

Long-Term Outcomes of Tonsillectomy in Padiatric PatientsPrince Kumar¹, Nisha Sharma², Sandeep Bansal³¹Senior Resident, Department of Ear, Nose & Throat, Post Graduate Institute of Medical Education & Research, Chandigarh, Punjab, India²Senior Resident, Department of Ear, Nose & Throat, Indira Gandhi Institute of Medical Sciences, Shimla, Himachal Pradesh, India³Professor, Department of Ear, Nose & Throat, Post Graduate Institute of Medical Education & Research, Chandigarh, Punjab, India

Received: 27-10-2024 / Revised: 25-11-2024 / Accepted: 27-12-2024

Corresponding Author: Prince Kumar

Conflict of interest: Nil

Abstract:**Background:** Tonsillectomy is one of the most frequently performed surgical procedures in pediatric populations, primarily indicated for recurrent tonsillitis and obstructive sleep apnea (OSA). While short-term outcomes are well documented, there remains a need to evaluate the long-term benefits and potential complications associated with the procedure.**Aim:** To assess the long-term outcomes of tonsillectomy in pediatric patients, focusing on symptom resolution, postoperative complications, quality of life improvements, and parental satisfaction.**Methods:** This prospective observational study included 80 pediatric patients who underwent tonsillectomy at the Post Graduate Institute of Medical Education & Research, Chandigarh, Punjab, between January 2020 and August 2023. Data were collected on demographics, surgical indications, postoperative complications, and symptom improvement. Quality of life was assessed using the Pediatric Quality of Life Inventory (PedsQL™), and statistical analysis was performed using SPSS version 23.0.**Results:** Of the 80 patients (mean age 8.3 ± 2.7 years; 58.8% male), 60% underwent surgery for recurrent tonsillitis and 40% for OSA. Complete symptom resolution was reported in 87.5% of patients in both groups. Postoperative complications occurred in 15% of patients, with prolonged pain (8.8%) and secondary hemorrhage (3.8%) being the most common. Mean PedsQL™ scores improved significantly from 63.4 ± 7.1 preoperatively to 84.7 ± 5.8 postoperatively ($p < 0.001$). Parental satisfaction was high, with 95% reporting “satisfied” or “very satisfied” with the outcome.**Conclusion:** Tonsillectomy in pediatric patients is associated with a high rate of symptom resolution, significant improvement in quality of life, and minimal complications. These findings support the continued use of tonsillectomy as an effective treatment for appropriately selected pediatric cases of recurrent tonsillitis and OSA.**Recommendations:** Clinicians should continue to consider tonsillectomy as a beneficial intervention in children with clearly defined indications. Long-term follow-up should be integrated into post-surgical care to monitor outcomes and address potential complications.**Keywords:** Tonsillectomy, Pediatric surgery, Obstructive sleep apnea, Recurrent tonsillitis, Quality of life.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Tonsillectomy is one of the most common surgical procedures performed in children, with indications primarily including recurrent tonsillitis and obstructive sleep apnea (OSA). Although the procedure has been performed for centuries, recent advancements in surgical techniques and a better understanding of its long-term outcomes have prompted a reevaluation of its benefits and risks. Tonsillectomy in pediatric patients is particularly significant due to its potential to improve both physical health and quality of life by resolving chronic infections and alleviating upper airway obstruction [1]. This study aims to evaluate the long-

term outcomes of tonsillectomy, specifically its impact on symptom resolution, complication rates, and overall quality of life in pediatric patients.

Recurrent tonsillitis and OSA are prevalent conditions in children that often lead to chronic morbidity. Recurrent tonsillitis, defined as multiple episodes of throat infections, can result in significant discomfort and missed school days, while OSA in children is associated with behavioral issues, developmental delays, and increased cardiovascular risk [2]. Tonsillectomy has long been considered a first-line treatment for these conditions, particularly

when conservative management, such as antibiotics or continuous positive airway pressure (CPAP) therapy, fails [3]. However, while the short-term benefits of tonsillectomy are well established, recent studies have focused on its long-term outcomes, including the resolution of symptoms, complications, and its influence on the patient's overall well-being [4].

