Orthodontic treatment after adenoidectomy patients: effect on jaw relations in sagittal plane

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Abstract Adenoid hypertrophy is a normal phenomenon seen in young children. Adenoids may however be of large size or may not reduce in size in adulthood. Large adenoids may cause mouth breathing, overcrowding of teeth or otological symptoms. When adenoids are large and producing these effects, adenoidectomy is necessary. Adenoidectomy immensely benefits such patients but they may still continue to be habitual mouth breathers. This can lead to formation of long narrow face, labially protruded maxillary incisors and class 2 malocclusion. Immediate orthodontic treatment of such patients will improve facial profile and lead to class 1 (Angle) occlusion. We present here a study of 20 patients who were given early orthodontic treatment in postadenoidectomy period as compared to those patients who were not treated by orthodontist.

Keywords Adenoidectomy · Class 2 malocclusion · Class 1 occlusion

Introduction

Adenoid hypertrophy leads to development of obstructive mouth breathers. Obstructive mouth breathers are children who have increased resistance to, or a complete obstruction of, the normal flow of air through the nasal passages. Because of the difficulty of inspiring and expiring air through the nasal passages, the child is forced by sheer necessity to breathe through his mouth [1]. Mouth breathers have a typical appearance, adenoid facies – narrow face, the upper anterior teeth protrude labially, and the lips are open with the lower lip extending behind the upper incisors. The appearance of the maxillary incisors is often excessive and an anterior marginal gingivitis around the anterior teeth may be present [2]. Long-standing nasal obstruction may lead to “disuse atrophy” of the lower lateral cartilages, resulting in a slit-like external nose with a narrow nasal vault. Because of the lack of normal muscular stimulation from the tongue and owing to the increased pressure on the cuspid and primary molar areas by the strained orbicularis oris and buccinator muscles, the buccal segments of the maxilla collapse, giving rise to a V-shaped maxilla and a high palatal vault [3, 4]. Adenoidectomy helps these patients but these children may still continue to breathe from mouth as they are habituated to it.

Case series

We hereby present a series of 20 patients who presented in the Departments of ENT and Dental Surgery in the Himalayan Institute of Medical Sciences, Dehradun. This study was conducted over a period of 1 year (Jan 2007–Dec 2007). Twenty patients in the age range of 5–15 years, in whom adenoidectomy was performed, were selected for this study. Patients were divided into two groups

Group 1: 10 patients who had adenoidectomy performed five or more years previously and were not given any orthodontic treatment.

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Group 2: 10 patients who were given orthodontic treatment within 1 year after adenoidectomy.

Two criteria were used to compare the results of two groups

1. Incisor overjet (horizontal overlapping of incisors i.e. protrusion of incisors).
2. Class occlusion (Angle's classification)
 - Class 1 occlusion (ideal) - the mesiobuccal cusp of the maxillary first permanent molar occludes in the buccal groove of the mandibular first permanent molar.
 - Class 2 malocclusion - the mandibular first permanent molar is distal to its maxillary counterpart.
 - Class 3 malocclusion - the mandibular first permanent molar is mesial to its maxillary counterpart.

Few of the patients having high level of stress and anxiety, especially in relation to facial aesthetics, were sent for psychological evaluation and counselling.

Paired 't-test' were used to compare the two groups and P values <0.05 were considered significant. Study models and cephalometric analysis were used to measure jaw relations in sagittal plane.

Class 1 occlusion was present in 2 (20%) patients of group 1, while all 10 (100%) patients in group 2 had class 1 occlusion (Table 1).

Overjet values of greater than 4 mm were seen in 8 (80%) patients of group 1 while only 1 (10%) patient in group 2 had overjet value greater than 4 mm (Table 2).

Discussion

Adenoidectomy has been performed by ENT surgeons since a long time. This procedure is of immense benefit for the patients who are mouth breathers, have otological symptoms or obstructive sleep apnea. Adenoid facies is characterized by an increased vertical facial height in the lower third of the face, excessive dentoalveolar height, "gummy smile", high arched palate and a steep mandibular plane [5]. The appearance of the maxillary incisors is often excessive

and an anterior marginal gingivitis around the anterior teeth may be present. Long-standing nasal obstruction may lead to "disuse atrophy" of the lower lateral nasal cartilages, resulting in a slit-like external nose with a narrow nasal vault [6]. Long-standing nasal obstruction appears to affect craniofacial morphology during periods of rapid facial growth. A change from nasal to oral respiration likely occurs when nasal resistance reaches two to three times normal. Since nasal resistance increases in the supine position, borderline airways may convert to oral respiration at night. During oral respiration, the mandible rotates to a more open position and the tongue assumes a lower position in the mouth and is no longer in contact with the palate. Prolonged periods of oral respiration lead to extensive eruption of the posterior molars, in response to a lack of surface contact [7]. This phenomenon of supereruption is a common finding in the face of missing teeth due to trauma, extraction, etc. These overerupted teeth exert a downward vector of force on the mandible, causing the lower jaw to rotate down and back in a "clockwise" direction. Because of the backward mandible rotation, retrognathia and open bite deformities are common [2, 3]. Tongue posture changes with chronic oral respiration can also affect the teeth. With a lowered tongue position, the lateral expansile forces of the tongue on the palate are lost, and the unopposed medial forces of the buccinator and masseter muscles lead to a narrow, high arched palate in susceptible children. The incomplete lateral expansion of the maxilla often leads to a unilateral or posterior crossbite. Orthodontic therapy is affected by the func-

Table 1 Comparative results of occlusion in two groups

Patients	Class 1 occlusion	Class 2 malocclusion
Group 1 (10)	2(20%)	8(80%)
Group 2 (10)	10(100%)	0 (0%)

Table 2 Comparative results of overjet values in two groups

Patients	Overjet values >4mm	Overjet values <4mm
Group 1 (10)	8(80%)	2(20%)
Group 2 (10)	1(10%)	9(90%)

Fig. 1 Cephalometric radiograph

Fig. 2 MRI scan showing enlarged adenoids compromising the airway

tion of the lips, tongue and masticatory musculature, all of which may accommodate to nasal obstruction in ways that can effect occlusion. Orthodontic treatment to broaden the maxillary arch serves to widen the nasal vault and improve nasal patency. The treatment is nonoperative and can be accomplished in about 3 weeks in patients 5–15 years of age [6]. In our study, we found a tremendous improvement in both the incisor overjet and class occlusion in patients who were given orthodontic treatment in immediate postoperative period. The results of our study were comparable to a study conducted by Kerr and Williams in 1987 who also found a significant improvement in these two parameters. Cheng et al. in 1988 had also found the same result in their study. The significant improvement in these two vital parameters shows the importance and necessity of immediate orthodontic treatment in post adenoidectomy period. We recommend every patient to be referred to an orthodontist 3 weeks after adenoidectomy for timely intervention if required.

Fig. 3 Photograph showing protruding incisors (front view)

Fig. 4 Photograph showing high overjet (lateral intraoral view)

Conclusion

Orthodontic treatment immediately after adenoidectomy was necessary for achieving the normal lips relation, normal overjet and class I (Angle).

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