e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(5); 75-80

Original Research Article

Post-Tonsillectomy Outcomes in Children with Obstructive Sleep Apnea

Subodh Kumar[1], Abhinav Kumar[2]

[1]Senior Resident, Department of ENT, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India

[2]Senior Resident, Department of ENT, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar, India

Received: 01-02-2026 / Revised: 15-03-2026 / Accepted: 21-04-2026

Corresponding author: Dr. Abhinav Kumar

Conflict of interest: Nil

Abstract

Background: Obstructive Sleep Apnoea (OSA) in children is a common sleep-related breathing disorder that is mostly caused by adenotonsillar enlargement. OSA, if untreated, can cause growth irregularities in behavior and heart problems. Tonsillectomy, with or without adenoidectomy is the first-line therapy, but postoperative response may be poor and children may experience residual symptoms.

Methods: 150 children were included in this retrospective hospital-based study aged between 3–14 years and diagnosed with OSA treated by tonsillectomy between January 2025 and January 2026. Demographic information, preoperative symptoms, resolution of symptoms following the operation and complications were recorded from medical records. Outcomes evaluated were symptomatic improvement and residual features of OSA at follow-up. Statistical analysis occurred through descriptive and inferential approaches, $p<0.05$ was accepted as significant.

Results: OSA symptoms resolved completely in 68% of children, whereas 22.7% improved partially and 9.3% remained unchanged postoperatively. The most frequently observed preoperative symptoms included habitual snoring (100%), mouth breathing (84%) and witnessed apnea (74.7%). Postoperative complications were mostly mild, and pain occurred in 78.7%, secondary haemorrhage in 6%, infection in 4% and respiration problems in 3.3% of patients. Older age, obesity and severe preoperative OSA were independent risk factors for incomplete resolution of symptoms.

Conclusion: Tonsillectomy is an effective and safe therapy for pediatric OSA, but some children have residual disease. For superior long-term outcomes after surgery, it's important to have close follow-up and treatment from a variety of fields.

Keywords: Adenotonsillectomy, Children, Obstructive Sleep Apnea, Outcomes, Tonsillectomy.

DOI: 10.25258/ijcpr.18.5.13

Introduction

Children with OSA have trouble breathing while they sleep because their upper airways get blocked during the night and this changes the way their bodies breathe and the way their sleep is altered [1]. Pediatric OSA does not usually present as excessive daytime sleepiness, in contrast to adult populations. The most common aetiology is adenotonsillar hypertrophy which leads to sleep-induced airway narrowing [2]. Obesity, craniofacial anomalies, neuromuscular disease, and allergic airway disease are other contributing factors [3,4].

If left untreated, paediatric OSA may lead to severe multi-organ complications involving physical, cognitive and emotional development [5]. Chronic sleep fragmentation and intermittent hypoxia could disturb growth hormone release. Behavioural disturbances like hyperactivity, irritability, short attention span and learning disabilities are commonly mentioned resembling the features of attention-deficit syndrome [6]. Long-standing OSA has also been linked with cardiovascular effects such as systemic hypertension, pulmonary hypertension and left ventricular remodeling [7]. Metabolic derangements such as insulin resistance and dyslipidemia are also increasingly being identified, highlighting that pediatric OSA provides a major health issue with long-term health implications.

Tonsillectomy with or without adenoidectomy are commonly considered as first-line surgical treatment for pediatric OSA, especially in cases of adenotonsillar hypertrophy [8,9]. The operation is intended to widen the upper airway, reduce flow

limitation and restore a normal sleeping pattern [10]. The majority of children have a affected resolution of snoring, apnea, and daytime behavioral symptoms after surgery. Treatment success is not however universal. OSA residual itself seems to occur in a subgroup of patients, especially those with obesity or severe preoperative OSA and specific comorbidities [11,12]. These changes underscore the necessity of outcome analysis beyond expected clinical status.

While adenotonsillectomy is the traditional intervention for pediatric OSA, outcome series from common hospital practice have yet to be done in many areas. The literature consists largely of data from establishment-based specialized sleep centers and may not be generalizable to every clinical setting. Furthermore, differences in demographic characteristics, nutritional status and access to postoperative follow-up may affect treatment outcome. The requirement for retrospective analyses with hospital chart review to evaluate rates of symptomatic improvement, complications and persistence of OSA in varied pediatric cohorts is apparent. This information may help clinicians in counseling families and planning for postoperative surveillance.

