

# Impact factor of using local steroid nasal spray in the prevention of recurrent nasal symptoms and adenoid regrowth after adenoidectomy

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**Introduction:** Adenoidectomy is one of the most frequent surgeries conducted in children along with tonsillectomy. The persistence of nasal obstruction and recurrent infection symptoms following adenoidectomy was reported in the range of 19–26% in the literature. In a recent survey of otolaryngologists in the United Kingdom, 38.8% recognized that the need for revision adenoidectomy is a problem. This study aims at evaluation of the value of using intranasal steroids to prevent recurrence of adenoid and related symptoms after adenoidectomy. This is to judge whether the use of intranasal steroids may obtain successful results in children to avoid surgery for adenoid recurrence.

**Material and Methods:** Sixty children after adenoidectomy were divided randomly into 2 groups. Group I received postoperative intranasal steroid and group II received postoperative intranasal saline spray. Both medications were administered for 8 weeks postoperatively. Patients were followed up for 6 months using the nasopharyngeal lateral X-rays and reporting the degree of the symptoms. Results: The intranasal steroid group recurrence as evident by lateral X-ray nasopharynx was found in 1 case (3.3%) and for intranasal saline group recurrence was found in 7 cases (23.3%) (P-value= 0.05). The intranasal steroid group had significantly lower score after 6 months as regards nasal obstruction, nasal discharge, snoring, nasal tone and recurrent infection than the intranasal saline group. Conclusion: This study has demonstrated that the use of steroid nasal spray following adenoidectomy significantly reduces the rate of adenoid regrowth and the recurrence of nasal symp.

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## Introduction

ADENOIDECTOMY is one of the most common surgical procedures performed in children. The adenoid tissue is part of the Waldeyer's ring and is located at the nasopharynx. It is the most frequent cause of upper respiratory tract obstruction among children. The most frequent symptoms of adenoid hyperplasia are snoring, mouth breathing, nasal discharge, sleep apnea and hyponasal speech. [1] Hyperplastic adenoid tissue may also be a source of recurrent infection. [2] Adenoidectomy performed for the above-mentioned indications is one of the most frequent surgeries conducted in children along with tonsillectomy. [3]

The persistence of nasal obstruction and recurrent infection symptoms following adenoidectomy was reported in the range of 19–26% in a study. [4]

Over the past few years, adenoid re-growth after adenoidectomy has received much attention. Previously published studies suggested that the rate of this phenomenon varied between 0.55% [5] and 1.6%. [6]

In a recent survey of otolaryngologists in the United Kingdom, 38.8% recognized that the need for revision adenoidectomy is a problem. [7]

While it is a well-recognized entity, uncertainty remains regarding its risk factors. Adenoid regrowth may be attributable to surgery that is performed under indirect view. Also, the lymphoid tissue does not have a clear delineation. There are 2 difficulties that have been described to prevent complete adenoidal removal. Firstly, lymphoid tissue in the pharyngeal recess is considered by all authors as difficult to remove. [8] The second difficulty is the bulging adenoidal tissue into the posterior choanae, which was addressed by

Pearl and Manoukian; [9] they found choanal adenoids in 9% of their study group.

Other hypotheses on what causes the recurrence of adenoid obstructive symptoms include the contribution of other pathologic conditions such as allergies, gastroesophageal reflux disease, [10] an unrecognized intranasal pathologic condition, [11] or tubal tonsil hyperplasia. [12] In addition, young age may lead to an increased rate of repeated adenoidectomy through a mechanism that remains uncertain. [13]

There are several studies suggesting the use of intranasal corticosteroids for children with adenoid vegetation as an alternative to surgery. [14] However, a limited number of studies have been performed to prevent regrowth after adenoidectomy. [15]

## Aim of the work

The study aims at evaluation of the value of using intranasal steroids to prevent recurrence of adenoid and related symptoms after adenoidectomy. This is to judge whether the use of intranasal steroids may obtain successful results in children to avoid surgery for adenoid recurrence.

Our concern was not to evaluate the most appropriate drug, the most efficient dose, and optimal treatment duration. It is merely to evaluate the value of the use of intranasal steroids after adenoidectomy and its effect on the recurrence rate of adenoid regrowth and symptom scores.

## Material and Methods

This study included 60 patients, of both genders, all suffering from hypertrophied adenoid tissue, presented clinically with mouth breathing, snoring, bilateral nasal obstruction and/or

discharge and evidenced radiologically with plain x-ray film lateral view to the nasopharynx. All cases presented to the outpatient clinic of the otolaryngology department, during the period from June 2016 through January 2017, seeking for management of their problem. Adenoidectomy for all patients was performed by the same surgeon. Patients after adenoidectomy were divided into 2 groups. Randomization was done with every other patient consecutively. Group I received postoperative intranasal steroid fluticasone furoate (27.5 mcg/day) and group II received intranasal saline spray starting at postoperative week 2 after wound healing. Both medications were administered for 8 weeks postoperatively. Patients were followed up for 6 months. Follow up was done using the nasopharyngeal lateral X-rays and reporting the degree of the symptoms. All patients or parents were asked to report the degree of the symptoms after 2 weeks, 6 months.

