

Complications of Pediatric Tonsillectomies at Divisional Headquarter Teaching Hospital Kohat: Descriptive Case Series Study

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Abstract: Tonsillectomy is a commonly performed surgical procedure in pediatric patients for recurrent tonsillitis and obstructive sleep apnea. Despite its effectiveness, postoperative complications can impact recovery and patient outcomes. Identifying the frequency and nature of these complications can aid in optimising perioperative management and reducing morbidity. **Objective:** This study aimed to determine the frequency of complications following pediatric tonsillectomy. **Methodology:** A descriptive case series was conducted at the Department of ENT, Divisional Headquarter Teaching Hospital Kohat. One hundred thirty-one pediatric patients aged 1 to 12 years who underwent tonsillectomy were included through non-probability consecutive sampling. Patients with hematological disorders, congenital anomalies, or those undergoing adenotonsillectomy were excluded. Ethical approval was obtained, and informed consent was secured from guardians. Tonsillectomy was performed using extracapsular dissection and bipolar electrocautery techniques, with postoperative follow-up on the 1st, 7th, and 15th days. Complications, including hemorrhage, respiratory distress, infection, pain, and nausea, were recorded. **Results:** The mean age was 6.15 ± 3.63 years, with 54.2% males. Hemorrhage occurred in 3.8% of cases. Respiratory complications affected 7.6% of children. Infection was seen in 9.2% of children. Pain was recorded in 4.6% of children. Nausea was the most frequent complication, occurring in 14.5% of children. **Conclusion:** Post-tonsillectomy complications vary with age. Hemorrhage (3.8%) is more frequent in older children, while respiratory complications (7.6%) affect younger ones. Infection (9.2%) is linked to shorter symptom duration, pain (4.6%) is more common in females, and nausea (14.5%) is the most frequent complication. These findings emphasise the need for enhanced postoperative monitoring and individualised management strategies to reduce morbidity.

Keywords: Pediatric tonsillectomy, postoperative complications, hemorrhage, respiratory distress, infection, pain, nausea, pediatric surgery, otolaryngology, perioperative outcomes

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Introduction

The faucial tonsils are located in the lateral region of the oropharynx. The palatine arches, or pillars, are located within the palatoglossal arch at the front and palatopharyngeal arch at the back. Tonsillitis, characterised by an inflammation of tonsils, is a prevalent condition, accounting for about 1.3% of outpatient visits. The condition primarily arises from an infection that is bacterial or viral and, in uncomplicated cases, manifests as throat discomfort (1-3).

Tonsillectomy ranks among the most frequently executed surgical interventions. Annually, more than 500,000 cases are conducted in children under 15. Two prevalent indications for this surgical procedure are sleep-related breathing problems and frequent throat infections. Multiple complications associated with tonsillectomy have been documented, including bleeding, velopharyngeal deficiency, and dehydration. The American Academy of Otolaryngology-Head and Neck Surgery defines tonsillectomy as a type of surgery that involves the complete removal of the tonsil, such as its capsule, using dissection of the peritonsillar space that exists between the tonsil capsule and the muscular wall, with or without adenoidectomy (4-6).

The perioperative morbidity associated with tonsillectomy is around 2%. The literature indicates that the overall incidence for post-surgical complications varies between 8% and 14% (7). The incidence of postoperative haemorrhage ranges from 0.5% to 24% (8). In a study, the reported frequency of hemorrhage was 33.02%, respiratory complication 14.25%, infection 13.07%, pain 8.22%, and nausea was 5.78% after tonsillectomy among children (9). The broad spectrum observed is attributed to the inconsistency in the studies found in the literature. Some

authors reported only those haemorrhages necessitating surgical intervention, while others encompassed incidents of bleeding that were addressed in an outpatient context using medical management exclusively (9).

Collaborative efforts to minimise the risks of complications in children following tonsillectomy require a thorough collection of epidemiological data describing the frequency of complications of tonsillectomy in patients, which is currently deficient. No record of previous studies covering the same topic has been conducted in the institute. No study, specifically, on complications of pediatric tonsillectomy has been published in the last 5 years in Pakistan. With tonsillectomy being the most commonly performed otolaryngology procedure, analysing this topic will provide a plethora of informational content. This study will eventually lead to a decrease in hospital visits, a decrease in the burden on hospital resources, and a significant reduction in mortality and morbidity of the patients. Therefore, I have planned to determine the frequency of complications after tonsillectomy in children at the Divisional Headquarter Teaching Hospital Kohat.

