3 months, aiming at complete resolution of the effusion and its associated symptoms.

Statistical analysis was performed using SPSS 22; results were considered significant when $P<0.05$.

Results

A total of 138 patients aged 1 to 13 years (mean 3.6y, with 127 patients younger than 7 years of age), 78 (56.5%) males and 60 (43.5%) females, were included in the study. Of these, 34.8% had coexisting ROM, 18.1% had nasal obstruction symptoms at the time of recruitment, and 34.1% had significant hearing loss. All received desloratadine, while 87 patients (63%) received intranasal steroids.

Of the treated children, 52.2% did not need grommets anymore, one month after initiating the treatment (Table 1). Concomitant ROM occurred in 53 patients, 51.0% of them did not need grommets anymore. Other variables did not have an impact on the outcome (Table 2). There was no benefit from adding intranasal steroids to the treatment (Table 3).

There was no significant influence of age and gender on the results. The presence of nasal obstruction, and measurable hearing loss also have no impact on the results.

The effect of treatment on the persistence of the middle ear effusion showed a resolution of the effusion at the end of the treatment in 39.1%. Factor influencing this resolution was not identified (Table 4). The persistence of the effusion did not always mean the persistence of significant hearing loss or the need for grommets.

		No grommets needed anymore	Grommets insertion performed	P value
Total sample		N= 72	N= 66	
Age	Mean (±sd)	4.0 (±2.5)	3.3 (±1.7)	0.05
Gender	Male	37 (51.4%)	41 (62.1%)	0.20
	Female	35 (48.6%)	25 (37.9%)	
Recurrent otitis media	No	46 (64.8%)	43 (65.2%)	0.97
	Yes	25 (35.2%)	23 (34.8%)	
Nasal obstruction	No	57 (79.2%)	56 (84.8%)	0.39
	Yes	15 (20.8%)	10 (15.2%)	
Significant Hearing loss*	No	48 (66.7%)	43 (65.2%)	0.85
	Yes	24 (33.3%)	23 (34.8%)	

*Measurable conductive hearing loss, which is at least mild in magnitude

Table 1: Effect of various variables on the need for grommets at the end of treatment (N=138).

Discussion

Otitis media with effusion is characterized by the accumulation of fluid in the middle ear in the absence of an acute inflammation. It should be distinguished from acute otitis media (AOM), which is defined as middle ear effusion with acute onset of inflammatory signs like otalgia and fever [5]. Otitis media with effusion is commonly associated with a viral illness and might follow AOM [12]. It is the leading cause of conductive hearing loss in children; with a prevalence of 15% to 20% in children whose ages range from 2 to 4 years [13]. It is therefore crucial to relieve this conductive hearing loss to avoid linguistic and developmental delays in these children. It can also have undesirable consequences if neglected, leading to tympanic membrane atrophy, adhesive otitis, atelectasis, tympanosclerosis, and cholesteatoma [14,15].

Though it has been long studied, its pathogenesis is still unclear. Otitis media with effusion is thought to be multifactorial, involving Eustachian tube dysfunction, microbial load (viral and bacterial), host's immune system imbalance, and environmental factors [16]. Moreover, low grade infection, adenoidal hypertrophy

		No bilateral tympanostomy and tube insertion	Bilateral tympanostomy and tube insertion	P value
Total sample		N= 27	N= 26	
Age	Mean (±sd)	3.4 ((±2.0)	2.6 ((±1.1)	0.07
Gender	Male	13 (48.1%)	16 (61.5%)	0.33
	Female	14 (51.9%)	10 (38.5%)	
Nasal obstruction	No	27 (100.0%)	24 (92.3%)	0.24
	Yes	0 (0.0%)	2 (7.7%)	
Significant Hearing loss*	No	16 (59.3%)	20 (76.9%)	0.17
	Yes	11 (40.7%)	6 (23.1%)	

*Measurable conductive hearing loss, which is at least mild in magnitude

Table 2: Association between tube insertions and all the variables among patients having recurrent otitis media (N=53).

	Bilateral tympanostomy and tube insertion		
	Yes	**No**	**P-value**
Nasal steroids	41 (61.19)	47 (66.2)	0.58
	26 (38.81)	24 (33.8)	

Table 3: Effect of nasal steroid on the need for grommets at the end of treatment.