Objectives

- To measure the magnitude of improvement in OSA among children undergoing tonsillectomy with or without adenoidectomy.
- To determine the incidence and nature of complications after tonsillectomy in children with OSA.
- To identify clinical predictors of continued or residual OSA symptoms following surgical intervention.

Materials and Methods

Study Design and Setting: This retrospective hospital-based study was conducted at a tertiary care centre. Pediatric patients' medical records were lost during a year from January 2025 to January 2026. The purpose of the work is to estimate the outcomes following tonsillectomy with or without adenoidectomy in children with OSA. Ethical clearance of this study was approved by institution's ethical committee and patient confidentiality was assured throughout the study.

Study Population: A total of 150 children ranging from 3 to 14 years were included in the study. All subjects had a diagnosis of OSA, which was established by history, physical examination, and where applicable, supportive testing. These children were treated with tonsillectomy, with or without adenoidectomy for OSA. Patients with complete preoperative evaluation and postoperative follow-up were considered eligible for the analyses.

Inclusion Criteria

- Clinical diagnosis of OSA.
- Received a tonsillectomy with or without adenoidectomy as inpatient treatment during the study period.
- Availability of complete medical records.
- Documented preoperative symptom assessment.
- Recoded postoperative follow-up with documentation of preoperative symptom improvement.
- Recorded information on postoperative complications.

Exclusion Criteria

- Craniofacial syndromes affecting airway anatomy
- Neuromuscular disorders cause of airway obstruction
- Other structural airway anomalies
- History of previous airway surgery
- Incomplete or missing medical records

Data Collection: From hospital medical records data were extracted. Recorded data comprised patient demographics, age, sex, symptoms on presentation, snoring, observed apneas and mouth breathing and OSA severity based on clinical examination. Polysomnography results were recorded whenever possible. Postoperative data were reviewed to establish the resolution of symptoms, residual symptoms and any intra- or post-operative complications, including bleeding, infection and respiratory distress. Follow-up visit times and their details were also recorded.

Outcome Measures: The primary outcome was improvement in OSA symptoms after tonsillectomy as demonstrated by clinical follow-up postoperatively. Secondary outcomes were the incidence and category of postoperative complications, and further medical or surgical interventions for persistence or recurrence of symptoms.

Statistical Analysis: Statistical software was implemented for peering at the data. Descriptive statistics were used to describe demographic and clinical factors. Chi-square and t-tests were used to look for associations, and $p < 0.05$ was considered statistically significant.

Results

Demographic Profile

Table 1: Demographic Profile of Study Participants (n = 150)

Variable	Category	Number of Children	Percentage (%)
Age Group (years)	3–5	48	32%
	6–8	46	30.7%
	9–11	34	22.7%
	12–14	22	14.6%
Gender	Male	92	61.3%
	Female	58	38.7%

Most of the children (62.7% of them) are between the ages of 3 and 8, which is the peak age for adenotonsillar hypertrophy. Predominance male to female ratio is approximately 1.6:1, which is consistent with previous report are pedriatric OSA trends.

Preoperative Clinical Features

Table 2: Preoperative Symptoms in Children with OSA

Symptom	Number of Children	Percentage (%)
Habitual snoring	150	100%
Witnessed apnea	112	74.7%
Mouth breathing	126	84%
Daytime symptoms	98	65.3%

The presence of habitual snoring among all the children in this study reinforced that it is a significant cardinal symptom of pediatric OSA.

Mouth breathing (84%) and observed apnea (74.7%) were also common. Daytime behavioral (64.1%) or functional (62.2%) disruptions affected almost two-thirds, illustrating the broader neurocognitive implications of sleep disordered breathing in children.