#### Inclusion criteria were:

1. Patients' age ranged between 3 years to 12 years.
2. Adenoid is the only cause for nasal obstruction.
3. History of mouth breathing, snoring, bilateral nasal obstruction and/or bilateral nasal discharge.
4. X-ray evidence of adenoid hypertrophy encroaching on the airway column.

#### Exclusion criteria were:

1. Patients younger than 3 years and older than 12 years old.
2. Recurrent cases.
3. The use of intranasal or systemic steroids within the last 1 year.
4. Use of any intranasal medication within the previous 2 weeks of entering the study.
5. Acute URTI within 2 weeks of entering the study.
6. History of epistaxis.
7. Immunodeficiency disorders.
8. Hypersensitivity to the fluticasone furoate.
9. History of craniofacial neuromuscular or genetic disorder.

#### Procedure:

##### All patients were subjected to the following protocol:

- A. Preoperative preparation: in the form of Careful history taking from the parents, general and local clinical examination, investigations and detailed consent from the parents.
- B. Operative technique: All patients were operated under general anesthesia with oral endotracheal intubation, a Davis-Bowel mouth gag was used to open the mouth. The nasopharynx was palpated digitally to examine for adenoid hypertrophy. Using the conventional curette, the hypertrophied adenoid tissue was removed. Endoscopic evaluation for the adenoid's bed to remove any remnant. Hemostasis was secured by packing the operative bed with a guaze soaked with 0.05% oxymetazoline. After

control of bleeding and pack removal, hemostasis was achieved by dealing with any bleeding point by the bipolar coagulator by retraction of the soft palate.

- C. Postoperative protocol: All patients were given the same medical treatment in the form of:

1. Oral Amoxicillin-clavulanic acid for 10 days. Oral macrolides were used in cases of amoxicillin allergy.
2. Oral Acetamenophin for 5 days.
3. Local nasal decongestant; Xylometazoline 0.5 mg/ml for 5 days.

In the above mentioned drugs, the doses were calculated according to the body weight of the patient. Both groups were followed up 2weeks & 6 months postoperatively. Recurrence of hypertrophied adenoid was evaluated by Clinical manifestations:

nasal obstruction, nasal discharge, snoring, nasal tone of voice and recurrent infection and scored according to given questionnaire.

#### Radiological assessment:

Signs By The Lateral View Nasopharyngeal Radiograph, plain x-ray nasopharynx with soft tissue radiation dose with mouth opened and neck extended was done for all patients to detect adenoid recurrence. The size of the adenoids was graded according to the palatal airway measured from the most convex point of the adenoid tissue to the soft palate. The narrowest distance between the nasopharyngeal soft tissue and the soft palate was taken. Grading was as follows, Grade 1: >6 mm; Grade 2: 3–6 mm; Grade 3: 0–3 mm. Grades 2 and 3 were considered recurrent obstructive adenoid [30]. The lateral radiographs were done before surgery and 6 months postoperatively

#### Statistical analysis:

Pre-coded data was entered on the computer using "Microsoft Office Excel Software" program (2016) for windows. Data was then transferred to the Statistical Package of Social Science Software program, version 24 (SPSS) to be statistically analyzed. Data was summarized using mean, standard deviation, median, minimum and maximum in quantitative data and using frequency (count) and relative frequency (percentage) for categorical data. Comparisons between quantitative variables were done using the non-parametric Mann-Whitney test (Chan, 2003a). For comparing categorical data, Chi square ( $\chi^2$ ) test was performed. Exact test was used instead when the expected frequency is less than 5 (Chan, 2003b).

P values less than 0.05 were considered statistically significant, and less than 0.01 were considered highly significant.

#### Results

The present study included 60 children. Patients after adenoidectomy were divided into 2 groups, with ages range from 3 to 12 years for both groups.

Recurrence	Drug group (n=30) Count	Drug group (n=30) %	Placebo group (n=30) Count	Placebo group (n=30) %	P value
X-Ray Grade 2+ 3	1	3.3%	7	23.3%	0.052*
Nasal Obstruction	3	10%	12	40%	0.007*
Nasal discharge	3	10%	12	40%	0.007*
Snoring	3	10%	12	40%	0.007*
Nasal Tone	2	6.7%	11	36.7%	0.005*
Recurrent Infection	3	10%	12	40%	0.007*

**Group I:** which included 30 patients, received intranasal steroid fluticasone furoate (27.5 mcg/day) at postoperative week 2 after wound healing.

