Nonsurgical Treatment of Adenoidal Hypertrophy with Cefuroxime Axetil and Intranasal Mometasone Furoate Combination

Adenoidal Hipertirofinin Sefuroksim Aksetil ve Mometazon Furoat ile Cerrahi Dışı Tedavisi

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Summary

Aim: Adenoidal hypertrophy causes substantial morbidity in childhood. This prospective randomized open-label trial was conducted in order to evaluate the efficacy of cefuroxime axetil (CEF) and mometasone furoate nasal spray (MFNS) combination treatment in symptomatic adenoidal hypertrophy, in comparison to either treatment alone, or controls (CON).

Material and Methods: Three to 14 years old 128 children with symptomatic adenoidal hypertrophy were randomized to receive a 4 week-course of CEF (30 mg/kg in 2 divided doses daily, po), MFNS (100 mg once daily), CEF plus MFNS (in same doses), or normal saline as control (CON). After cessation of therapy, they were followed-up for 2 months. Main outcome measures were changes from baseline in total symptom score, and air column/soft palate (AC/SP) ratio on lateral neck radiograph on the 4th and 12th week control visits.

Results: The improvement in mean symptom score of CEF plus MFNS group was significantly (p= 0.017) higher than CON group at the end of 4th week. Increase in mean AC/SP ratio from baseline to 12th week in CEF plus MFNS group was significantly greater than CON group and other two groups (p= 0.03). Neither CEF, nor MFNS alone was better than CON on any visit. The changes in symptom scores or radiographic measurements were not different between atopic and nonatopic patients.

Conclusion: Oral CEF plus MFNS combination therapy of one month's duration may delay, or substitute, surgical intervention in some pediatric outpatients with mild to moderate adenoidal hypertrophy. *(J Pediatr Inf 2007; 1: 6-12)*

Key words: Adenoidal hypertrophy, adenoids, topical steroids, cefuroxime axetil, mometasone furoate

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Özet

Amaç: Adenoidal hipertrofi çocukluk çağında önemli bir morbidite nedenidir. Bu prospektif, randomize çalışma semptomatik adenoidal hipertrofili olgularda sefuroksim aksetil (CEF) ve mometason furoat nazal sprey (MFNS) kombinasyon tedavisinin, her iki tekli tedavi ve kontrollere göre etkinliğini belirlemek üzere yürütülmüştür.

Gereç ve Yöntem: Semptomatik adenoidal hipertrofisi olan 3-14 yaş grubundan 128 çocuğa randomize olarak 4 hafta süreyle CEF (30 mg/kg/g bölünmüş 2 dozda, po), MFNS (100 mg günde 1 kez), CEF artı MFNS (aynı dozlarda) veya control (CON) olarak normal serum fizyolojik verilmiştir. Tedavinin kesilmesinden sonra hastalar 2 ay süreyle takip edilmiştir. Temel sonuç ölçütleri olarak 4. hafta ve 12. hafta kontrollerinde total semptom skorunda bazale göre değişiklik ve yan boyun grafisinde nazofarenks hava kolonu/yumuşak damak (AC/SP) oranı kullanılmıştır.

Bulgular: Dördüncü haftada ortalama semptom skorunda bazale göre düzelme CEF + MFNS grubunda kontrol grubuna göre anlamlı olarak yüksek bulunmuştur (p=0.017). Kombine tedavi alan grupta 12. haftada ortalama AC/SP oranında bazale göre artış diğer gruplara göre anlamlı olarak yüksek bulunmuştur (p= 0.03). Tek başına CEF veya MFNS tedavileri hiçbir kontrol tarihinde skor veya radyolojik olarak CON grubundan üstün bulunmamıştır. Atopik ve nonatopik hastalarda semptom skoru veya radyolojik ölçümdeki değişiklikler farklı bulunmamıştır.

