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Study on Efficacy of Nasal Steroids in Adenoid Hypertrophy and Otitis Media with Effusion in Pediatric Age Group

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Abstract: ***Adenoids are a part of the Waldeyer's ring of lymphoid tissue at the portal of the upper respiratory tract andit is the first site of contact for inhaled antigens. It plays an important role in the 'immunological memory'in children but it is also associated with many pediatric pathologies such as upper airway obstruction, obstructive sleep apnea and most commonly otitis media with effusion. This is a prospective study in the tertiary health care centre of Guahati medical college, Assam conducted on 12 patients of 3-15 years of age for a duration of 1year from July 2017-June2018,to study the efficacy of topical steroid spray in improving the clinical and audiological status of childrenwith otitis media due to adenoid hypertrophy.***

Keywords: pediatricage, adenoidhypertrophy, otitismedia, ventilationtube, topical steroid spray

1. Introduction

Lymphoid tissue lying within the mucous membrane of nasopharynx in between its roof and posterior wall is called the adenoid .The lymphoid tissue of the adenoid can extend to the fossa of rosnmuller and the Eustachian tube opening as Gerlach's tonsil. Adenoid can be identified from 4-6 weeks of gestation. Growth of the adenoid continues rapidly during infancy and platues in 2-14 years then from 15 years onward there is a progressive regression in most childrens. Clinical symptoms are more common in younger age group due to the relative small size of the nasopharynx ,the rapidly growing adenoid and increased frequency of upper respiratory tract infections. The importance of the adenoids is in the fact that they are the first site of contact for inhaled antigens and are responsible for antibody mediated immune responsevia B cells which give rise to IgG and IgA plasma cells but the adenoid are also responsible for upper respiratory tract disease due to partial or complete obstruction of the chonae. The pathologies seen are obstructive sleep apnea, rhinusinusities, otitis media with effusion.

Aims and Objective

To study the role of nasal steroids on adenoid hypertrophyand otitis media with effusion in pediatric age group.

2. Materials and Methods

A prospective clinical study was carried out in the deptt of otorhinolaryngology in Guahati medical college, Assam from July2017-June2018 and has been diagnosed with otitis media with effusion with adenoid hypertrophy.

Sample size was 12 patients of 3-15 years with 9 male and 3 female. The study was carried out in an outpatient bases.

Clinical assessment was done on the bases of clinical history, presence of adenoid facies, nasal examination, nasal endoscopy and radiological examination of the nasopharynx, otoscopic examination of the ear,audiometric evaluation and the clinical response after treatment.

Clinical grading of adenoid size is done according to Clemens et al and Fajioluet al ANR (adenoid nasopharynx ratio)

Grade	*Description*
I	Aenoid filling one third of the nasopharynx
II	Adenoid filling one third to two third of nasopharynx
III	From two third to nearly complete obstruction of nasopharynx
IV	Complete chonal obstruction

Inclusion Criteria

- Patient in age group between 3-15 years
- Intact tympanic membrane with audiological finding of otitis media with effusion
- Presence of otitis media and adenoid hypertrophy in the same patient.
- No history of previous surgery or medical treatment.

Exclusion Criteria

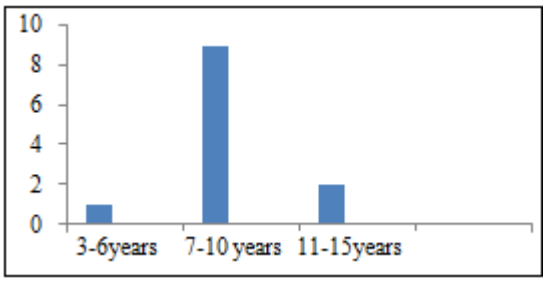
- Otitis media with effusion due to craniofacial abnormality, Allery, GERD and other causes
- Adenoid hypertrophy with normal audiological findings.
- Cases of obstructive sleep apnea due to adenoids.
- Patients lost in the follow up.

3. Results and Observations

Out of the 12 patients there were 9 males and 3 females between 3-15 years age maximum number of patients being7-8 years age group.