**Group II:** which included 30 patients, received intranasal saline spray starting at postoperative week 2 after wound healing. Both medications were administered for 8 weeks postoperatively. Patients were followed up for 6 months. Follow up was done using the nasopharyngeal lateral X-rays and reporting the degree of the symptoms. All patients or parents were asked to report the degree of the symptom after 2 weeks, 6 months.

\*Significance level obtained ( $p < 0.05$ ).

### Discussion

Revision adenoidectomy is common. However, a review of the literature, including some prominent textbooks, does not illuminate the issue or its frequency. Buchinsky and coworkers failed to find a new obstructing adenoid pad after adenoidectomy in a large series of children, [8] while, on the contrary, Joshua and his colleagues found a new obstructing adenoid tissue in the clinical practice. They reported infrequent occurrence of adenoid re-growth after adenoidectomy that causes nasal obstruction which accounts for 3% of patients with persistent post adenoidectomy symptoms. [4]

Adenoidectomy can reduce both nasal obstructions and upper respiratory infections. However, some patients display clinically significantly persistent nasal symptoms even after surgery. Symptoms, such as nasal obstruction or recurrent upper respiratory infections, persist in 19–26% of patients. [4] Adenoidectomy remains a commonly performed procedure, although it produces short-term benefits. [16]

In our study, postoperative intranasal steroid fluticasone furoate was used starting postoperative week 2 after wound healing and was administered for 8 weeks postoperatively.

Patients were followed up for 6 months using the nasopharyngeal lateral X-rays and reporting the degree of the symptoms. All patients or parents were asked to report the degree of the symptom after 2 weeks, 6 months.

Demain and Goetz in 1995, Successfully introduced the use of intranasal steroid treatment in children with adenoid hypertrophy. It was also demonstrated that the medical use of intranasal corticosteroids like Mometasone furoate [17] or Fluticasone propionate [14] for the treatment of adenoid hypertrophy achieved significant improvements in symptoms. It was reported that treatment with intranasal steroids can decrease the size of adenoid hypertrophy, using beclomethasone, [18] fluticasone, [19] and mometasone. [20]

Bitar and his colleague in 2016, found that among the steroids used in the various reviewed trials, mometasone is the most studied. However, none of the reviewed studies investigated the long-term effect of this treatment. They demonstrated a persistence of the improvement in 75 per cent of the patients who continued to attend follow up, one year after the cessation of treatment. This was the first long-term follow-up study on patients previously treated with mometasone furoate monohydrate. [21]

The duration of treatment with intranasal steroids in previous studies varied from 8 to 24 weeks. None of these trials established the optimal duration of treatment in children. Criscuoli and his colleague in 2003, showed in the study they conducted that the effects became visible 2 weeks

after the start of the treatment. Twenty-four patients exhibited improvement after 2 weeks of steroid treatment, and an additional 24 weeks of therapy at a lower steroid dose maintained clinical improvement at 52 and 100 weeks for 45.8% of those patients. In our study treatment was continued for 8 weeks following adenoidectomy. [22]

Bitar et al., 2016, showed that the short-term effect of intranasal steroids on obstructive adenoids is encouraging, especially given that this effect was observed using a variety of steroids. The optimal treatment duration is not known. A positive effect has been reported with a treatment duration as short as four weeks, but others have given a treatment time as long as seven months. [21]

Bitar et al., 2013, observed that no additional effect was gained after six weeks of treatment with mometasone furoate spray. [23]

Like our study Sobhy, 2013, performed the assessment of adenoid size using lateral nasopharyngeal radiography since pediatric patients were not able to tolerate flexible nasopharyngoscopy well. Adenoid nasopharynx ratio (A/N) is the most frequently used method for the assessment of adenoid size on the lateral nasopharynx X-ray. [15]

Unlike our study in Yildirim et al., 2016, Every patient had flexible nasal endoscopy at postoperative week 3 and one year after the operation. Choana was scored according to its occlusion level by the adenoid tissue. Additionally, nasal obstruction symptoms (nasal congestion, dry mouth, snoring, nasal speaking, apnea and night coughing) were scored. [24]

The literature review performed by M.F.N Feres et al., 2011, in three studies did not find the A/N ratio to be correlated with the adenoid size while two studies found them to be correlated. X-ray has advantages such as being non-invasive and easily administered, its disadvantages are that it offers a two-dimensional view and is static. Furthermore, the effect of radiation may not be ignored albeit at low doses. However, the bigger problem is that the A/N ratio changes on the lateral nasopharynx X-rays in the phases of respiration and swallowing. For this reason, it should be purposefully taken at the end of the inspiration. But it is quite difficult to take X-rays at this particular time of respiration, especially during pediatric ages. [25]

Computed tomography scan is not normally used to evaluate the adenoids, the use of pediatric CT, which is a valuable imaging tool, has been increasing rapidly. However, because of the potential for increased radiation exposure to children undergoing these scans, pediatric CT is a public health concern. Thus, in our study we considered the cost-benefit and radiation exposure risk of CT and we didn't use CT as a diagnostic tool for diagnosis or follow up for adenoid hypertrophy.