Sonuç: Sonuç olarak, bir ay süreli oral sefuroksim ve nazal mometason furoat sprey kombine tedavisinin hafif-orta derecede adenoid hipertrofisi olan çocuklarda semptomatik ve radyolojik düzelme sağlayarak cerrahi tedaviyi geciktirebileceği veya engelleyebileceği tespit edilmiştir. *(Çocuk Enf Derg 2007; 1: 6-12)*

Anahtar kelimeler: Adenoid hipertrofisi, adenoidler, topikal steroidler, sefuroksim aksetil, mometazon furoat

Introduction

Adenoidal hypertrophy and recurrent adenotonsillitis are common disorders which cause substantial morbidity in pediatric age group (1). Severe adenoidal upper airway obstruction causing obstructive sleep apnea (OSAS) and cardiorespiratory syndrome may necessitate urgent surgical removal of the adenoid (2,3). Lesser degrees of adenoidal hypertrophy complicated by chronic sinusitis, recurrent/chronic serous otitis media and/or significant obstructive symptoms are among other indications for surgical intervention (4). Although regarded as a generally safe procedure, adenoidectomy and/or tonsillectomy can be complicated by reactions such as bleeding, adverse anesthetic events, dehydration, pain, and even death (5). Hence, effective medical treatment alternatives to surgery for relief of adenoidal obstruction may be very valuable, especially when surgery is not clearly indicated, or possible.

Nonsurgical treatment modalities for adenoidal hypertrophy are limited. A prolonged course of beta-lactamase resistant antibiotic therapy resulted in both the reduction of symptoms and the need for surgery in chronic adenotonsillar hypertrophy (6). It has been shown that nasal topical corticosteroids can significantly ameliorate obstructive indexes in children with adenoidal hypertrophy (7), or OSAS associated with adenotonsillar hypertrophy (8).

The aim of this study was to evaluate the efficacy of intranasal corticosteroid and prolonged beta-lactamase resistant antibiotic combination treatment with either treatments alone, and normal saline as control in reduction of adenoid size and nasal airway obstructive symptoms in pediatric outpatients with adenoidal hypertrophy.

Methods

Study Population

Three to fourteen years old children who were admitted to the pediatric outpatient clinics with chronic nasal obstructive symptoms were recruited to this study. Inclusion criteria were: (1) presence of any of the following signs and symptoms of nasal obstruction; snoring, mouth breathing awake, mouthbreathing asleep, restless sleep or difficulty breathing while asleep, nasal congestion, chronic nasal discharge, sleep apnea and hyponasal voice for at least 2 months; and (2) adenoidal hypertrophy assessed on lateral neck radiograph as an air column/soft palate ratio < 1 (9). Exclusion criteria were: (1) use of any nasal, inhaled or systemic corticosteroids within the past 6 months; (2) use of antibiotics or any nasal medications within 1 month of entering the study; (3) history of apnea lasting more than 15 seconds; (4) any craniofacial anomaly; (5) a history of hypersensitivity to penicillin, cephalosporin or corticosteroids; (6) a history of immunodeficiency; (7) any history or laboratory evidence of cardiac, hepatic, or renal disease; and (8) a history of chronic epistaxis. Patients were enrolled between September 2001 and October 2002 in order to overcome the seasonal effect.

Study Design

This was an open-labelled, controlled study. Eligible patients were randomized to one of the following treatment groups for 4 weeks: cefuroxime axetil (CEF), 30 mg/kg/day per os in 2 doses (Group 1); mometasone furoate nasal spray (MFNS), 50 mg into each nostril (100 mg total) once daily (Group 2); MFNS plus CEF, in the same doses (Group 3); or normal saline as control (CON) (Group 4). At entry the patients in group 2 and 3 were instructed in the proper technique of nasal spray application. At the end of the fourth week study medications were stopped and patients were reevaluated after 8 weeks. Informed consent was obtained from the parents of study participants. The study was approved by the Ethical Committee of Mersin University, Faculty of Medicine.

Evaluations and Outcome Measures

Study subjects had a thorough clinical and radiological assessment at baseline and on the 4th and 12th weeks after entrance into the study.

Initial evaluation of the subjects included history and physical examination, symptom scoring, lateral neck and sinus roentgenograms, total IgE levels, specific IgE levels, skin prick test (SPT) with inhalant and food allergens (38 allergens), complete blood count, serum C-reactive protein, liver function tests, blood urea nitrogen, urinanalysis, immunoglobulin levels and throat cultures. Initial historical evaluation accomplished by face-to-face interview with parents included the inclusion and exclusion criteria, frequency of upper respiratory infection, tonsillitis, otitis media, sinusitis and lower respiratory infection, individual allergic symptoms and diagnoses, and family atopy.