		Absence of effusion	Persistence of effusion	P value
Total sample		N= 54	N= 84	
Age	Mean (±sd)	3.9 (±2.5)	3.6 (±2.0)	0.47
Gender	Male	30 (55.6%)	48 (57.1%)	0.85
	Female	24 (44.4%)	36 (42.9%)	
Recurrent otitis media	No	38 (71.7%)	51 (60.7%)	0.19
	Yes	15 (28.3%)	33 (39.3%)	
Nasal obstruction	No	42 (77.8%)	71 (84.5%)	0.32
	Yes	12 (22.2%)	13 (15.5%)	
Significant Hearing loss*	No	38 (70.4%)	53 (63.1%)	0.38
	Yes	16 (29.6%)	31 (36.9%)	

*Measurable conductive hearing loss, which is at least mild in magnitude

Table 4: Effect of various variables on the persistence or resolution of post treatment effusion (N=138)

or infection, and increase in inflammatory mediators from local allergic reactions in the mucosa of the nose or nasopharynx have been implicated [17,18].

The natural history of OME is a favorable one, where children with OME after one episode of untreated AOM had 60% to 70% spontaneous resolution by 3 months. However, COME (persistent bilateral OME for at least 3 months or persistent unilateral OME for at least 6 months) has less favorable outcome with 26% resolving by 6 months and 33% resolving by one year. If the OME has an unknown duration, 28% will have a spontaneous resolution by 3 months rising to 42% by 6 months [12].

Until now, no medical treatment has been confirmed to be effective for COME. Decongestants, nasal and systemic steroids, antimicrobials, and antihistamines have all been tried and studied; however, the studies concluded that these medications do not improve the course of COME and are therefore not recommended. These medications would cause more adverse effects then benefit; especially the first generation antihistamines, causing drowsiness, behavioral changes, and gastrointestinal upset. The second or third generation antihistamines have not been tried in managing COME. Of these, we selected desloratadine, as it has an anti-inflammatory (anti-TNF alpha) and decongestant effect and its dosing is very convenient for the patient since it has a long half life of 27 hour [19].

In our series, we found that with desloratadine, 52.2% of children with COME did not need grommets' insertion after 1 month of treatment. This is quite significant if we look at the natural history of COME, where only 26% are expected to resolve spontaneously after 6 months of watchful waiting; which is not a desirable option for these kids, especially that they have already received multiple medical treatments (antibiotics, decongestants, watchful waiting) before being referred for grommets' insertion. Desloratadine was the last trial for these children before being scheduled for a surgical procedure to relieve the effusion.

Various studies have shown contradicting results regarding histamine effects and its role in the middle ear inflammation and effusion development. In general, histamine is believed to increase vascular permeability and vasodilation in the middle ear mucosa [20]. In a study by Chimona et al. [4], histamine was injected into the middle ear of rabbits that have been pre-medicated with antihistamine. This resulted in a decrease in the inflammation of the mucosa and in the vascular dilation and congestion; supporting the role of antihistamine in suppressing the inflammatory process in OME. On the other hand, a study by McCormick et al. [7] showed that though histamine existed in the effusion of AOM, antibiotics with and without antihistamines, could decrease its level; implicating the presence of histamine as part of a general inflammatory reaction rather than a part of an allergic reaction.

Theoretically, the second and third generation antihistamines should be able to decrease the inflammatory changes present in the middle ear, whether it is resulting from allergic rhinitis, viral or bacterial infection or as an isolated phenomenon. In our series, we avoided recruiting patients who have moderate to severe or persistent allergic rhinitis symptoms; to decrease the amount of variables that can affect the outcome. An antihistamine with anti-inflammatory effect would be a plus and thus our choice of desloaratadine.

We tried a relatively short course of treatment prior to labeling a patient as a responder or not. Giving a longer course to all patients may have shifted more children to the responders group; however, we elected a short course to decrease the frustration of the parents who were exhausted of trying medical treatments and whose children were actually referred for grommets insertion.