Postoperative Symptom Improvement

Table 3: Post-Tonsillectomy Symptom Outcomes

Outcome Category	Number of Children	Percentage (%)
Complete resolution	102	68%
Partial improvement	34	22.7%
Persistent symptoms	14	9.3%
Total	**150**	**100%**

After tonsillectomy, 68% of the children had total resolution of OSA-related complaints related with lack of reported snoring and apneic episodes on follow-up visits. Partial recovery occurred in 22.7% of patients, and symptoms were decreased but still remained in these cases. Only a minority (9.3%) reported persistent symptoms indicative of residual OSA. These results demonstrate that tonsillectomy is effective but a significant proportion of children may still need further reassessment and treatment, especially if additional risk factors are present.

Postoperative Complications

Table 4: Postoperative Complications Observed

Complication	Number of Children	Percentage (%)
Postoperative pain	118	78.7%
Secondary bleeding	9	6%
Local infection	6	4%
Respiratory complications	5	3.3%

The most common complication was pain after surgery, which happened to 78.7% of the children and was handled conservatively. Recurrent bleeding was noted in 6% of cases with no permanent consequences. Infection and respiratory complications were rare, with less than 5% of patients affected. Severe postoperative incidents were infrequent following tonsillectomy.

Factors Associated with Outcomes

Table 5: Factors Associated with Persistent or Partial OSA Symptoms

Factor	Persistent/Partial (%)	Complete Resolution (%)	p-value
Age > 10 years	38%	62%	0.03
Obesity	42%	58%	0.01
Severe preoperative OSA	46%	54%	0.002
Mild–Moderate OSA	18%	82%	—

More age, obesity and severe preoperative OSA were independently associated with incomplete symptom resolution following surgery ($p < 0.05$). Recovery rates were higher in patients with mild-to-moderate OSA. These results imply that some clinicopathologic parameters might be associated with the presence of residual disease and underline our obligation to optimize postoperative follow-up in high-risk subsets.

Discussion

This was a retrospective study of 150 children who were diagnosed with OSA and post-tonsillectomy follow-up. Results show that tonsillectomy, with or without adenoidectomy, led to significant symptomatic improvement for most patients. Full improvement of OSA symptoms was obtained in 68% of children, while partial improvement was found in 22.7%. However, 9.3% remained symptomatic with some signs of residual OSA. Postoperative complications were mostly mild and treated, with the most frequent being pain, extra low rates of bleeding, infection and respiratory sequelae. Moreover, advanced age, obesity and severe preoperative OSA were independent risk factors for failed recovery.

Table 6: Comparison with Other Similar Studies

Study	Study Type	Sample Size	Key Findings
Current Study	Retrospective hospital-based	150 children	Complete symptom resolution in 68%; partial improvement in 22.7%; persistent OSA in 9.3%. Complications were mainly pain, with low rates of bleeding and respiratory issues. Older age, obesity, and severe preoperative OSA were associated with residual symptoms.
Study 1 [13]	Retrospective chart review	85 children	Significant reduction in AHI from 35.4 to 7.1 post-surgery. Only 9.4% achieved AHI ≤ 1; most had residual elevations in AHI postoperatively. Emphasizes need for postoperative monitoring.
Study 2 [14]	Retrospective cohort	196 children	Significant improvement in quality-of-life scores after surgery. Most children were male; ~26.5% experienced postoperative complications. Shown improvements in areas of physical complaints and sleep problems.
Study 3 [15]	Prospective longitudinal	135 children	Adenotonsillectomy significantly reduced AHI initially, but residual OSA (AHI >1) persisted in 53.4% at 6 months and increased over time. Long-term follow-up showed incomplete resolution in many. Highlights the importance of extended monitoring.

Explanation for Persistent OSA in Some Children: Even though tonsillectomy had a high success rate in this study, some children performed not entirely heal from their OSA. This may be due to several reasons, with obesity being known to cause airway restriction because of fat deposition around the pharyngeal structures, which is not ameliorated by adenotonsillar removal alone. Older children may have other anatomical or neuromuscular components to airway collapse that decrease the relative effect of surgery. Preoperative severe OSA may reflect a multi-level airway obstruction such as an involvement of the tongue base or nasal airway. In addition, allergic rhinitis, craniofacial structure and genetic predisposition could be factors associated with OSA in children and perhaps the disease is polyfactorial instead of being only adenotonsillar.