The main outcome measures were the changes in total symptom scores and adenoid size on lateral neck radiographs from baseline to 4th and 12th weeks. The frequency of intervening illnesses and antibiotic usage were secondary outcome measures.

The symptom scoring system was a modification of the scores used in previous studies (6-8) and included the following symptoms: snoring; mouth breathing awake; mouth breathing asleep; nasal congestion; hyponasal voice; chronic nasal discharge; daytime drowsiness, or hyperactivitiy; restless sleep; sleep apnea <15 sec; night cough; and poor oral intake/weight loss. Each symptom was scored as follows: none (0 point), rarely (1 point), frequently (2 points), constantly (3 points). Scores from eleven symptoms were added together to provide a total symptom score of 33.

Lateral neck radiographs were taken and interpreted by the method of Cohen and Konak by a blinded radiologis (9). According to this method, the thickness of the soft palate (SP) in its superior anterior part and the airway column (AC) immediately posterior to it were measured and AC/SP ratio was calculated. The measurement was done about 1 cm below the upper end of the soft palate in children > 3 years of age and half a centimetre in younger children. A radiographic example of this method is demonstrated in Figure 1.

Degree of obstruction was graded as follows: AC/SP ≥ 1 (grade 0 or no obstruction), AC/SP= 0.50-0.99 (grade 1 or mild obstruction), AC/SP= 0.01-0.49 (grade 2 or severe obstruction), AC/SP= 0 (grade 3 or total obstruction).

On the 4th and 12th week visits parents were interviewed for any intervening illness (upper respiratory infection, tonsillopharyngitis, otitis media and sinusitis) and antibiotic treatment since the last visit and these were recorded. Compliance with medications and side effects of the treatments were also assessed by parental interview. Compliance with medications was described by the number of missing doses per month. Renal and hepatic function tests were performed for any side effects.

Serum total IgE levels were measured by nephelometric method (Bade-Behring Inc., Germany). Skin prick tests were performed with 38 inhalant and food allergens (Allergopharma, Germany) of general and local relevance in a standardized fashion. Any wheal reaction ≥ 3 mm when the negative control was substracted was considered as a positive skin prick test reaction. Levels of IgE antibodies to inhalant and food allergens were studied by fluoroenzymeimmunoassay method (UniCAP, Pharmacia and Upjohn, Sweden). Any allergen-specific IgE level ≥ 0.70 kU/L was considered as positive. Atopy was defined as the presence of one or more positive skin test reactions and/or one or more positive allergen-specific IgE examination.

Statistical Analysis

Analysis of variance and chi-square tests were used to compare admission characteristics of the patients between the study groups. Analysis of variance and paired t-test were used to interpret the changes in symptom scores and radiographic adenoidal indexes from baseline to 4th and 12th weeks between study groups. Student t-test was used to evaluate the effects of gender, physician-diagnosed atopic disease, family history of atopy, sinusitis, atopy (SPT and/or specific IgE exam), and any intercurrent illnesses and/or antibiotic usage over the changes in symptom scores and radiographic adenoidal indexes from baseline to 4th and 12th weeks. The relation between total symptom score and AC/SP ratios at each week was determined using regression and correlation analysis. Values were expressed in mean ± standard error, $p<0.05$ was considered significant.

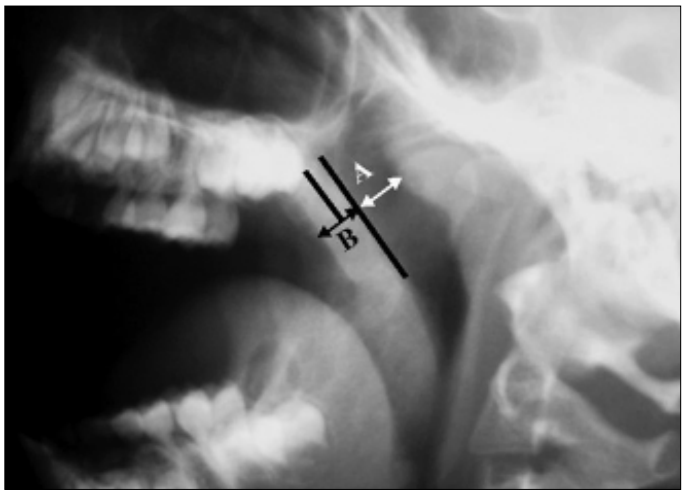

Figure 1. Radiographic evaluation of adenoid size by the method of Cohen and Konak (9). Thickness (mm) of "Airway column" (A) and "Soft palate" (B) is measured and A/B ratio is calculated in order to evaluate nasopharyngial airway patency