Methodology

The study was conducted as a descriptive case series at the Department of ENT, Divisional Headquarter Teaching Hospital Kohat from 11-10-2023 to 11-04-2024. The primary objective was to determine the frequency of complications associated with pediatric tonsillectomy.

The sample size was determined using WHO sample size software, based on an expected frequency of nausea of 5.78%⁹ following tonsillectomy

in children, a margin of error of 4%, and a confidence level of 95%. The calculated sample size was 131.

The research followed a non-probability consecutive sampling technique, selecting children aged 1 to 12 who underwent tonsillectomy. Patients with a history of hematological disorders, congenital anomalies, or those undergoing adenotonsillectomy were excluded from the study. Ethical approval was obtained before initiating data collection, and informed consent was acquired from the guardians of all participants to ensure compliance with ethical standards and patient confidentiality.

In this study, extracapsular dissection and bipolar electrocautery techniques were employed for tonsillectomy procedures. Both methods involve the removal of the tonsil as a single unit by dissecting lateral to the tonsil within the plane between the tonsillar capsule and the pharyngeal musculature. The procedures were carried out by experienced ENT surgeons in a controlled hospital environment, ensuring adherence to standardised surgical protocols.

Postoperative follow-up was conducted on the 1st, 7th, and 15th postoperative days, during which complications were assessed based on predefined operational definitions. The complications examined included hemorrhage, respiratory complications, infections, pain, and nausea. Hemorrhage was classified as primary (within 24 hours post-surgery) and secondary (after 24 hours but within 15 days post-surgery), with a bleeding threshold of 10 ml being the criterion for clinical significance. Respiratory complications included laryngospasm, bronchospasm, pneumonia, and pulmonary edema, which were identified through clinical examination and symptomatic presentation—erythema, tenderness, or purulent discharge at the surgical site defined infections. Postoperative pain severity was assessed using the Visual Analog Scale (VAS), considering a score greater than three as significant. Nausea was evaluated based on the urge to vomit lasting more than 15 minutes within the first 24 hours post-surgery.

All data were systematically recorded on a pre-designed proforma and subsequently analysed using IBM-SPSS v.26. Descriptive statistics were employed to calculate frequencies and percentages for categorical variables such as gender distribution and the prevalence of complications. For continuous variables such as age and duration of complaints, mean and standard deviation (SD) were calculated. To identify statistically significant differences, complications were stratified according to age, gender, and duration of symptoms, and a chi-square test was applied with a p-value ≤ 0.05 considered significant.

Results

The study included 131 participants, with a mean age of approximately 6.15 ± 3.63 years, reflecting a relatively young cohort. The sample comprised slightly more males (54.2%) than females (45.8%), and the age

distribution was nearly balanced between younger children (1–6 years, 52.7%) and older children (7–12 years, 47.3%). The duration of preoperative complaints averaged around 3.07 ± 1.48 months, indicating a moderate period of symptoms before intervention.

Postoperative complications were documented across several categories. Hemorrhage occurred in 3.8% of cases, with a notable age-related pattern: 20.0% of these incidents were observed in children aged 1–6 years compared to 80.0% in those aged 7–12 years. Respiratory complications arose in 7.6% of participants, disproportionately affecting younger children (80.0% in the 1–6 age group). Infections were reported in 9.2% of cases, with a higher prevalence in children with shorter symptom durations (75.0% in those with complaints lasting 1–3 months vs 25.0% in those with complaints exceeding three months). Pain was less common, affecting 4.6% of participants, though two-thirds of these cases occurred in younger children. Nausea emerged as the most frequent complication (14.5%), with 63.2% of affected individuals falling within the younger age bracket.

Gender stratification revealed minimal differences in complication rates. For instance, hemorrhage occurred in 60.0% of males versus 40.0% of females, while respiratory complications were slightly more prevalent in females (60.0%). Pain was reported in 66.7% of female participants compared to 33.3% of males. Nausea showed a near-even gender split (47.4% male vs 52.6% female).