Clinical Implications: The findings of this study demonstrate that although tonsillectomy is an efficacious primary therapy in children with OSA, ongoing surveillance is critical after surgery. Those children who persist in snoring or are symptomatic during the day cannot be considered cured without additional assessment. The follow-up visit is an opportunity to evaluate the persistence of symptoms, again counsel in weight management for obese children and to screen for those who may require further intervention such as medical therapy or Continuous Positive Airway Pressure (CPAP). Polysomnography (PSG), although not universally conducted, should be contemplated in selected high-risk children, especially those with ongoing symptoms, obesity or severe preoperative disease for objective assessment of residual OSA severity.

Strengths and Limitations of the Study: The present study has the advantage of a large sample size and is based on actual clinical practice in a tertiary hospital. The relatively large pediatric age span includes also to the general use of the findings. The retrospective nature may impose some limitations, such as dependence on documentation completeness and variability of follow-up time. Objective sleep study data were not available in some patients and symptoms assessment could lead to underestimation or overestimation of true OSA resolution. Long-term effects at times of follow-up were not measured.

Conclusion

This retrospective study reveals that tonsillectomy, with or without adenoidectomy, is an acceptable first-line therapy for pediatric patients with OSA. A high proportion of patients in this study achieved complete or marked resolution of their symptoms after surgery, confirming the adenotonsillar hypertrophy as one of the major reversible causes for airway obstruction in children. The operation was also proven to be safe, while there were no significant postoperative complications, if the morcellation-related problem occurred, it could be manageable with ordinary care.

The results also demonstrate that surgery does not universally cure OSA in all children. A subset of patients still had persistent or partially relieved complaints after tonsillectomy. Predisposing factors such as higher age, obesity and severe preoperative disease seem to be associated with residual OSA and airway obstruction in children, and may rather have multiple causes. These cases emphazise that several groups in which tonsillectomy is performed should not be considered as cured.

The importance of organised out-patient follow-up to identify children with continuing symptoms that may necessitate further investigation or management is emphasized in this study. Multidisciplinary care from an otolaryngologist, pediatrician, sleep specialist, and nutritionist is required for the best long-term results. In some patients, postoperative polysomnography may be indicated to objectively evaluate persistent disease. If children with OSA are diagnosed and treated early, they may avoid long-term problems and have a better quality of life.

Future Research

Future studies should focus on prospective, multicenter trials that would result in more robust data on post-tonsilectomy outcomes in children with OSA. Conducting routine preoperative and postoperative PSG would enable objective measurement of disease severity and true cure rates. Longitudinal follow-up is also required to determine whether symptoms return with growth, weight gain or pubertal airway development. Future studies could investigate the effects of combination therapy on OSA residual in children as well as weight management program, medical treatment of allergic airway disease and orthodontic or craniofacial approaches to children with residual treating OSA at various levels. The use of risk stratification models to establish reliable clinical predictors for surgical success would permit the tailoring of treatment planning.

Recommendation

Tonsillectomy should remain the initial treatment option for children with OSA secondary to adenotonsillar hypertrophy. Nevertheless, clinicians must advise caregivers that full resolution of symptoms may not be observed in all children particularly older or obese who have more severe preoperative disease. Surgical follow-up should be well organized in order to pick up and address remaining symptoms as soon as possible. Children with persistent snoring, problems of behavior or with symptoms suggestive of an OSA that is still active should be further evaluated, including possible respiratory polysomnography. Such a multidisciplinary approach, including pediatricians, otolaryngologists, and sleep- and nutrition specialists, should lead to better long-term outcomes for the management of pediatric OSA.

