

Evaluating The Effect Of Tonsillectomy On Anti-Streptolysin O Titre Levels In The Pediatric Population

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Abstract

Objective: To evaluate the effect of tonsillectomy on anti-streptolysin O (ASO) titre levels in children.

Methods: This study was conducted at Railway Teaching Hospital, Rawalpindi. Approval was taken from the institutional ethical review committee. 48 patients 3 -15 years of age with ASO titre > 200IU/ml were included in the study. Tonsillectomy was performed in all patients using the bipolar technique under general anaesthesia. Standard post-operative care was provided to all patients. Patients with a history of rheumatic fever or known rheumatic heart disease were excluded from the study. ASO titre was measured at 1 month, 2 months and 3 months after tonsillectomy. SPSS 21 was used for data analysis. A P-value of < 0.05 was taken as significant.

Results: Out of 48 patients, 28 were male and 20 were female. The age range was 5 to 15 years with mean age of 08 ± 3.67 years. 3 (6%) of 48 patients showed ASO titre < 200 IU/ml at the first follow-up 1 month after tonsillectomy. 27 (56%) of 48 patients showed ASO titre < 200 IU/ml at the second follow-up 2 months after tonsillectomy. 46 (96%) of 48 patients showed ASO titre < 200 IU/ml at the third follow-up 3 months after tonsillectomy.

Conclusion: Tonsillectomy significantly reduces ASO titre levels in pediatric patients with recurrent tonsillitis. This reduction suggests that tonsillectomy can effectively mitigate the immune response to streptococcal infections. These findings support the clinical utility of tonsillectomy in managing recurrent tonsillitis and preventing streptococcal-related complications.

Keywords: Tonsillectomy, Streptococcal Infections, Tonsillitis, Rheumatic Fever

Introduction

Acute tonsillitis frequently emerges as a primary symptom of upper respiratory infections, predominantly affecting children, with an annual rate of approximately 32 occurrences per 1000 children.¹ The highest rates of incidence are noted in children aged 3 months to 5 years, and school-aged children between 6 to 12 years are also significantly susceptible. The primary bacterial culprit in cases of bacterial pharyngitis, especially in children over the age of five, is Group A beta-haemolytic streptococci (GABHS), responsible for 37% of acute pharyngitis instances. Other bacterial sources include Group C Streptococcus, *C. pneumoniae*, *M. pneumoniae*, and various anaerobes, while viruses such as Rhinovirus, Coronavirus, and Adenovirus make up around 30% of pharyngitis cases.² GABHS infections can lead to both suppurative complications—like cervical lymphadenitis and peritonsillar abscess—due to bacteria spreading to nearby tissues, and non-suppurative, immune-mediated conditions such as acute rheumatic fever and Sydenham chorea.

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The prevalence of suppurative complications has decreased with antibiotic use, yet they persist if the initial infection is overlooked or untreated.³

Non-suppurative sequelae include immune-mediated conditions like acute rheumatic fever and pediatric autoimmune neuropsychiatric disorders associated with *Streptococcus pyogenes* (PANDAS).⁴ Recent studies have linked Group A streptococcal infections with conditions such as Tourette syndrome and attention deficit disorders.⁵ The anti-streptolysin O (ASO) antibody response, a primary marker in serological testing for previous streptococcal infection, was initially measured by an assay developed by Todd. An ASO titre exceeding 200 IU/ml signals a heightened risk of rheumatic fever development, with about 80% of patients showing elevated ASO levels two months post-infection onset.⁶

Tonsillectomy ranks as the top surgical procedure within otolaryngology for children, notably improving the frequency and length of sore throat episodes, particularly in those severely afflicted.⁷ Despite this, paediatricians often administer long-acting penicillin for tonsillitis treatment, with dosages adjusted based on patient weight.⁸ Nonetheless, penicillin treatment can fail, especially in severe invasive streptococcal infections, due to factors like bacterial growth phases, poor medication adherence, antibiotic resistance, and the suppression of host immunity. Consequently, tonsillectomy plays a crucial role in preventing recurrent infections caused by streptococcal bacteria.⁹

The linkage between tonsillectomy and reduced frequency of streptococcal infections is well-noted but inadequately quantified, especially concerning the long-term immunological impact on pediatric patients. Despite the procedural commonality, the decision to proceed with tonsillectomy is often based on clinical judgment and patient history rather than definitive immunological evidence. This gap in knowledge underlines the necessity for empirical studies assessing the effect of tonsillectomy on the immune response, particularly through markers like anti-streptolysin O titre levels. Elevated ASO titres not only signify recent streptococcal infection but also correlate with an increased risk of post-streptococcal complications, which can severely impact a child's health and quality of life. By evaluating the changes in ASO levels post-tonsillectomy, this study aims to provide clearer guidance on the benefits of this surgical intervention beyond the immediate relief from chronic and recurrent tonsillitis. Furthermore, understanding the relationship between tonsillectomy and ASO titres could offer insights into the procedure's role in preventing the development of severe streptococcal sequelae, thereby informing clinical decisions and potentially leading to updated guidelines for tonsillectomy indications. This additional layer of research is crucial for advancing pediatric healthcare and ensuring that surgical interventions are optimally employed to enhance patient outcomes.

