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Original Article

Assessment of Obstructive Sleep Apnea in Children Referred for Adenotonsillectomy, Outcome Evaluation by Pre and Post Operative Osa Score

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ABSTRACT

Objective: To determine the Assessment of Obstructive sleep apnea in children referred for adenotonsillectomy, outcome evaluation by pre and post operative OSA score.
Study Design: Comparative Cross-Sectional study.
Place and Duration of Study: Department of ENT, Combined Military Hospital, Rawalpindi Pakistan, from Jul 2021 to Jul 2022.
Methodology: We enrolled 40 children age 3-11 years with OSAS, they underwent AT and were hospitalized. Each participant underwent a physical examination and their medical history was reviewed. Each patient underwent a standardized pre- and post-operative polygraph evaluation, and patient answered the OSA questionnaire.
Results: The Pre operative OSA AHI-Event was 4(10.0%) while in Post operative it was 2(5.0%). Pre-operative OSA Allergen Sensitization was 11(17.5%) and in post-operative OSA allergen Sensitization was 10.0%. Pre-operative OSA Rhinitis was 5(12.5%) and in post-operative OSA Rhinitis was 4(10.0%). Pre-operative OSA Asthma was 3(7.5%) and in post-operative OSA asthma was 1(2.5%). Pre-operative OSA IQR was 5(12.8 %) and in post-operative OSA IQR was 19(45.5%). Pre-operative OSA Friedman Plate Position III-IV was 3(7.5%) and in post-operative OSA Friedman Plate Position III-IV was 1(2.5%). All the parameters showed significant results *p*-value less than <0.00.
Conclusion: Result showed that AT is related with considerable changes in post-operative measurement of all parameters in children with OSAS.

Keywords: Apnea-Hypopnea Index, Body Mass Index.

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INTRODUCTION

Recurrent breathing pauses during sleep caused by partial or complete blockage of the upper airway are the hallmarks of a sleep disorder called Obstructive sleep apnea.[1] Apnea, the term for these pauses, can occur several times during the night and cause low blood oxygen levels and disruptions in sleep patterns. Male sex, age, having a family, obesity, and narrow airways are risk factors for obstructive sleep apnea.[2] History of smoking, alcoholism, sleep apnea, and specific physical characteristics such as large tonsils or a sunken jaw. Currently, overnight laboratory polysomnography, or PSG, is the most accurate way to diagnose obstructive sleep apnea (OSA).[3] However, they are expensive, and often not available anywhere else.

On the other hand, home polygraph (HRP) has proven to be a practical and trustworthy method. There are many different treatment options for sleep apnea, depending on the severity of the condition. These include surgery, oral appliances, compression therapy (continuous positive airway pressure, or CPAP), weight loss, and local therapy Addressing anatomical issues.[4] Upper airway obstruction during sleep is a feature of obstructive sleep apnea (OSA) and can cause acute increases in intrathoracic pressure, hypercapnia, intermittent hypoxia, increased respiratory effort, and frequent awakenings.[5]

It is estimated that 1-3% of children suffer from obstructive apnea syndrome (OSAS), which is associated with several pathologies, such as ventricular remodeling, endothelial dysfunction, neurobehavioral problems, urinary incontinence, and inhibition of physical growth. In addition, depending on the severity of the condition,[6] OSAS in children is associated with severe anxiety, which affects the mental health of the parents. Compared with inflammatory diseases, OSAS is characterized by upregulation of inflammatory markers and enhanced sympathetic activity in association with apnea and intermittent hypoxic episodes.[7] While some studies

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found that quality of life improved after AT, they did not evaluate the relationship between PSG values and QOL.[8] After further research, the 18-item Quality of Life Questionnaire was used to measure OSA-related outcomes before and after surgery. These results were found to correlate with PSG data. This study used the OSA questionnaire and a standard in-hospital polygraph (PG) to retrospectively evaluate the functional and clinical outcomes of AT in a group of children with OSAS before and after surgery.[9]

METHODOLOGY

This was hospital-based comparative cross section study demonstration study conducted with approval from the IRB [IRB-SER-228]. It Started in July 2021 and end in July 2022, Military Hospital Rawalpindi. The sample size was calculated by using WHO EPI-INFO Calculated Sample size Calculator. **Inclusion Criteria:** Patients of either gender with age ranging from 3 to 11 years, presenting in Outpatient Department Pediatric Pulmonology Service in Pediatrics and gave their consent for surgery were included in the study.

Exclsuion Criteria: Patients with genetic or craniofacial syndromes, or neuromuscular abnormalities were not included in the research. Additionally, kids whose parents didn't finish the OSA-18, were also excluded from the study.

