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Original Article

Effect of nasal beclomethasone spray in the treatment of otitis media with effusion

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Abstract

BACKGROUND: Antimicrobials treatment of Otitis media (OM) reduces some complications, but some of chronic complications, and specially otitis media with effusion (OME), seem to increase. Theoretically the usage of nasal corticosteroid sprays may prevent this problem by reducing the local inflammation around the eustachian tube. So, this study aimed to evaluate the role of nasal corticosteroid spray as an adjuvant for the treatment of OME.

METHODS: In a randomized, prospective clinical trial, 2 groups of 46 subjects who had OME were recruited. A questionnaire containing patients' characters, history, complaints, otologic examinations, and the report of tympanometries was filled for all before and after treatment. We administered a period of amoxicillin and a decongestant for both group and nasal beclomethasone spray only for case group.

RESULTS: Thirty five of cases (76.1%) and 22 (47.8%) of controls had an improvement in their symptoms or the quality of hearing ($p = 0.005$). Partial remission was the most common finding in 52.2% of the patients in the case group but for control group there was no change ($p = 0.024$). The higher improvement in the tympanic retraction in the case group was significant ($p < 0.05$). A significant better tympanometric result has showed in the treatment of left ear in the patients of the case group ($p = 0.038$) but not for right ear ($p = 0.136$).

CONCLUSIONS: We concluded that the administration of nasal beclomethasone spray as an adjuvant for the treatment of OME not only improved the results treatment but also increased the resolution of symptoms and the patients' quality of hearing.

KEYWORDS: Otitis Media with Effusion (OME), Middle Ear Effusion (MEE), Beclomethasone Spray, Nasal Corticosteroids.

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Otitis media (OM) is the most common bacterial infection in children and the most frequent indication for antimicrobial or surgical therapy in this age group. It is also the leading cause of hearing loss in children.[1] The aggregate morbidity associated with OM is substantial: we do not have such estimation, and as an example, we refer to the United States where the costs of medical or surgical therapy for 5 year old or younger children are estimated $5 billion annually.[1] OM is more frequent in the winter months.[1] Many factors pre-

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dispose children to OM, but the impact of these factors is variable; Risk factors for OM are male gender, bottle feeding, a sibling with OM, and early occurrence of OM, daycare, smoking by the mother, allergy, socioeconomic status, parental history of OM, cleft palate, Dawn's syndrome, cystic fibrosis, immune deficiency, and viral infections in the home.[1] Treatment of OM with widespread antimicrobials has reduced the suppurative and intracranial complications, but some of chronic complications, and specially OME, seem to increase.[2] OM is a generic term for any inflammatory process in the middle ear cleft behind an intact tympanic membrane (TM). A diagnosis of AOM requires the presence of a middle ear effusion and the symptoms and signs of acute infection (fever, pain, a red and bulging TM). OME indicates a MEE without signs of inflammation; equivalent terms are chronic secretory OM, chronic serous OM, and glue ear. Its incidence has been estimated at 6% to 27% from clinic-based studies and 7-15% from population-based studies.[3] Tympanometric evidences reveal that there is a negative pressure of -150 daPa within 24% of the ears of 1-year old infants.[1] The adverse effects of OME on hearing and on the development of cognitive, linguistic, auditive and communicative skills are of concern to parents and physicians alike, especially when there is less agreement that mild hearing loss invariably produces mild impairment. Mild to moderate conductive hearing loss occurs concomitant with the disease in most children.[3] A number of studies reported an adverse effect of OM on cognitive development.[4,5] For example, Klein and et al[5] found that in higher socioeconomic groups, more than 130 days of OME in early life is associated with significant language delays and lower intelligence quotient scores as compared with children with fewer than 30 days of OME. On the other hand, chronic illness of any type often has a deleterious effect on the child and family. Disruption of family life by an irritable or inattentive child plus the extra costs for physicians' services, time lost from work, and medications may place a financial and emotional strain on the family.[1] What remains to be established, however, is the most effective strategy to counter this effect. Therapy of OME is either medical or surgical.[1] OME, like AOM, is a bacterial disease and MEE is known to contain viable, pathogenic bacteria.[6] So, it is apparently logical to use antibiotics for the medical treatment of OME. Several years ago, Agency for Health Care Policy and Research (AHCPR) recommended a course of antibiotics (optional for children with asymptomatic OME) followed by at least a 1-month observation period.[7] Surgical therapy may be considered if the effusion persists and is associated with hearing loss. So, the authors designed a study to find an adjuvant to be strong enough to improve the response to accepted medical therapy and lower the need to surgical therapy. To date, it is accepted that the eustachian tube dysfunction is a nearly universal finding in children with OME. However, the obstruction is probably secondary to the inflammatory process and is usually functional in nature (caused by edema, vicious secretions, or both).[1] Thus, theoretically the usage of nasal corticosteroid sprays may prevent this problem by reducing the local inflammation around the eustachian tube. According to this hypothesis, we arranged a single blinded randomized clinical trial to evaluate the role of nasal corticosteroid spray as an adjuvant for the current regimen of antibiotics with decongestants in the treatment of OME.