Duration of preoperative complaints appeared to influence specific outcomes. Infections were more frequently observed in individuals with symptom durations of 1–3 months (75.0% vs 25.0% for longer durations). Similarly, nausea was reported in 63.2% of those with longer-standing complaints.

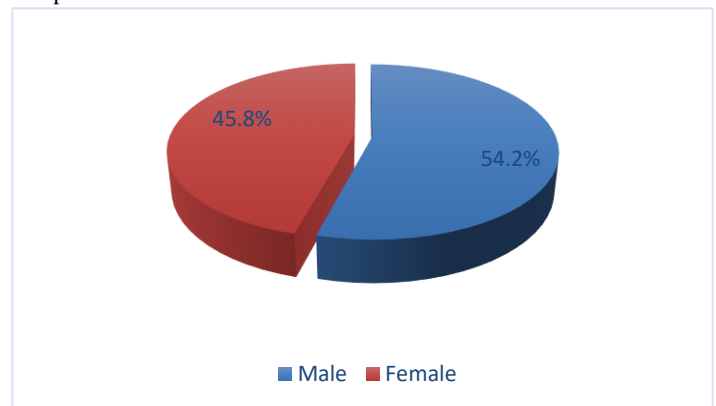


Figure 1 Gender distribution.

Table 1 Frequency of complications

Complications		N	%
Hemorrhage	Yes	5	3.8%
	No	126	96.2%
Respiratory complication	Yes	10	7.6%
	No	121	92.4%
Infection	Yes	12	9.2%
	No	119	90.8%
Pain	Yes	6	4.6%
	No	125	95.4%
Nausea	Yes	19	14.5%
	No	112	85.5%

Table 2 Stratification of complications with age

Complications		Age distribution (Years)				P value
		1 to 6		7 to 12		
		N	%	N	%	
Hemorrhage	Yes	1	20.0%	4	80.0%	0.13

Respiratory complication	No	68	54.0%	58	46.0%	0.07
	Yes	8	80.0%	2	20.0%	
Infection	No	61	50.4%	60	49.6%	0.42
	Yes	5	41.7%	7	58.3%	
Pain	No	64	53.8%	55	46.2%	0.48
	Yes	4	66.7%	2	33.3%	
Nausea	No	65	52.0%	60	48.0%	0.32
	Yes	12	63.2%	7	36.8%	
	No	57	50.9%	55	49.1%	

Table 3 Stratification of complications with gender

Complications		Gender				P value
		Male		Female		
		N	%	N	%	
Hemorrhage	Yes	3	60.0%	2	40.0%	0.79
	No	68	54.0%	58	46.0%	
Respiratory complication	Yes	4	40.0%	6	60.0%	0.34
	No	67	55.4%	54	44.6%	
Infection	Yes	5	41.7%	7	58.3%	0.36
	No	66	55.5%	53	44.5%	
Pain	Yes	2	33.3%	4	66.7%	0.29
	No	69	55.2%	56	44.8%	
Nausea	Yes	9	47.4%	10	52.6%	0.51
	No	62	55.4%	50	44.6%	

Table 4 Stratification of complications with duration of complaints

Complications		Duration of complaints (Months)				P value
		1 to 3		> 3		
		N	%	N	%	
Hemorrhage	Yes	3	60.0%	2	40.0%	0.79
	No	68	54.0%	58	46.0%	
Respiratory complication	Yes	4	40.0%	6	60.0%	0.34
	No	67	55.4%	54	44.6%	
Infection	Yes	9	75.0%	3	25.0%	0.12
	No	62	52.1%	57	47.9%	
Pain	Yes	2	33.3%	4	66.7%	0.29
	No	69	55.2%	56	44.8%	
Nausea	Yes	7	36.8%	12	63.2%	0.10
	No	64	57.1%	48	42.9%	

Discussion

The observed hemorrhage rate of 3.8% in this cohort falls within the range reported in broader studies, which cite rates of 1.1–3.4% depending on surgical technique and patient demographics¹⁰. However, the age-related distribution of hemorrhage in our research, 80% occurring in children aged 7–12 years contrasts with findings from Tran AH et al., who identified older age as a risk factor but focused on adolescents up to 19 years (9). This discrepancy may reflect anatomical or physiological differences between younger children and adolescents, such as vascular development or healing patterns, which need further exploration.