A trained investigator obtained a complete medical history and performed a physical examination for each child who was enrolled. Age, gender, tonsil size classification, palate morphology (Friedman palate position), nasal obstruction, mouth breathing, and presence of allergy to inhaled allergens were among the demographic and clinical data collected. Skin prick test (SPT) and total IgE test have been used to evaluate allergic sensitization. The physical distress, mental distress, sleep disturbance, daytime issues concerns. Measurements were made of snoring, chest and abdominal movements (induction plethysmography), and oral and nasal airflow assessment of pulse oximetry and posture. A polygraph test was conducted following the intervention. The American Academy of Pediatrics and the American Academy of Sleep Medicine guidelines for OSAS in children were adhered to when assessing PG scores. The number of apneic and hypopneic episodes (events/hour) during a single sleep hour was counted to determine the AHI. The diagnosis of OSAS in this research was made using the AHI 2 events total sleep time (TST). The following classification of OSAS severity was made: Moderate OSAS (5/h AHI 10/h), Severe OSAS (AHI 10/hour), and Mild OSAS (5/h AHI 10/h). To find out whether age and severity of OSAS influence the factors under investigation, the study subjects were divided into group through non probability convenient sampling technique. Treatment with AT was given to most research participants with moderate to severe OSAS. The American Academy of Otolaryngology-Head and Neck Surgery guidelines state that AT has been used in patients with recurrent tonsillitis and comorbidities such as dysphagia, high-grade tonsillar enlargement, poor general health, and urinary incontinence. Behavioral problems and asthma can arise with any degree of OSAS.

Data was analyzed by using SPSS version 26.0.

Anova statistical technique was employed to compare study parameters to evaluate pre-operative and post-operative variables. A *p*-value less than <0.001 indicate a statistically significant result on all comparative tests.

RESULTS

Result showed that frequency of male was 27(67.50%) and frequency of female was 13(32.5%). Mean and SD value of the Age were 2.02±0.76.

Table: Comparison of Pre Operative Osa with Post Operative Osa -18 Questionnaire (n=40)

Parameters	Pre-Operative OSA (n=40)	Post-Operative OSA (n=40)	*p*-value
AHI-Event	1.50+0.57	1.00+0.00	<0.001
Oral Breathing	5.75+0.50	2.00+0.00	<0.001
Nasal Airways Obstruction	7.00+0.00	4.33+4.04	<0.001
Snoring	9.00+1.00	5.50+3.53	<0.001
Tonsil Size Grading iii-iv	3.20+0.83	1.33+0.57	<0.001
Allergen Sensitization	9.00+0.00	4.25+2.50	<0.001
Rhinitis	9.00+0.00	4.00+0.00	<0.001
Asthma	9.00+0.00	5.00+0.00	<0.001
IQR	6.67+2.08	7.11+1.49	<0.001
Friedman Plate Position III-IV	7.33+2.88	5.00+0.00	<0.001

Table shows the comparison of preoperative OSA and post-operative OSA along with the mean and significant value. The comparison reveals that the IQR 18(45.5%) is higher in postoperative as compared to preoperative OSA. On the other hand, Allergan sensitization 7(17.5%) is higher in preoperative as compared to postoperative. Otherwise, the remaining parameters are approximately same in preoperative and postoperative conditions. So, there is a need to critically focus on Allergan sensitization in

preoperative OSA, whereas IQR in postoperative OSA conditions.

DISCUSSION

A useful diagnostic technique to determine whether a child has AT or severe OSAS before PSG surgery. However, some authors have proposed a technique to determine the severity of OSAS using tonsil size classification.[10] In addition, tonsil size were shown to be significantly associated with AHI when clinical data were compared with PSG. More than two-thirds of the children in this research who underwent surgery had severe OSAS. This finding appears to be in line with similar research.[11] The American Academy of Pediatrics states that the best course of action for children with OSAS is surgery, especially if the child's AHI is greater than 10 hours.[12] Because randomized controlled trials are challenging to implement and because ethical considerations make them impractical, observational studies provide evidence of the effectiveness of AT in children with OSAS.[13] In the absence of significant co-morbidities, available data consistently demonstrate the effectiveness of intervention in the treatment of children with tonsillar enlargement and obstructive apnea syndrome (OSAS).[14] Some meta-analyses have shown that AT is unsuccessful in treating OSAS in childhood and there have been cases of persistent OSAS. A recent comprehensive analysis found that children with severe OSAS who received AT had significantly lower postoperative AHI values[15] and it support our results. Furthermore, the percentage of residual OSAS after AT varied in each report the authors evaluated. According to meta-analysis[16] 83% of children had positive outcomes from their treatments. Our findings showed that the 6(15.0%) patients in included criteria have mild OSA, 10(25.0%) have moderate OSA and 24(60%) have Severe OSA Condition.

There is statistical significance. Prior research has established a connection between surgical results and preoperative AHI, which gauges the severity of OSAS. However, by reducing AHI cognitive/behavioral abilities , and general quality of life AT is beneficial in treating sleep problems.[17] According to results from other prospective research, children with OSAS had lower quality of life and worse cognitive and behavioral abilities and similar results obtained in our study in pre operative assessment.

The relationship between QOL parameters and PSG in children with OSAS is not well documented. Several investigations have evaluated the relationship between pediatric QoL and OSAS severity (as defined by the AHI).[18] Research that have used the OSA-18 as a screening tool for OSAS have yielded inconsistent findings.[19] The PSG cannot replace the questionnaire, which is probably more useful when combined with other diagnostic resources. Our results indicate that preoperative AHI values have a non-significant relationship[20] with preoperative OSA-18 scores in terms of the relationship between PSG and OSA-18 scores, which is inconsistent with the conclusions of other research.

CONCLUSION

In conclusion, our research demonstrates that AT, especially in more severe cases of OSAS, is associated with marked changes in behavior, quality of life indicators, and PG in children. It is necessary to pay special consideration to the possibility of residual postoperative OSAS. The AT is related with considerable changes in post-operative measurement of all parameters in children with OSAS.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

IY & FN: Data acquisition, data analysis, critical review, approval of the final version to be published.

MTR & NK: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

NA & MZK: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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