Results

A total of 128 patients were included in the study. Number of patients that completed the treatment period of four weeks was 28 in group 1, 37 in group 2, 25 in group 3, and 38 in group 4. One patient in group 2 was withdrawn from the study because of medication side effect (epistaxis). Other patients were lost to follow-up which may be due to either treatment failure or success. Fourteen, 21, 12, and 20 patients completed through the 12 weeks of follow-up, in the respective groups. Proportion of drop-outs among groups was similar (50.0, 43.3, 52.0, and 47.4%, for group 1, 2, 3, and 4, respectively).

Comparison of admission characteristics of the patients according to study groups are shown in Table 1. There were no significant differences between age and gender distributions, frequency of previous (during the last 12 months) upper and lower respiratory infections (tonsillitis, otitis media, sinusitis, and bronchitis), family history of atopy and personal history of atopic disease (physician-diagnosed asthma, allergic rhinitis, or atopic dermatitis) between the study groups. Mean baseline white blood cell count of the patients was 8,450 ± 2,370 /mm^3, with no significant differences between the groups ($p> 0.05$). A clinical and radiological diagnosis of sinusitis was present in 48.0% of patients at entry and the frequency was not statistically different between the treatment arms. Thirty-four point one per cent of the whole study group was found to be atopic according to SPT and/or specific IgE levels. The most common allergens were mites, cockroach, pollens, and dog epithelium. The mean air column/soft palate (AC/SP) ratio on lateral neck radiographs and distribution of the degree of obstruction at entry are shown in Table 1. There were no significant differences between these baseline values of nasopharygeal airway patency, or baseline symptom scores among the treatment groups ($p>0.05$).

Compliance with medications was assessed by parental interview at the end of the fourth week. Mean missed doses per week were 0.16±0.4 for group 1, 0.25±0.50 for group 2, none for group 3 and 3.00±1.41 for group 4. Number of missed doses was significantly higher for group 4 when compared to other groups ($p<0.01$). Side effects associated with medications included one case of epistaxis from group 2. One patient from group 1 and one patient from group 3 developed mild limited diarrhea not requiring cessation of therapy. No patient developed any hepatic or renal function abnormalities during the treatment.

Table 2 shows the main outcome measures; changes in mean symptom scores and AC/SP ratios from baseline through 12 weeks according to study groups. In all groups, mean symptom scores showed a significant decline from baseline to 4th, and 12th weeks ($p<0.001$). When the groups were compared with each other, the improvement in mean symptom score of group 3 was significantly ($p= 0.017$) higher than that of group 4 at the end of the treatment period (0 to 4th week), and better, but not significant, than other groups at the 12th week. Differences across other groups were not significant. Age, gender, physician-diagnosed atopic disease, family history of atopy, sinusitis, total IgE levels, atopy (SPT and/or specific IgE exam), and any intercurrent illnesses and/or antibiotic usage during the treatment period (0-4 wks) and on follow-up (4-12 wks) were not significantly related to the changes in symptom scores according to regression analysis and t-tests.