The role of tonsillectomy in improving quality of life is a particularly important aspect of its outcomes. Several studies have demonstrated that the procedure can lead to substantial improvements in sleep quality, daytime behavior, and cognitive function, especially in children with OSA [5]. Furthermore, parental satisfaction with the surgery has been shown to be high, as parents report significant reductions in both the frequency of infections and the severity of sleep disturbances [6]. However, like any surgical procedure, tonsillectomy is not without risks. Potential complications include bleeding, infection, and prolonged pain, which can impact postoperative recovery [7].

Given the variation in outcomes and the potential for long-term benefits, it is crucial to assess these factors in a structured manner to guide clinical decision-making. To assess the long-term outcomes of tonsillectomy in pediatric patients, focusing on symptom resolution, postoperative complications, quality of life improvements, and parental satisfaction.

Methodology

Study Design: This study was conducted as a prospective observational study.

Study Setting: The study was carried out at the Department of Otorhinolaryngology, Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh, Punjab. Data were collected over a period of three years and eight months, from 1st January 2020 to 31st August 2023.

Participants: A total of 80 pediatric patients who underwent tonsillectomy during the study period were enrolled. These patients were selected based on predefined eligibility criteria and were followed up to assess their postoperative outcomes.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Pediatric patients aged 3 to 14 years.
- Patients who underwent tonsillectomy for either recurrent tonsillitis or obstructive sleep-disordered breathing.
- Patients with a minimum postoperative follow-up of six months.
- Written informed consent obtained from parents or legal guardians.

Exclusion Criteria:

- Children with immunodeficiency disorders.
- Patients with co-existing adenoidectomy or other major concurrent surgeries.
- Patients lost to follow-up or with incomplete clinical records.
- Children with pre-existing neurological or developmental disorders.

Bias: Selection bias was minimized by using consecutive sampling of all eligible pediatric patients undergoing tonsillectomy during the study period. Observer bias was reduced by having postoperative assessments conducted by clinicians not involved in the surgical procedure. Recall bias was minimized by using structured clinical records and parental interviews conducted shortly after surgery and during follow-up.

Data Collection: Data were collected using a standardized data collection form. Information was obtained from hospital records, operative notes, and follow-up visits. Variables included demographic details, indication for surgery, intraoperative findings, postoperative complications, symptom resolution, and parental satisfaction.

Procedure: All patients underwent tonsillectomy under general anesthesia using standard dissection and snare or coblation techniques, as appropriate. Postoperative care included routine pain management and monitoring for complications such as bleeding, infection, or voice changes. Follow-up evaluations were performed at 1 month, 3 months, and 6 months postoperatively. Long-term outcomes were assessed via clinical examination and structured parental interviews.

Statistical Analysis: Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 23.0. Descriptive statistics such as means, medians, and standard deviations were calculated for continuous variables. Categorical variables were expressed as frequencies and percentages. Comparative analysis was performed using the Chi-square test or Fisher's exact test for categorical variables, and independent t-test or Mann-Whitney U test for continuous variables, where applicable. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 80 pediatric patients who underwent tonsillectomy between January 2020 and August 2023 were included in the study. The mean age of the participants was 8.3 ± 2.7 years (range: 3–14 years). Of these, 47 (58.8%) were males and 33 (41.2%) were females.

Table 1: Demographic Characteristics of the Study Participants (N = 80)

Characteristic	Value
Mean Age (years)	8.3 ± 2.7
Age Range (years)	3–14
Gender	
- Male	47 (58.8%)
- Female	33 (41.2%)
Indication for Surgery	
- Recurrent Tonsillitis	48 (60.0%)
- Obstructive Sleep Apnea	32 (40.0%)

The majority of patients were males and the most common indication for surgery was recurrent tonsillitis.

2. Postoperative Symptom Improvement

Significant symptom improvement was observed in both patient groups. Among patients with recurrent tonsillitis, 42 (87.5%) reported no recurrence during the 6-month follow-up. In the OSA group, 28 (87.5%) patients showed complete resolution of snoring and daytime somnolence.

Table 2: Symptom Resolution Post-Tonsillectomy

Outcome	Recurrent Tonsillitis (n = 48)	OSA (n = 32)
Complete Resolution	42 (87.5%)	28 (87.5%)
Partial Improvement	5 (10.4%)	3 (9.4%)
No Improvement	1 (2.1%)	1 (3.1%)

The effectiveness of tonsillectomy was high, with most children reporting either complete or partial symptom resolution.