Methods

In a randomized, prospective clinical trial, we selected 106 children, ages 1-10 years, who had unilateral or bilateral OME and were referred to the otolaryngology outpatient clinic of Al-Zahra hospital, which is affiliated to the Isfahan University of Medical Sciences and the largest referral center at the central part of Iran, between March 2004 and March 2005. A designed questionnaire containing patients' characters, history, complaints, otologic examinations (including the presence of TM retraction and the degree from 0-3 for each of ears), and the report of tympanometries (from best to worst; type A, C1, C2, and B), was filled for all of the cases before treatment. The tympanometries were performed using an Imped-

ance Audiometer AT235 devise, (made by Interacoustic Company, Denmark). OME was documented by otoscopy and tympanometry in each of cases. Exclusion criteria were: (A) age more than 1 year or less than 10 years; (B) chronic otitis media in the involved ear; (C) previous operative surgery on the involved ear; (D) a history of previous adenoidectomy or AOM or a period of taking antibiotics in the last 4 weeks; (E) type A tympanometry at first for the suspiciously involved ear; (F) adverse or allergic reactions to amoxicillin; (G) concomitant use of inhalant corticosteroid sprays (for reducing of the adverse effects of higher dosing levels); (H) erative surgery on the involved ear; (D) a history of previous adenoidectomy; and (I) absence in the follow up dates. During the study, 14 subjects were excluded because of the presence of the exclusion criteria. Finally we completed our data with 92 patients; 46 subjects in each group. The arrangement of cases in the case or control group was performed using random number table. We administered a period of amoxicillin suspension or capsule, 50mg/kg per day divided in 3 doses for 10 days and a decongestant for 4 weeks; because of potential adverse effects of sympathomimetics in very young children, we selected normal saline drop, 0.25cc (4-5 drops)/nostril/BID, as the decongestant in children between 1-2 years (Normal saline has a brief, but safe nasal vasoconstrictive effect).[8] For other ages, we recommended pseudoephedrine syrup, 3mg/kg per day, divided in 3-4 doses, which was lower than the standard recommended dosage.[9] The approach to case group was the same, with the combination of nasal beclomethasone spray for 4 weeks; the dosage of spray was 1 puff/nostril, BID for children between 1 and 5 years, and 1 puff/nostril, TID for children between 6 and 10 years. After 4 weeks, all subjects in both groups underwent a 2nd otoscopic exam and tympanometry, and any improvement or worsening of complaints was directly asked from them and/or their parents. We used a telephone call, several days before the 2nd visit, to increase the probability of follow up for all cases. The same questionnaire for each of the cases was completed for the final analysis of the data. The research team filled all questionnaires and controlled all otoscopies during this process. All of tympanometries were performed by an expert audiologist.

According to our analyzer, chi-square test was arranged for data of improvement by parents, while a Wilcoxon test was considered to analyze data of otoscopic tympanic examinations before and after treatment. Lastly, we analyzed our results in tympanometries with Mann-Whitney test.