All the groups showed a significant increase in mean AC/SP ratios and decrease in grade values from baseline to 4th and 12th weeks. When the groups were compared with

Table 1. Admission Characteristics of Study Groups

Characteristic	CEF-Group 1 (n=28)	MFNS-Group 2 (n=37)	CEF + MFNS –Group 3 (n=25)	CON-Group 4 (n=38)
Age (y)	5.01±2.37	6.06±3.02	5.51±3.01	5.30±2.35
Gender (M/F)	56/44	42/58	52/48	53/47
Previous history of (%):				
Tonsillitis	63.0	63.2	66.7	65.8
AOM	11.5	30.6	24.0	13.2
Sinusitis	51.9	50.0	64.0	42.1
Bronchitis	40.7	30.6	48.0	26.3
Family atopy (%)	33.3	44.7	28.0	44.0
PD Allergic rhinitis (%)	18.5	23.7	20.0	26.3
PD eczema (%)	3.7	2.6	4.0	0
PD asthma (%)	48.1	28.9	40.0	26.3
Total IgE (IU/ml, median)	170.4±213.0	151.3±217.8	114.2±160.2	166.5±250.4
Atopy (%)	30.8	35.1	29.2	38.9
Sinusitis (%)	65.4	32.1	57.9	41.4
Symptom score (mean±SE)	14.5±5.6	15.2±6.0	15.6±6.6	13.1±4.2
AC/SP ratio (mean±SE)	0.48±0.22	0.51±0.26	0.49±0.24	0.59±0.25
Grading of obstruction (%)				
Grade 1-mild	44.4	63.2	48.0	73.7
Grade 2-severe	51.9	28.9	48.0	23.7
Grade 3-total	3.7	7.9	4.0	2.6

PD- physician-diagnosed, CEF- cefuroxime axetil, MFNS- mometasone furoate nasal spray, CON- control (normal saline),
AC/ SP- airway column/soft palate ratio on neck radiograph

Table 2. Changes in Symptom Scores and Radiographic Adenoidal Indexes from Baseline to 4th and 12th weeks Among Study Groups

Weeks	CEF-Group 1	MFNS-Group 2	CEF+MFNS-Group 3	CON-Group 4
Symptom Score				
0 to 4th	-7.80±5.73	-6.38±5.03	-9.78±5.62 *	-5.25±5.43
0 to 12th	-6.92±5.40	-7.84±5.65	-8.66±6.83	-7.66±4.40
AC/SP Ratio				
0 to 4th week	0.35±0.34	0.27±0.33	0.28±0.28	0.22±0.41
0 to 12th week	0.24±0.41	0.24±0.28	0.56±0.28 **	0.28±0.28
Grade value				
0 to 4th week	0.75±1.0	0.63±0.49	0.61±0.60	0.66±0.90
0 to 12th week	0.30±0.82	0.54±0.68	1.28±0.75	0.50±0.70

Values are given as mean±SE
* Significantly different from group 4, p=0.017.
** Significantly different from other groups, p=0.035

each other for the changes in nasal airway patency, the increase in AC/SP ratio from baseline to 12th week was significantly higher in group 3 than the other groups (p= 0.03). Also, the mean decrease in grade value of lateral radiographs showed a similar result of borderline significance (p= 0.06). There were no significant differences between the changes across other groups and other weeks. Age, gender, physician-diagnosed atopic disease, family history of atopy, presence of sinusitis, total IgE levels, atopy (SPT and/or specific IgE exam), and any intercurrent illnesses and/or antibiotic usage during the treatment period (0-4 wks) and on follow-up (4-12 wks) were not significantly related to the changes in AC/SP ratio according to regression analysis and t-tests.

The mean number of intercurrent illnesses (rhinopharyngitis, tonsillitis, otitis media and sinusitis) during the treatment period (0-4 wks) and from 4th to 12th weeks were 0.25±0.43, and 0.44±0.71, respectively for the whole study group. There were no significant differences between the treatment arms. The rate of antibiotic use for any intercurrent illness was not significantly different among study groups (p= 0.59).

The correlation between total symptom score and AC/SP ratios at each week was evaluated by the Pearson correlation coefficient. There was a significant negative linear correlation between symptom scores and AC/SP ratio on the nasopharyngeal radiographs with a correlation coefficient of – 0.256 (p= 0.004) for baseline, - 0.353 (p= 0.000) for 4th week, and –0.403 (p= 0.000) for the 12th week.

Discussion

The present study revealed that oral cefuroxime axetil and intranasal mometasone furoate combination therapy of one month's duration resulted in significant improvement in symptom scores and, on the long-term, adenoidal size in children with adenoidal hypertrophy, when compared to controls and either treatment alone. Neither CEF, nor MFNS treatments were superior to normal saline, or to each other.

