Short Term Changes in Growth Parameters of Children with SDB after Adenotonsillecomy V/S Conservative Management: A Randomized Trial

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Abstract

Objectives: To compare the effect of Adenotonsillecomy on the growth parameters of children with Sleep related breathing disorder and to compare it with children receiving medical treatment

Study design: Prospective, randomized study.

Material and methods: 40 children presenting with history of sleep related breathing disorder were assessed by Child’s Sleep Habit Questionnaire and Quality of Life (with OSA-18) questionnaire to assess the severity of SDB and their anthropometric measurements and appetite behavior were recorded. Children were randomly divided into two groups of 20 children. Group I underwent adenotonsillecomy and group II received medical treatment. At 3 months anthropometric measurements and appetite behavior were recorded again. The changes were compared between both the groups.

Results: A statistically significant improvement in weight and height of children and improvement in appetite behavior was seen in children receiving adenotonsillecomy irrespective of grade of adenotonsillar hypertrophy.

Conclusion: Adenotonsillecomy in sleep related disorder breathing disorder significantly accelerates the growth pattern when compared to children receiving medical treatment.

INTRODUCTION

Sleep disorder breathing disorder (SDB) is a common problem in children and is one of the common causes of a visit to the pediatric otolaryngologist. Its incidence is estimated to be 11-13% [1]. SDB ranges from primary snoring with no apnea episodes to OSA characterized by snoring, apnea and frequent arousals [2]. SDB can have a significant impact on the health of children which may include behavioral disturbances, learning deficits, compromised somatic growth, cardiovascular complications and pulmonary hypertension [3].

Adenotonsillar hypertrophy is one of the commonest causes of SDB in children [4]. Size of adenoid and tonsils determine the degree of pharyngeal airway narrowing. Maximum narrowing of the pharyngeal lumen is seen at the site where the tonsil and adenoid overlap [5]. Other causes of SDB in children are obesity, craniofacial abnormality and Allergies.

Growth retardation and failure to thrive is common in children presenting with SDB. Enlarged adenoid and tonsils may interfere with swallowing causing decreased food intake leading to decreased calorie intake. Upper air way obstruction during sleep in SDB children is also associated with abnormal nocturnal growth hormone secretion and increased caloric expenditure due to increased work of breathing during sleep. These pathophysiologic mechanisms may lead to growth retardation seen in SDB children [6].

Adenotonsillecomy is effective in reversing the ventilator and sleep disturbance seen in SDB children. Various studies have reported improved growth parameters after adenotonsillecomy in children’s with adenotonsillar hypertrophy [7-9]. Does adenotonsillecomy also reverse the growth parameters in children with SDB? Does medical treatment also reverse the growth disturbance seen in SDB children? This study was designed to study the changes in growth parameter after adenotonsillecomy in SDB children and to compare these changes in SDB children receiving medical treatment.
MATERIAL AND METHODS

This study was prospective randomized observational study. The study protocol and the informed consent form were approved by the Ethics Committee of PGIMER, Chandigarh. This study was done in Department of Otolaryngology, PGIMER, and Chandigarh from July 2017 to Dec 2018. The study included 40 consecutive children in the age group of 3-14 yrs and who were referred to our clinic with symptoms of difficulty in breathing during sleep at night and had adenoid tonsillar hypertrophy on examination. Children with history of congenital facial abnormality, craniofacial abnormality, history of asthma or perennial Allergy, diabetes, cardiac diseases and uneducated caregivers were excluded from the study. An informed consent was taken from the caregivers before inclusion in the study.

Demographic data, clinical symptoms and physical examination were recorded in all the children. Adenoid assessment was based on lateral cephalometric radiographs. An adenoidal/nasopharyngeal ratio higher than 0.67 was considered adenoid hypertrophy. The tonsils were graded based on the scheme of Brodsky et al. Anthropometric measurements were taken in all children. Height was measured using wall mounted stadiometer and weight was recorded using calibrated digital weighing machine.

The care givers were asked to fill the questionnaire related with child’s behavior during sleep using Child’s Sleep Habit Questionnaire and Quality Of Life (with OSA-18) questionnaire and the severity of SDB was assessed [10].

All 40 children included in the study were randomly divided based on computerization Table 1 into two groups:

Group A (n=21): These children underwent adenotonsillectomy, adenoidectomy or tonsillectomy for symptom relief.

Group B (n=20): These children were given medical management with steroids, antihistamine, nasal drops for 6 weeks. This group also had 20 children.

Postoperative Follow up

The children were reassessed after three months in both the groups. Anthropometric measurements: change in height, weight was recorded. Care giving parents were again asked to fill questionnaire related with child’s behavior during sleep using Child’s sleep habit questionnaire and quality of life (with OSA-18) questionnaire.

The statistical analysis was done using Paired T - Test. It was used to compare the Height and Weight of Pre and Post intervention status of both Groups and also the Inter Group comparison.

RESULTS

A total of 40 children who fulfilled the inclusion and exclusion criteria were included in the study. 3 children of group I was lost to follow up and hence was excluded from the study. While 4 children from Group II worsened with medical management and at the end of 3 months their care givers wanted surgical management. Adenotonsillectomy was done in these 4 children and they were included in both group I and group II. On final analysis our study had Group I: n=21 children Group II: n=20 children.

The mean age in group I was 6.1yrs (4-10 yrs) and the mean age in group II was 5.37 year (3-12years). Out of 21 children in group I, 15 children (70%) were males and 6 children (30%) were female. In group II out of 20 children 16 children (80%) were males and 4 children (20%) were female.