Conclusion

In conclusion, desloratadine seems to be effective in treating children with COME, accelerating the resolution of the middle ear effusion and its associated hearing loss, sparing a good number of children the need for grommets. Our comparison with the natural history is based on the figures existing in the literature and it would be important in the future to conduct placebo controlled trials, though it is usually harder to conduct in the pediatric population, especially that the involved children have already exhausted the conventional medical treatment and reached the need for grommets.

References

1. Monasta L, Ronfani L, Marchetti F, Montico M, Vecchi Brumatti L, et al. (2012) Burden of disease caused by otitis media: systematic review and global estimates. PLoS One 7: e36226.
2. Griffin G, Flynn CA (2011) Antihistamines and/or decongestants for otitis media with effusion (OME) in children. Cochrane Database Syst Rev 9: 1-29.
3. Prince AA, Rosenfeld RM, Shin JJ (2015) Antihistamine Use for Otitis Media with Effusion: Ongoing Opportunities for Quality Improvement. Otolaryngol Head Neck Surg 153: 935-942.
4. Chimona TS, Panayiotides JG, Papadakis CE, Helidonis ES, Velegrakis GA (2008) Antihistamine effects on experimental middle ear inflammatory model. Eur Arch Otorhinolaryngol 265: 899-905.
5. American Academy of Family Physicians; American Academy of Otolaryngology-Head and Neck Surgery; American Academy of Pediatrics Subcommittee on Otitis Media With Effusion (2004) Otitis media with effusion. Pediatrics 113: 1412-1429.
6. Rosenfeld RM, Schwartz SR, Pynnonen MA, Tunkel DE, Hussey HM, et al. (2013) Clinical practice guideline: Tympanostomy tubes in children. Otolaryngol Head Neck Surg 149: S1-35.
7. McCormick D, Saeed K, Uchida T, Baldwina C, Deskin R, et al. (2003) Middle ear fluid histamine and leukotriene B4 in acute otitis media: Effect of antihistamine or corticosteroid treatment. Int J Pediatr Otorhinolaryngol 67: 221-30.
8. Rosenfeld RM (1996) An evidence-based approach to treating otitis media. Pediatr Clin North Am 43: 1165-1181.
9. Butler C, van der Voort J (2002) Oral or topical nasal steroids for hearing loss associated with otitis media with effusion in children. Cochrane Database Syst Rev 4: 1-8.
10. Horak F, Stübner P, Zieglmeyer R, Harris AG (2003) Comparison of the effects of desloratadine 5-mg daily and placebo on nasal airflow and seasonal allergic rhinitis symptoms induced by grass pollen exposure. Allergy 58: 481-485.
11. Lippert U, Moller A, Welker P, Artuc M, Henz BM (2000) Inhibition of cytokine secretion from human leukemic mast cells and basophils by H1- and H2-receptor antagonists. Exp Dermatol 9: 118-124.
12. Rosenfeld RM, Kay D (2003) Natural history of untreated otitis media. Laryngoscope 113: 1645-1657.
13. Schousboe LP, Rasmussen LM, Ovesen T (2001) Induction of mucin and adhesion molecules in middle ear mucosa. Acta Otolaryngol 121: 596-601.
14. Horak F, Stübner UP, Zieglmayer R, Harris AG (2002) Effect of desloratadine versus placebo on nasal airflow and subjective measures of nasal obstruction in subjects with grass pollen-induced allergic rhinitis in an allergen-exposure unit J Allergy Clin Immunol 109: 956-961.

15. Paparella M, Jung T, Goycoolea M (1991) Otitis media with effusion. Philadelphia, Saunders, USA.

16. Rovers MM, Schilder AG, Zielhuis GA, Rosenfeld RM (2004) Otitis media. Lancet 363: 465-473.

17. Doyle W (1994) Panel on etiology of otitis media with effusion: the role of allergy and tubal function, Kugler Publications, Amsterdam, Netherlands.

18. Bluestone C, Klein J (1995) Otitis Media in Infants and Children, Philadelphia, Saunders, USA.

19. Bachert C (2001) Decongestant efficacy of desloratadine in patients with seasonal allergic rhinitis. Allergy 56 Suppl 65: 14-20.

20. Dennis RG, Whitmire RN, Jackson RT (1976) Action of inflammatory mediators on middle ear mucosa. A method for measuring permeability and swelling. Arch Otolaryngol 102: 420-424.

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