Table 1: Showing Age Group and the Number Patient Present in that Group

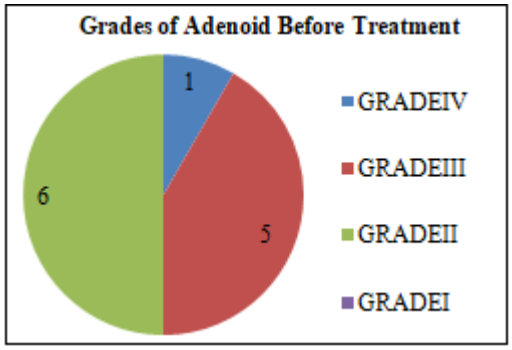
Age Group	*No. of Patients*
3-6 Years	1
7-10 Years	9
11-15 Years	2



Graph: Showing sex distribution in the study

Table 2: Showing Sex Distribution in this Study

Sex	*No. of Patients*
Male	9
Female	3



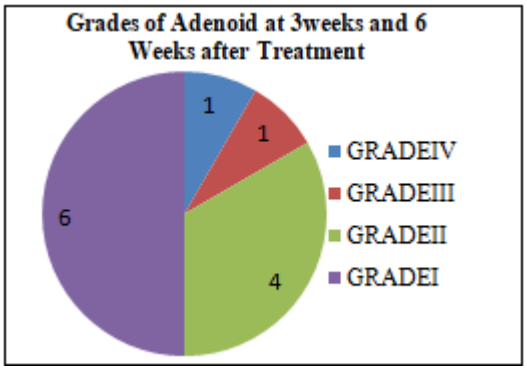


Table 3: Showing the Grade of Adenoid before and after Treatment with Nasal Steroid

Age	*Sex*	*Adenoid Grade Before Treatment*	*Adenoid Grade After 3 Weeks of Treatment*	*Adenoid Grade After 6 Weeks of Treatment*
3	F	III	II	II
7	M	II	I	I
7	F	III	II	II
7	M	IV	IV	IV
7	M	III	II	II
8	M	II	I	I
8	M	III	III	III
9	M	II	I	I
10	F	II	I	I
10	M	III	II	II
14	M	II	I	I
15	M	II	I	I

Table 4: Showing Tympanometric Finding after Treatment with Steroid Spra

Age	*Sex*	*Tympanometry Before Treatment*	*Typanometry After 3weeks Treatment*	*Tympanometry After 6weeks Treatment*
3	F	B	B	C
7	M	B	A	A
7	F	B	B	C
7	M	B	B	B
7	M	C	A	A
8	M	B	A	A
8	M	B	B	C
9	M	C	A	A
10	F	B	B	A
10	M	B	A	A
14	M	B	A	A
15	M	B	A	A

From this study we come to the observation that most of the patients have symptomatic relieve with the use of steroid spray. The clinical symptoms have been found to have decreased significantly. All patients had a bilateral otitis media with effusion except 1 who had left sided otitis media with effusion.

There is no sex predilictation of adenoid or otitis media with effusionbut most of the patients belonged to 7-10 age group. The patients guardians have reported a significant reduction in nasal blockage and snoring and sleep apnea for the patients on steroid.

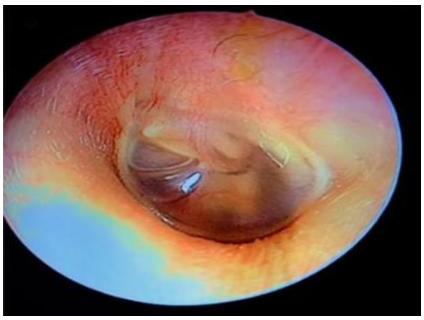
Most of the patients had a decreased the size of adenoid and hence the grade of adenoid except who was on grade IV before and after treatment this patient needs to be taken up for adenoidectomy. Therefore out of 12 patients 6(50%) of them had grade I after treatment. And 4 (33%) had grade II after treatment. There was not much difference in the grades at 3ks and 6 wks of treatment

Only 1 patient of 3 years and to be put under sedation for nasal endoscopic examination rest all patients were examined on an OPD basis.

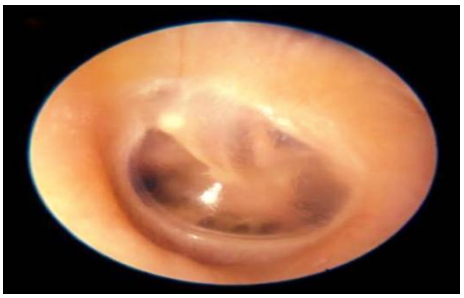
Pic 1: Endoscopic view of adenoid(grade IV)

Pic 2: Endoscopic view of adenoid (grade III)

On ear examination all the patients had a bulged or air fluid level with intact tympanic membrane before the start of treatment. Only 2 patients had a retracted tympanic membrane. After treatment all had a normal looking tympanic membrane except 1 were the was still fluid present even after treatment. Three patients showed a congested tympanic memberand at 6 week follow up due to exposure to viral infection prior to check up.



Pic: otitis media with effusion



Pic: Resolution of effusion after treatment

On audiometric findingmost of the patient had a A type curve out of the 12 there were 8(66%) having audiological improvement and 3 patient showing a C type curve and another had a consistent B curve even after treatment. All the patients were given a course of antibiotic, antihistaminic and topical steroids. Oral steroids were not used in this study due to its adverse systemic effect. Most of the patients had no complaint with the topical steroid spray except 1 patient whose attendant complaint of crusting. The patient was given saline irrigation and nasal drops.