Adenoidal hypertrophy is a common disorder of pediatric population frequently resulting in complications such as chronic sinusitis, otitis media and OSAS leading to important morbidity and a high rate of outpatient admissions. Although adenoidectomy is the most effective treatment modality for relief of obstructive symptoms and related disorders it may not be desirable in many patients because of potential complications and parental reluctance about surgery (4,5). Moreover, adenoidal tissue may regrow after surgical removal, as we have seen in two of the study patients (5). Some authors recommend a conservative treatment strategy until the child is 8 to 10 years old (10). Hence, a safe non-surgical treatment option with sustained effects on airway obstruction may be preferable in adenoidal hypertrophy except for cases needing urgent surgical removal (2).

Studies have revealed that adenoidal hypertrophy is frequently accompanied by significant adenoidal bacterial infection and the importance of the adenoid as a reservoir of pathologic bacteria associated with airway and ear disease has been stressed (11,12) Streptococcus pyogenes, Haemophilus influenzae, Staphylococcus aureus, Moraxella catarrhalis and Streptococcus pneumoniae are most commonly found organisms in cultures of the adenoids (6,11,13). The proportion of beta-lactamase-producing organisms (BLPOs) ranged from 22% to 83%, with significantly higher values in recurrent adenoiditis cases and children with rhinosinusitis symptoms (6,13,14). These data provided the basis for selection of cefuroxime axetil, which has a broad spectrum of activity against this bacterial spectrum, as a prolonged course of eradicating antimicrobial therapy in the present study. We did not have a bacteriological profile of our patients, since our study did not include surgically removed adenoid tissue cultures, which is the optimal method of evaluating adenoidal bacteriology. The emergence of resistant strains with a prolonged course of broad-spectrum antibiotic may be a drawback to this kind of treatment. Sclafani et al. have shown that a 30-day course of amoxicillin/clavulanate significantly reduced the need for adenoidectomy in obstructive adenotonsillar hypertrophy in short- and long-term follow-up and did not result in any increase in antibiotic-related sequelae (6). In the present study we could not show a significant effect of cefuroxime axetil alone, an antimicrobial with a similar spectrum of activity, on symptoms or adenoid size when compared to controls. However, when combined with a topical nasal corticosteroid, MFNS, a significant amelioration of symptoms and a decrease in adenoid size was encountered.

It is currently accepted that adenoidal hypertrophy is caused by the antigen-stimulated increased activity of lymphocytes (15). Fujiyoshi et al. have demonstrated that hypertrophied adenoidal tissue showed evidence of immunologic activation and chronic inflammation in patients undergone adenoidectomy surgery (16). Intranasal corticosteroids significantly affects the production and/or activity a variety of proinflammatory mediators, including cytokines, adhesion molecules, mast cells, eosinophils and T lymhocytes, probably through local actions in the nasal mucosa (17). They also decrease vascular permeability and edema. Hence, these profound antiinflammatory effects may help to decrease the immunologic activation shown in hypertrophied adenoid tissue and reduce the adenoid size.

There have been contradictory reports about the effects of glucocorticoids in adenoidal hypertrophy and/or accompanying OSAS. A 5-day course of oral prednisone was found to be ineffective in improving OSAS and adenoidal obstruction in 1 to 12 years old children (3). Brouilette et al. have shown a moderate improvement in pediatric OSAS, but no significant changes in symptom scores or adenoidal size with a 6-week course of fluticasone nasal spray in 25

children with proven OSAS (8). An 8-week double-blind, placebo-controlled cross over study of standart-dose nasal beclamethasone revealed a significant reduction in adenoidal size and obstructive symptoms in children with adenoidal hypertrophy (7). The latter study also revealed a significant carryover effect of beclamethasone from 4 to 8 weeks. However, age effect over the response was not clear and the sample size was relatively small.

Mometasone furoate 100 μg once daily was chosen as an appropriate and safe topical nasal corticosteroid regimen in our study. In children with perennial allergic rhinitis no suppression of growth, or other adverse effects was seen after one year of treatment with MFNS, 100 μg QD (once daily) in 3 to 9 years old children (18). In a dose-response relationship study of MFNS, 100 μg once daily was found as the most appropriate, safe and efficient therapeutic dosage in the treatment of SAR in 6 to 11 years old children, but MFNS 200 μg provided no additional benefit over 100 μg (19).