References

1. Z. Elwell, D. Mancuso, N. E. Wolter, E. J. Propst, T. Valdez, and P. Scheffler, “Post-tonsillectomy outcomes in children with mucopolysaccharidosis and obstructive sleep apnea,” J. Otolaryngol. Head Neck Surg., vol. 52, no. 1, p. s40463-023, 2023.
2. R. Schwartz, C. Gagnon, C. Caron, M. Sauthier, and M. Bergeron, “Intensive care unit monitoring post-tonsillectomy in children with obstructive sleep apnea,” J. Otolaryngol. Head Neck Surg., vol. 54, 2025, Art. no. 19160216251379321.
3. T. C. Uwiera, “Considerations in surgical management of pediatric obstructive sleep apnea: Tonsillectomy and beyond,” Children, vol. 8, no. 11, p. 944, 2021.
4. M. Cavaliere, P. De Luca, E. De Bonis, R. Maurizi, C. Cassandro, M. Ralli, et al., “Partial intracapsular tonsillectomy in the treatment of pediatric obstructive sleep apnea/hypopnea syndrome: A prospective study with 5-year follow-up,” Eur. Arch. Otorhinolaryngol., vol. 279, no. 6, pp. 3089–3093, 2022.
5. K. Mothersole, S. O. Ulualp, P. Szmuk, and C. Liu, “The effect of tonsillectomy and adenoidectomy on upper airway obstruction patterns in children with obstructive sleep apnea,” Int. Arch. Otorhinolaryngol., vol. 27, no. 02, pp. e211–e217, 2023.
6. [6] N. A. Rossi, J. Spaude, J. F. Ohlstein, H. S. Pine, S. Daram, B. J. McKinnon, and W. Szeremeta, “Apnea–hypopnea index severity as an independent predictor of post-tonsillectomy respiratory complications in pediatric patients: A retrospective study,” Ear Nose Throat J., vol. 103, no. 7, pp. 424–429, 2024.
7. H. M. Sjöblom, M. Nahkuri, M. Suomela, J. Jero, and J. M. Piitulainen, “Treatment of sleep apnoea with tonsillectomy: A retrospective

analysis using long-term follow-up data," Eur. Arch. Otorhinolaryngol., vol. 279, no. 7, pp. 3727–3732, 2022.
8. M. M. Carr, E. W. Schaefer, and J. R. Schubart, "Post-tonsillectomy outcomes in children with and without narcotics prescriptions," Ear Nose Throat J., vol. 100, no. 2, pp. 124–129, 2021.
9. N. Saied, R. N. Solis, J. Funamura, J. Chen, C. Lammers, and K. Nandalike, "Clinical characteristics and post-operative outcomes in children with very severe obstructive sleep apnea," Children, vol. 9, no. 9, p. 1396, 2022.
10. J. E. Cledera, M. C. H. Lozada, and K. L. Bautista, "Postoperative pulmonary complications following adenotonsillectomy in pediatric patients with obstructive sleep apnea in a tertiary government hospital," Acta Med. Philipp., vol. 58, no. 22, p. 23, 2024.
11. S. V. Raj, K. L. Vittetoe, E. L. Mace, D. Larson, and A. S. Whigham, "Utility of concurrent pharyngoplasty with adenotonsillectomy to treat pediatric obstructive sleep apnea," Int. J. Pediatr. Otorhinolaryngol., 2025, Art. no. 112571.
12. H. H. Chuang, L. A. Lee, L. P. Chuang, H. Y. Li, Y. S. Huang, S. H. Chou, et al., "Alterations of gut microbiome composition and function pre- and post-adenotonsillectomy in children with obstructive sleep apnea," J. Otolaryngol. Head Neck Surg., vol. 53, 2024, Art. no. 19160216241293070.
13. K. S. Ji, N. H. Greene, R. J. Eapen, E. Commesso, and E. M. Raynor, "Pre- versus post-tonsillectomy intraoperative bupivacaine injection in the pediatric population: An age- and surgical indication-stratified analysis," Ear Nose Throat J., vol. 101, no. 8, pp. 518–525, 2022.
14. N. Ahmad, D. Roke, J. Kilkelly, T. Demidovich, A. Zepeda, A. Oster, et al., "A retrospective study on pain sensitivity in pediatric patients with severe obstructive sleep apnea undergoing adenotonsillectomy," Anesthesiol. Pain Med., vol. 15, no. 4, p. e163436, 2025.
15. A. I. Alsaleem, K. M. Alsultan, S. A. Alsaif, B. M. Almatrafi, and A. A. Alsaif, "Role of orthodontics and otorhinolaryngology in the management of pediatric obstructive sleep apnea (POSA)," 2025.