4. Discussion

Insertion of tympanostomy tubes with adenoidectomy is an universally accepted treatment of persisting middle ear effusion due to adenoid hypertrophy. However, this procedure may cause complications such as tympanic membrane perforations, aural discharge, sclerotic changes and hearing[1]TARGET is a UK multicentric study showed that at 12 months postoperatively there is decrease in hearing level due to nonfunctioning of the tube after sometime and also due to the small but material conductive defecit of 14db even after extrusion of tube on the contrary the patients in the nonsurgical arm improved over time due to the spontaneous resolution of the disease[2].In the study conducted by B Black et al, D, Dempster et al,M,Maw and Herod adenoidectomy improves hearing by 3-4db at six months and 1db at 12 months .Now if we take into consideration the complication of adenoidectomy such as the risk of bleeding, dentaltrauma, cervical spine injury and the possibility of regrowth, we can easily see the advantage of going for a conservative treatment[3,4].

The topical is a better modality of treatment as steroid exert their anti-inflammatory effect locally on the nose, nasopharynx and eustachian tube. Corticosteroids have a direct anti-inflammatory action in the middle ear and eustachian tube by preventing the synthesis of inflammatory mediators, increase in surfactant in the eustachian tube, and shrinkage of peritubal lymphatics allowing for better tubal function. In addition, the decrease in the viscosity of middle ear fluids, amelioration of allergic diathesis, and upregulation of transepithelial sodium transport in the middle ear epithelium promotes removal of middle ear fluid. They influence a variety of inflammatory cells and their mediators such as epithelial cells, lymphocytes, basophils, mast cells, and Langerhan cells. The data on efficacy of intranasal steroids for persistent OME are limited with few published studies[5,6]

Our study demonstrates the outcome of intranasal mometasone furoate nasal spray in the treatment of OME on 12 children aged between 3 and 15 years. There was an overall improvement in the symptom score of 66% after treatment. A previous study by Berlucchi *et al*., evaluated the efficacy of mometasone nasal spray in decreasing the adenoid size and in reducing the severity of nasal obstruction, which was 77.7% in the study group. Mometasone nasal spray is safe and well tolerated. After intranasal administration, it undergoes extensive first pass metabolism[7]. As a result, the systemi concentrations are below quantifiable limits suggesting a negligible risk of adverse events. Ratner *et al*., studied the long-term safety and efficacy of mometasone nasal spray in children[8]. They concluded that 100 µg of mometasone furoate nasal spray once daily for one year was well tolerated in children of age group 6-11 years with negligible systemic exposure and no evidence of suppression of hypothalamic-pituitary-adrenal axis or ocular changes. Among the several steroid nasal sprays, mometasone furoate was preferred in our study because it does not cause any adverse tissue changes in the nasal mucosa of patients with no effect on growth in children and no effect on hypothalamic-pituitary-adrenal axis. The systemic availability of drug after topical application is lower than other steroids.

Yaman *et al*., investigated the dose-related effectiveness of corticosteroids in the treatment of OME by using objective measurement techniques of tymapanometry and cytokine

measurement. The study confirmed the short-term beneficial effect of systemic steroids on the resolution of OME in a rat model[9]. Similarly, Schwartz *et al*., reported the results of 40 children treated with steroid spray either initially or following cross over with 70% showing resolution of OME via pneumo-otoscopy and 64% via tympanometry. Shapiro *et al*., in 1982 compared dexamethasone nasal spray with a placebo in a blinded study of 45 children with persistent Eustachian tube dysfunction for a minimum of 4 weeks. In the first 3 weeks, dexamethasone showed more efficacies than the placebo but in the third week there was no difference between the two[10]. Cengel and Akyol conducted prospective, controlled, randomized study in children (3-15 years) using intranasal mometasone furoate monohydrate 100 mcg/day. They found the resolution of OME in the study group, that is, 42.2% was significantly higher than in the control group, that is, 14.5% ($P < 0.001$). They concluded that nasal spray can significantly reduce the adenoid hypertrophy and eliminate the obstructive symptoms[11].

5. Conclusion

Corticosteroids have a potential role in the treatment of otitis media with effusion. Topical intranasal steroids are safer than systemic preparations. The efficacy of mometasone furoate topical nasal spray in the resolution of middle ear fluid in children aged between 3 and 15 years with otitis media with effusion due to adenoid hypertrophy was observed to be significant and comparable with previous studies. Taking into account the risk associated with putting a young patient under general anesthesia along with the risk associated with surgery the use of topical steroids gives us an alternative to adenoidectomy with or without insertion of tympanotomy tube for a disease which shows natural resolution over time.

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