Results

Mean ages of the case and control groups were 5.6 ± 1.9 and 4.5 ± 2.1 years. There was no significant difference between groups. In the case group, 26 patients (56.5%) had a history of altered response to sounds or hearing loss by their parents, and the other 20 cases (43.5%) were found to have OME by routine exams or follow up visits after previous AOM episodes without complaining of hearing loss. In the control group, 18 patients (39.1%) had a history of altered response to sounds or hearing loss by their parents, and 28 subjects (60.9%) were found to have OME by routine exams or follow up visits after previous AOM episodes without complaining of hearing loss. After treatment, according to their parents, 35 subjects from case group (76.1%) and 22 (47.8%) from control group had an improvement in their symptoms or the quality of hearing; analysis of the data with chi-square test revealed that this difference was statistically significant ($p = 0.005$). The most common tympanic retraction in the ears found at the beginning of treatment, was type 2. After treatment, a normal tympanic membrane was reported as the most common finding in otoscopies of the patients in both groups. Tables 1 and 2 show tympanometries of both groups before and after treatment. A tympanogram type B was the most common report in the subjects of both groups at the beginning of treatment; this report was found in

Table 1. Tympanometry of patients in both groups before treatment

Tympanometry	GROUP			
	Case		Control	
	Right ear(%)	Left ear(%)	Right ear(%)	Left ear(%)
A	4(8.7)	3(6.5)	7(15.2)	4(8.7)
C_1	1(2.2)	6(13)	1(2.2)	3(6.5)
C_2	4(8.7)	5(10.9)	8(17.4)	8(17.4)
B	37(80.4)	32(69.6)	30(65.2)	31(67.4)
	46(100)	46(100)	46(100)	46(100)

80.4% of the involved right ears and 69.6% of the involved left ears in the case group, and 65.2% of the involved right ears and 67.4% of the involved left ears in the control group. After treatment, the most common reported tympanometry of both ears in the case group and the right ears of the control group was type A. However, the most common tympanogram in the left ears (37%) of the control group was still type B. Wilcoxon test showed that the result of treatment for right and/or left ears within each group was strongly significant ($p < 0.001$ within each group). For comparing the results of treatments between the two groups, we used Mann-Whitney test. According to 1st and 2nd tympanometries for each case, we considered 4 classes for the results; complete remission, partial remission, no change, and exacerbation (Table 3). Partial remission was the most common finding in 24 cases (52.2%) of the case group. However, the most common report in the control group was no change in 17 patients (37%). The difference was statistically significant ($p = 0.024$). Mann-Whitney test revealed that a higher improvement in the tympanic retraction of the right and left ears in the case group was significant as compared with the control group ($p = 0.026$ and $p = 0.03$, respectively). Again, Mann-Whitney test revealed that a better tympanometric result in the treatment of left ear in the patients of the case group comparing with the control group was statistically significant ($p = 0.038$). But, for the only time, we could not find a significant difference in the improvement of right ear tympanometries between the two groups after treatment ($p = 0.136$).

Discussion

OME is a frequent and problematic consequence of the otitis media continuum with appreciable morbidity. Investigations into the pathogenesis of chronic OME have showed that certain bacteria and inflammatory mediators contribute to the chronic middle ear inflammation.[3] Thus, some researchers have selected antibiotics, antihistamines, decongestants, and corticosteroids to determine their efficacy in the treatment of OME.[1] The role of antibiotics is accepted, but the role of decongestants and specially antihistamines in this management seems to be under question,[1] especially the latter may