Snoring at night was the most common symptom in both the groups. It was the presenting feature in 50% of children of group I and 58% of children in group II. Other presenting symptoms were recurrent respiratory infections, altered sleep habits during sleep, changes in mood and poor school performance and bedwetting.

Adenoid and tonsillar status was recorded in both the groups.

In group I 14 children (67%) had grade III, 4 (20%) had grade IV, 1(4%) had grade II and 2(9%) had grade I adenoid hypertrophy and tonsillar status in group I: 14 children (65%) had grade III tonsillar hypertrophy, 4 children (20%) had grade IV, 2(10%) had grade II and 1(5%) had grade I (Figure 1a,1b).

In group II, 15 children (75%) had grade III, 3 (15%) grade IV, 1 (5%) grade II and 1(5%) grade I adenoid hypertrophy. While the tonsillar status was 12 children (75%) had grade III, 4 grade IV, 3(15%) had grade II, 1(5%) had grade II and 1(5%) had grade I tonsillar hypertrophy (Figure 1a,1b).

Sleep questionnaire was used to assess the sleep disordered breathing in both the groups. The mean score of sleep questionnaire in group I was 55.35. The mean score of the sleep questionnaire in group II was 54.65. The difference between both groups was not significant (p value >.05).

Height and weight of the children were compared Pre and post intervention in both the groups. The mean height of children in group I preoperatively was 108.68 (89-138cm) while the mean height of children after surgery at 3 months was 109.73 (89-138cm). This difference was found to be statistically significant (p value 0.019). The mean height in group I was 104.68 (89-138cm) while post medical management after three months the mean height was 104.68 (89-138cm) was found to be statistically non-significant (p value 0.104) (Figure 2).

Weight measurements were taken in both the groups’ pre and post intervention after 3 months. The mean weight of children’s in group I was 19.63 Kg (12-39) and postoperatively after 3 months of surgery the mean weight was 20.26Kg (12.5-39). This difference was found to be statistically significant. (P value 0.009) In group II the mean weight of children pre intervention was 17.0 Kg (11.5-32) while after three months after intervention the mean weight was 17.18 Kg (11.5-32.5). This difference was found to be statistically insignificant (P value 0.18) (Figure 3).

We also evaluated the appetite behavior in children in both groups pre and post intervention as stated by the parents and care

| Table 1: Age and sex distribution of both groups. |
|-----------------|------------------|------------------|
|                  | Mean age | Male   | Female     |
| Group A (n=21)  | 6.1 yrs (4-10)| 15(70%) | 6(30%)     |
| Group B (n=20)  | 5.37yrs (3-12)| 16(80%) | 4(20%)     |
givers. In Group I the appetite behavior was low in 14, moderate in 4 and very good in 3. After surgery the appetite behavior was very good in 10, moderate in 8 and low in 3 patients. This was statistically significant (p value<.05) While in Group II the appetite behavior was low in 12, moderate in 4 and very good in 4 children. After medical intervention the appetite was low in 10, moderate in 6 and very good in 4 patients. This was found to be statistically non-significant (p>.5) (Figure 4).

**DISCUSSION**

Sleep disorder breathing has become a well-recognized entity in young and prepubertal children. Its estimated incidence is 11-
13% [1]. SDB in children is associated with retarded growth is well documented in the literature [11,12]. Various causes have been postulated like poor appetite and difficulty in feeding resulting lower calorie intake, increased work of breathing leading to increased calorie expenditure during sleep have been suggested. Abnormal nocturnal growth hormone secretion and impaired growth hormone action in children with SDB have also been suggested [13].

The most common cause of SDB in children is adenotonsillar hypertrophy. Various studies have shown that adenotonsillectomy significantly improves growth parameters of children with SDB [11-13]. But is surgery the only option to correct the growth disturbance seen in children? Can medical therapy for adenotonsillar hypertrophy correct the growth disturbance seen in SDB children? This study was designed to know if growth catches up occurs in SDB children after adenotonsillectomy and to compare it with growth catch up that occurs after medical therapy.

Our study showed a statistically significant increase in the weight and gain in height following adenotonsillectomy in children presenting with sleep disorder breathing. However, the gain in weight and height after three months of medical therapy was found to be nonsignificant. Katz et al., in a randomized trial showed a significant increase in weight gain and BMI at 7 months follow up after adenotonsillectomy [14,15]. However, Aydogan M et al., and Huang et al., in their retrospective study have found no significant increase in weight gain after adenotonsillectomy [16,17]. Our study was a prospective study and we found significant increase in the weight and height of children with SDB after adenotonsillectomy when compared to medical treatment. Children’s in our study presented with varying grades of adenotonsillar hypertrophy but all of them had SDB. All children had showed gain in weight and height after adenotonsillectomy irrespective of grade of adenotonsillar hypertrophy.

We also evaluated the change in appetite after
adenotonsillectomy in children with SDB. We found a statistically significant increase in the appetite of children who underwent adenotonsillectomy when compared children receiving medical treatment. Farnaz H also reported a significant increase in appetite of children following adenotonsillectomy in their study [16,18]. The increase in appetite after adenotonsillectomy could be one of the reasons for the accelerated growth seen in children after adenotonsillectomy.

CONCLUSION

Adenotonsillectomy improves the appetite and causes increase in the weight and height of children presenting with SDB irrespective of grade of adenotonsillar hypertrophy.

REFERENCES


Cite this article