3. Postoperative Complications

Minor complications occurred in 12 patients (15%). The most common complication was postoperative pain lasting >7 days. Secondary hemorrhage was reported in 3 patients (3.8%), all of whom recovered with conservative management.

Table 3: Postoperative Complications

Complication	Frequency (n)	Percentage (%)
Prolonged Pain (>7 days)	7	8.8%
Secondary Hemorrhage	3	3.8%
Infection/Fever	2	2.5%
Total	12	15.0%

The complication rate was low and manageable, with no major or life-threatening outcomes.

4. Parental Satisfaction and Quality of Life

Parental satisfaction was high, with 66 (82.5%) parents rating the procedure outcome as "Very

Satisfied", and 10 (12.5%) as "Satisfied". Using the PedsQL™ (Pediatric Quality of Life Inventory) scores, the mean preoperative score was 63.4 ± 7.1, which increased significantly to 84.7 ± 5.8 at 6 months postoperatively (p < 0.001, paired t-test).

Table 4: Parental Satisfaction and Quality of Life Scores

Outcome Measure	Preoperative Score	Postoperative Score	p-value
PedsQL™ Mean Score	63.4 ± 7.1	84.7 ± 5.8	<0.001*
Parental Satisfaction			
- Very Satisfied	—	66 (82.5%)	—
- Satisfied	—	10 (12.5%)	—
- Neutral/Not Satisfied	—	4 (5.0%)	—

A statistically significant improvement in pediatric quality of life was observed post-surgery, with a high level of parental satisfaction.

Key Findings

- The most common indication was recurrent tonsillitis (60%).

- Symptom resolution was observed in >85% of both tonsillitis and OSA groups.
- Postoperative complications occurred in 15%, mostly minor.
- Significant improvement in quality of life and high parental satisfaction were noted.

- Statistical analysis confirmed the significance of postoperative improvements ($p < 0.001$).

Discussion

In this prospective observational study involving 80 pediatric patients undergoing tonsillectomy at PGIMER, Chandigarh, the findings revealed a strong positive impact of the procedure on both symptom resolution and quality of life. The average age of participants was 8.3 years, with a male predominance (58.8%). The majority underwent tonsillectomy for recurrent tonsillitis (60%), while the remaining 40% had surgery for obstructive sleep apnea (OSA).

Postoperatively, a substantial proportion of patients demonstrated complete resolution of symptoms. Specifically, 87.5% of children in both the recurrent tonsillitis and OSA groups reported complete relief from their preoperative complaints. Only a small fraction experienced partial or no improvement. These findings highlight the effectiveness of tonsillectomy in appropriately selected pediatric cases, supporting its role in managing both infectious and obstructive indications.

The overall complication rate was low (15%), with prolonged pain being the most frequent issue. Secondary hemorrhage occurred in only 3 patients (3.8%) and was managed conservatively, indicating a favorable safety profile for the procedure when performed in a controlled hospital setting.

A significant improvement in quality of life was observed, as measured by the Pediatric Quality of Life Inventory (PedsQL™). The mean score improved from 63.4 preoperatively to 84.7 postoperatively ($p < 0.001$), indicating not only clinical improvement but also better physical, emotional, and social well-being. Furthermore, 95% of parents expressed satisfaction with the surgical outcome, reflecting strong parental approval and perceived benefit.

Recent studies have shed light on the complex long-term outcomes of tonsillectomy in pediatric populations. Hariharan and Patel (2019) emphasized that while tonsillectomy is frequently performed to manage recurrent tonsillitis and obstructive sleep apnea, it is increasingly associated with adverse long-term effects. These include a higher incidence of respiratory, infectious, and allergic disorders, suggesting overtreatment and highlighting the need for more conservative, evidence-based surgical criteria [8]. In a large retrospective cohort, Asulin et al. (2024) compared tonsillotomy and tonsillectomy in nearly 2,000 children, finding significantly lower postoperative bleeding and readmission rates in the tonsillotomy group, suggesting that partial removal may be safer in the short term. However, long-term benefits and risks require further scrutiny [9]. Boiko et al. (2022) presented a comprehensive literature

review and found that while tonsillectomy provides lasting symptom relief for conditions like obstructive sleep apnea and recurrent tonsillitis, it may also increase the long-term risk of autoimmune and upper respiratory diseases, underscoring the importance of stringent patient selection [10].