Respiratory complications, reported in 7.6% of cases here, were disproportionately higher in younger children (80% in ages 1–6 years). This aligns with Cooper F et al., who noted elevated risks of respiratory distress and reintubation in children under 24 months (11). While the current study did not include infants, the trend suggests that younger age subgroups face heightened vulnerability even within the pediatric population, possibly due to smaller airway dimensions or immature compensatory mechanisms. Notably, the absence of severe complications like mediastinitis or cervical osteomyelitis—reported in rare cases by

Leong SCL et al., highlights the generally low incidence of such events but underscores the need for vigilance in high-risk groups (13).

Infections occurred in 9.2% of participants, a rate consistent with the lower bounds of earlier reports (6–41%) (13). interestingly, infections were more frequent in children with shorter preoperative symptom durations (1–3 months), a finding not explicitly addressed in prior literature. This could suggest that acute or subacute inflammatory processes—standard in recurrent tonsillitis—may predispose to postoperative infections more than chronic hypertrophy. Conversely, chronic cases might involve adaptive changes in local immunity or tissue remodeling that reduce infection risks. This hypothesis aligns with observations by Schmidt R et al., who noted that intracapsular techniques reduced infection rates in hypertrophic cases, though further research is needed to clarify these dynamics (10).

Pain was reported in 4.6% of cases, a lower rate than the 3–5.4% of patients requiring hospital evaluation for pain or dehydration in other studies (13). This discrepancy may reflect differences in pain assessment protocols or analgesic regimens. For example, the current study’s reliance on caregiver-reported pain might underestimate mild-to-moderate discomfort compared to structured scales used in prospective designs. Additionally, the use of standardised postoperative care protocols,

including preemptive analgesia, could have mitigated severe pain episodes.

Nausea emerged as the most frequent complication (14.5%), consistent with Lee WC et al., who reported a 20.3% incidence. However, this study uniquely identified a link between nausea and prolonged preoperative symptom duration, with 63.2% of affected children having complaints exceeding three months. This association might be explained by chronic inflammation altering gastrointestinal motility or vagal responsiveness, though such mechanisms remain speculative. Comparatively, Cooper F et al., attributed postoperative nausea to anesthetic agents or opioid use, suggesting multifactorial etiology (11).

Gender differences in complications were minimal, mirroring broader trends in the literature. For example, hemorrhage occurred in 60% of males versus 40% of females, a nonsignificant difference consistent with Tran AH et al., who found no sex-based disparities in revisit rates (9). Similarly, respiratory complications showed a slight female predominance (60%), echoing sporadic reports of sex-specific inflammatory responses but lacking conclusive evidence (13). These subtle variations may reflect hormonal or anatomical differences but are unlikely to justify gender-specific interventions without further validation.

The relationship between preoperative symptom duration and complications introduces novel considerations. Infections were more common in children with shorter symptom durations (1–3 months), whereas nausea correlated with longer durations (>3 months). The former might indicate that acute infections create a pro-inflammatory milieu conducive to postoperative bacterial colonisation. At the same time, the latter could reflect chronic systemic effects of prolonged inflammation, such as autonomic dysfunction.

Conclusion

In conclusion, this study identified the frequency of postoperative complications following pediatric tonsillectomy, with hemorrhage occurring in 3.8%, respiratory complications in 7.6%, infections in 9.2%, pain in 4.6%, and nausea in 14.5% of cases. These findings highlight the need for tailored postoperative care, particularly for older children at higher risk of hemorrhage and younger children prone to respiratory issues. Recommendations include enhanced monitoring protocols, preoperative optimisation for acute cases, and multimodal strategies to manage nausea and pain effectively.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRB-KIMS-REC-/ECC/23/01)

Consent for publication

Approved

Funding

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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

DA (Post Graduate Trainee)

Data Collection, Manuscript Drafting, Study Design, Conception of Study, Date Entry, Development of Research Methodology Design

MSA (Assistant Professor)

Supervision, and Critical Input.

AF (Professor), **Z** (Associate Professor)

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Data Entry

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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