Materials And Methods

The study was conducted in the ENT department of Railway General Hospital Rawalpindi, for 6 months from July 2023 till December 2023. This study adopted a prospective cohort design. A sample of 48 subjects was calculated using the open epi website calculator using a reference study.¹⁰ Patients 3 to 15 years of age admitted for tonsillectomy having positive ASO titre (> 200 IU/ml) were included in the study. Patients with a history of rheumatic fever or known rheumatic heart disease were excluded from the study.

All participants underwent tonsillectomy with bipolar technique under general anaesthesia. Post-surgery, patients received standard care, including pain management and antibiotics as required. Follow-up visits were scheduled at one, two, and three months post-surgery. During each visit, blood samples were collected for ASO titre measurement.

Data was analyzed using SPSS 21. Descriptive statistics summarized the demographics and clinical characteristics of the participants. The change in ASO titre levels before and after the tonsillectomy was analyzed using paired t-tests or non-parametric equivalents depending on data distribution. A p-value of less than 0.05 was considered statistically significant. Chi-square tests or Fisher's exact tests were used for categorical variables.

Results

Out of total 48 patients 28 were male and 20 were females. The age range was 5 to 15 years with mean age of 08 ± 3.67 years. Table 1.

Table 1: Gender and Age distribution (n=48)

Male	28 (58%)
Female	20 (42%)
Age Range	05 – 15 years
Age Mean $\pm$ SD	08 $\pm$ 3.67 years

3 (6%) of 48 patients showed ASO titre < 200 IU/ml at the first follow-up 1 month after tonsillectomy. 27 (56%) of 48 patients showed ASO titre < 200 IU/ml at the second follow-up 2 months after tonsillectomy. 46 (96%) of 48 patients showed ASO titre < 200 IU/ml at the third follow-up 3 months after tonsillectomy. Table 2. There is a significant reduction in ASO titres after 3 months of tonsillectomy. Figure 1

Table 2: Contingency table (Fisher exact test) at first, 2nd and 3rd follow-up (n=48)

	Patients with ASO titre > 200 IU/ml	Patients with ASO titre < 200 IU/ml	p-value
1 month after surgery	45 (94%)	3 (6%)	0.0001
2 months after surgery	21 (44%)	27 (56%)	0.0001
3 months after surgery	2 (4%)	46 (96%)	0.0001

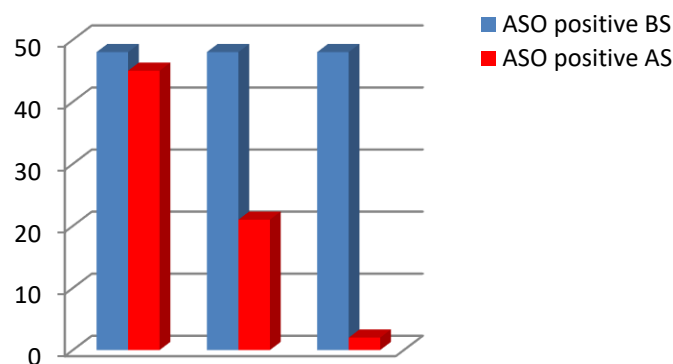


Figure 1: Reduction in ASO titres after tonsillectomy

Discussion

The results of this study provide significant insights into the impact of tonsillectomy on ASO titre levels in pediatric patients suffering from recurrent tonsillitis.

The study also showed a significant reduction in ASO titres post-tonsillectomy. Initially, at the one-month follow-up, only a small percentage (6%) of patients showed a reduction in ASO titres to levels below 200 IU/ml. However, this result was statistically significant, indicating that even within a short period after surgery, some children start showing a response in terms of reduced ASO titres. Despite the low percentage, the statistical significance underscores the potential beginning of a trend towards normalization of ASO levels post-surgery.¹¹

By the second month post-surgery, more than half of the patients (56%) exhibited reduced ASO titres. This could suggest variability in individual immune responses or the natural decline of ASO levels over time.

The most notable improvement was observed three months post-surgery, where a dramatic 96% of the patients showed ASO titre levels falling below 200 IU/ml, a statistically significant change. This significant reduction in ASO titres suggests that tonsillectomy has a considerable impact on the immunological response to past streptococcal infections in children. The findings align with the hypothesis that removing the tonsils, which may harbour chronic infections, can lead to a decrease in the immune system's production of antibodies against streptococci, as reflected by the ASO titres.^{12,13}

Recurrent tonsillitis and related streptococcal infections contribute significantly to pediatric morbidity, school absenteeism, and healthcare costs.¹³ By providing evidence that tonsillectomy can lead to significant decreases in ASO titres, the study underscores the potential public health benefits of reducing the incidence of streptococcal-related complications, such as rheumatic fever and post-streptococcal glomerulonephritis, which can result from untreated or chronic infections.

Conclusions

Tonsillectomy significantly reduces ASO titer levels in pediatric patients with recurrent tonsillitis, particularly notable three months post-surgery. This reduction suggests that tonsillectomy can effectively mitigate the immune response to streptococcal infections. These findings support the clinical utility of tonsillectomy in managing recurrent tonsillitis and preventing streptococcal-related complications.

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Contributions:

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- Experimentation/Study Conduction

S.N, F.J.M - Analysis/Interpretation/Discussion

U.I, M.A - Manuscript Writing

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