Rao et al. (2024) evaluated 240 pediatric patients who underwent tonsillectomy and adenoidectomy and found a recurrence rate of 6.7% for tonsillitis and adenoiditis. Additionally, the most common postoperative complications included bleeding (5.2%) and infection (3.1%) [11]. In contrast, Bennett et al. (2021) conducted a prospective observational study using the Pediatric Throat Disorders Outcome Test (T-14) and reported significant quality of life improvements up to two years post-surgery, indicating durable symptomatic relief and satisfaction among patients and families [12]. A long-term comparison by Soaper et al. (2020) between intracapsular and extracapsular tonsillectomy techniques in over 2,500 patients showed that intracapsular methods had substantially lower rates of post-tonsillectomy hemorrhage (0.76% vs. 2.3%) and revision surgery (0.12% vs. 0%), suggesting it is a safer and more effective surgical technique for long-term outcomes [13].

These findings collectively indicate that while tonsillectomy offers meaningful long-term symptom relief, potential risks such as autoimmune complications, recurrence, and surgical morbidity necessitate judicious patient selection and consideration of less invasive alternatives like tonsillotomy.

Conclusion

The study supports tonsillectomy as an effective and safe intervention for pediatric patients with recurrent tonsillitis or OSA, leading to high symptom resolution, minimal complications, and a marked improvement in quality of life. These findings align with existing literature and reinforce the importance of proper patient selection and follow-up in achieving optimal long-term outcomes.

References

1. Finkelstein Y, et al. Tonsillectomy in children: a review of clinical outcomes. *Pediatrics*. 2019;143(3):e20181415.
2. Bhattacharyya N. Obstructive sleep apnea and tonsillectomy in children: a systematic review. *Otolaryngol Head Neck Surg*. 2018;158(5):801-808.
3. Rao P, et al. Tonsillectomy for recurrent tonsillitis in children: outcomes and complications. *Eur J Pediatr*. 2021;180(5):1373-1379.
4. Tabae A, et al. Long-term outcomes of tonsillectomy in pediatric patients: a systematic

- review. *Laryngoscope*. 2020;130(7):1693-1702.
5. Sawyer SM, et al. Quality of life after tonsillectomy in children with obstructive sleep apnea: A randomized controlled trial. *JAMA Otolaryngol Head Neck Surg*. 2020;146(4):308-314.
 6. Baker L, et al. Parent satisfaction following pediatric tonsillectomy for obstructive sleep apnea: A cohort study. *Int J Pediatr Otorhinolaryngol*. 2022;152:110959.
 7. Kim JH, et al. A review of complications in pediatric tonsillectomy. *Ann Otol Rhinol Laryngol*. 2021;130(3):243-248.
 8. Hariharan NN, Patel K. Novel evidence depicting adverse long-term outcomes linked to tonsillectomy: a spotlight on overtreatment. *McMaster Univ Med J*. 2019;16(1):45-49.
 9. Asulin Z, Cohen O, Forer B, Sichel J, Attal P, Shaul C. Comparison of postoperative bleeding in pediatric tonsillectomy versus tonsillotomy. *Int J Pediatr Otorhinolaryngol*. 2024;186:112125.
 10. Boiko NV, Stagnieva I, Kim AS, Gukasyan E, Zatulivetrova DO, Stateshnaya PA. Long-term impacts of tonsillectomy in children. *Bull Contemp Clin Med*. 2022;15(5):93-99.
 11. Rao PSN, Ajmeera R, Abhishek M, Nalini MR, Malik K, Nelson A, et al. Retrospective review of tonsillectomy and adenoidectomy outcomes in pediatric patients: complications and recurrence rates. *J Pharm Bioall Sci*. 2024;16:S2407-S2409.
 12. Bennett S, Gao J, Osen E, Myuran T. Long-term impact of paediatric tonsillectomy and adenotonsillectomy on the Paediatric Throat Disorders Outcome Test: a prospective observational study. *J Laryngol Otol*. 2021;136:1066-1070.
 13. Soaper AL, Richardson ZL, Chen JL, Gerber M. Pediatric tonsillectomy: a short-term and long-term comparison of intracapsular versus extracapsular techniques. *Int J Pediatr Otorhinolaryngol*. 2020;133:109970.