In the current study, we could not perform endoscopy for all children, although it is now the best diagnostic technique for diagnosis of adenoid related nasal obstruction because it depends on the age and compliance of the child.

Our study showed that the use of intranasal steroids after adenoidectomy was beneficial to prevent recurrence of nasal symptoms and prevent recurrence of adenoid after adenoidectomy after a follow-up period of 6 months. Regarding X-ray nasopharynx grade as an evidence for adenoid regrowth, there was statistically significant difference between patients in the two group 6 months postoperative with ( $P$  value 0.05) towards the drug group.

Also, there was statistically significant difference between patients in the two groups 6 months postoperative towards the drug group regarding Nasal Obstruction, Nasal Discharge, Snoring, Nasal Tone and recurrent infection with P value (0.007,0.007,0.007,0.005,0.007) respectively.

It was also found that adenoid recurrence as evident by grade 2 and 3 in Lateral X-Ray Nasopharynx was numerically higher in the age group 3-5 years but wasn't clinically significant (P value = 0.299).

Sobhy, 2013 was the first to compare the use of steroids and saline nasal spray after adenoidectomy. This study identified a significant improvement in the scores for nasal obstruction, discharge and snoring with the use of postoperative nasal corticosteroids. The assessment performed on the lateral nasal X-ray found that it was effective in preventing adenoid regrowth. [15]

These results were like Yildirim et al., 2016, In the flexible endoscopic assessment completed in the twelfth month of the study, significant reduction was found in drug group compared to placebo in terms of adenoid size. When patients in both groups were compared, statistically significant reduction was observed in nasal obstruction symptom scores at the twelfth month. [24]

Ciprandi and coworkers, 2007, found that the use of intranasal flunisolide was associated with a significant reduction of adenoid hypertrophy in 72.6 % of the children. On the contrary, isotonic saline solution was associated with a non-significant improvement of adenoid hypertrophy as reported in 30.7% of children [26]. Another study by Criscuoli et al., 2003, provided evidence that treatment with nasal steroids could represent for some children an effective means of avoiding adenoidectomy. [22]

Lepcha and coworkers, 2002, did not find any significant efficacy of intranasal steroids in improving nasal blockage, nasal discharge, or snoring, although a fivefold reduction in adenoid size was observed in intranasal steroid group when compared with the placebo group. However, this difference did not reach a statistical significance. [27]

Steroids are generally well tolerated in children. Studies showed only one case of episodic nasal bleeding. [17] The effect of intranasal steroids on growth was studied by Allen and his colleagues in a randomized, double-blind, placebo-controlled study. [28] The growth rate in pre-puberty children who had used intranasal steroids for 1 year was reported to be equal to the growth rate of the placebo control group.

The mechanisms by which topical steroids improve nasal airway obstructive symptoms remain unclear. Three main trials succeeded to demonstrate the improvement of nasal obstruction with reduction of adenoid size with the use of intranasal steroids. [14,17,18] It may be due to the lympholytic effect; the anti-inflammatory effect of steroids help to reduce adenoidal and nasopharyngeal inflammation or they reduce the possibility of the adenoid acting as an infection reservoir. Studies which proved the fact that adenoid tissue includes many glucocorticoid receptors and messenger RNA strengthens these probable mechanisms. [29]

The study is limited by the absence of the nasal endoscopic examination which is considered the best diagnostic technique for the diagnosis of the adenoid related nasal manifestations. We did not include nasal endoscopy because of the noncompliance of the children. One of the limitations is the noncompliance of the children to the intranasal steroids which is observed mainly in the young children. Another

limitation of the study is the method of adenoidectomy which is limited to the adenoid curette, although other methods are used, but the most feasible method of adenoidectomy was the adenoid curette. A multicenter study with longer follow-up for 1 year period on the study patients should elicit a more informative data and properly evaluate the long-term effect of intranasal corticosteroids after adenoidectomy.

### Conclusion

Following Adenoidectomy, the use of intranasal steroids may obtain successful results in children to prevent adenoid regrowth and recurrence of related nasal symptoms. The most appropriate drug, the most efficient dose, and optimal treatment duration need to be investigated and determined.

### Compliance with ethical standards.

**Funding** No funding was received.

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed consent** Informed consent was obtained from all parents of the individual participants included in the study.

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