There were no significant differences in markers of adenoidal obstruction between MFNS and control groups in the present study. However, prolonged oral antibiotic and MFNS combination therapy of one month's duration was significantly superior to controls both clinically and radiologically. This result may point out that chronic adenoidal hypertrophy and/or adenoiditis should be regarded as a coexistence of a chronic infectious and a chronic inflammatory disorder. Hence, treatment modalities directed at only one component may fail to be successful. Antibiotic and MFNS combination resulted in significant amelioration of airway obstruction not only at the end of treatment period but also 2 months after discontinuation of therapy. This prolonged efficiency may be the result of a dual activity; antibiotic effect by eradicating adenoidal core pathogens and decreasing the immune stimulation, and adjunctive antiinflammatory effects of the topical steroid medication. It has been shown that a four-week course of either nasal beclamethasone (7), or amoxicillin/clavulanate (6) has prolonged, even to 24 months, effects on reduction of adenoidal hypertrophy.

Broad spectrum antimicrobial and intranasal corticosteroid combination therapy has been tried before in acute rhinosinusitis cases (20,21). Addition of MFNS (20), or fluticasone propionate nasal spray (21) to 21 days of amoxicillin/clavulanate (20), or 10 days of cefuroxime axetil (21) antimicrobial therapies significantly improved the clinical success and recovery rates in patients with acute rhinosinusitis. In the present study, 48.0% of the children had clinical and radiological evidence of acute sinusitis. However, the presence of sinusitis did not have a significant effect on the response to treatment modalities. Atopy, defined by SPT and/or specific IgE measurements was present in 34.1% of the participants. Twenty-two point seven per cent of children had a physician diagnosed allergic rhinitis. Neither a physician diagnosed atopic disease, nor atopy predicted the degree of response to any kind of treatment in our study. Therefore, the beneficial clinical and radiological effects of combination therapy on adenoidal hypertrophy were independent of atopy, any atopic disease, or rhinosinusitis.

There has been controversy about the assessment method of adenoidal size in clinical practice. Although endoscopy is the most accurate method of assessment, radiography is frequently used for adenoidal evaluation among pediatricians. Wormald et al. have compared the symptom score and four different and commonly used radiological measurement methods to the endoscopically determined percentage obstruction of the post nasal space by the adenoids (22). They found that the symptomatology score had the best correlation with endoscopy. Among the radiological methods they evaluated, the method of Cohen and Konak (9) provided the highest predictive value and best overall performance when compared to other methods (22). The importance of measuring the residual nasopharyngeal airway rather than the adenoidal thickness has been stressed by other authors (23). Because of these, we have used the radiological method of Cohen and Konak, which is based on the ratio of residual nasopharyngeal airway to soft palate thickness. We did not employ endoscopic examination since small children not suitable for cooperation were mostly included in the study. The discrepancy between symptom scores and radiological examination, which is a drawback of this study, could be overcomed if endoscopy could be used.

One of the limitations of this study was that about 50% of the patients enrolled were lost to follow-up at 12th week. However, percentage of patients not returning for follow-up was nearly the same for each arm of treatment. Either treatment failure, or more commonly for this population, a better health status may be the underlying reasons.

This trial demonstrated that intranasal MFNS and oral cefuroxime axetil combination therapy of one month's duration reduced the symptomatic obstruction caused by adenoidal hypertrophy and this effect was maintained at least for two months after the cessation of therapy. Apart from severe cases requiring urgent surgery, mild to moderate cases of adenoidal hypertrophy may benefit from such a treatment modality. However, the optimal dose and duration of this treatment remains to be elucidated by further work. Because of potential microbiological and ecological effects of prolonged antibiotic therapy selection of cases may be limited to certain situations. The relatively safe profile of MFNS in children as young as 3 years of age allows to prolong the intranasal MFNS to many months – a year, as shown in children with allergic rhinitis (18). Some children with adenoidal hypertrophy can avoid or delay surgical intervention with such a regimen, until they outgrow the disorder by age.

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