Table 2. Tympanometry of patients in both groups after treatment

Tympanometry	GROUP			
	Case		Control	
	Right ear(%)	Left ear(%)	Right ear(%)	Left ear(%)
A	16(34.6)	16(34.8)	16(34.8)	12(26.1)
C_1	6(13)	12(26.1)	8(17.4)	8(17.4)
C_2	11(23.9)	9(19.6)	8(17.4)	9(19.6)
B	13(28.3)	9(19.6)	14(30.4)	17(34)
	46(100)	46(100)	46(100)	46(100)

prolong the duration of MEE.[10] There are a few trials in the literature that have evaluated the effect of corticosteroids on the resolution of OME. The effect of corticosteroids has been under debate; some articles have accepted the effect of corticosteroids on the resolution of OME. Giebink et al[3] in their study revealed that the combination of trimethoprim-sulamethoxazole and oral prednisolone had a better response rather than trimethoprim-sulamethoxazole alone, or the combination of trimethoprim-sulamethoxazole and ibuprofen. They also concluded that the difference between prednisolone and ibuprofen response rates was related to the blockage of lypoxygenase metabolites such as leukotrienes. Perisco et al[11] reported a significantly better response to Ampicillin and daily prednisolone for 2 weeks (53%) than to Ampicillin alone (17%). Schwartz et al[12] noted that the initial response to sulfisoxazole plus daily prednisolone for 1 week (62%) was better than sulfisoxazole alone (6%). Niederman et al[13] showed a better response to daily dexamethasone for 2 weeks (25%) than to placebo (0%). Berman et al[14] in another study reported a better response to daily prednisolone and trimethoprim-sulamethoxazole after 1 week (64%) than to placebos (21%). Recently, Buchman and others have accepted that corticosteroids have some benefit on the resolution of OME.[15] However, some studies have shown no significant response to corticosteroids for OME treatment. Macknin and Jones in their placebo controlled trial were unable to show a significant response to daily dexamethasone for 2 weeks.[16] Shapiro et al used aerosolized nasal dexamethasone, but they could not show a significant difference between this and placebo.[17] Recently, American Academy of Family Physicians, American Academy of Otolaryngology, Head and Neck Surgery, and American Academy of Pediatrics Subcommittee on Otitis Media With Effusion recommended that medical therapy with antimicrobials and corticosteroids does not have a long-term efficacy, so this option should not be used for routine management.[18] Rosenfeld et al in their clinical practice guideline for OME in 2004 have not recommended corticosteroids for the routine treatment of OME.[19] The AHCPR guideline has not recommended corticosteroid treatment for OME, yet.[7] On the other hand, Grzincich et al. reported that although at present the data may not support use of intranasal corticosteroids in the management of OME, the use of these drugs in combination with antibiotics facilitates a more rapid improvement of symptoms.[20] On the other hand, some authors believe that decision of existence of OME when negative pressure of middle ear is betweeen -150 and -350 Deca Pascal, is based on otoscopic examination.[21] In our study, we used nasal beclomethasone spray below the dosing levels recommended for the age of the patients. No hypothalamic-pituitary-adrenal suppression has been reported with the recommended dosing levels.[8] Thus, comparing with the majority of previous trials, we had the advantage to continue nasal corticosteroid treatment for at least 4 weeks, when the patients were referred for the follow-up visit. Apparently, we found that administration of the nasal beclomethasone spray to the routine management of OME not only improves the results of treatment with the analyzation of otoscopic and tympanometric parameters, but also increases the resolution of symptoms. Exceptionally, we could not find a significant difference in the improvement of right ear tympanometries between the two groups after treatment; this may need a larger sampling for better evaluation of the difference. Thus, it may deserve further investigation, especially for long-term effects of medical management.

Conclusion

The authors reveal that medical therapy of OME with a combination of amoxicillin and a decongestant has a significant effect on the resolution of OME. They also conclude that the administration of the nasal beclomethasone spray to this regimen not only improves the results of treatment with the otoscopic and tympanometric findings, but also increases the resolution of symptoms and the patients' qual-

ity of hearing by their parents. So, the authors strongly recommend the routine use of nasal corticosteroid sprays for at least one month to increase the benefit of medical treatment for the resolution of OME.

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Conflict of Interests
Authors have no conflict of interests.

Authors' Contributions
All the authors have carried out the study, participated in the design of the study and acquisition of data performed the statistical analysis and wrote the manuscript. All authors read and approved the final manuscript.

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