Original Research Article

Effect of Tonsillectomy on Antistreptolysin O (ASO) Titer

Abstract:

Background: Acute recurrent tonsillitis is a common problem worldwide and tonsillectomy is the preferable treatment for patients not responding to medical treatment. Many patients with acute recurrent tonsillitis and increased antistreptolysin O (ASO) titers are caused by group A beta hemolytic streptococcal (GABHS) tonsillitis, which can lead to serious side effects such rheumatic fever and glomerulonephritis.

Aim: To assess the consequence of tonsillectomy on ASO titer.

Patients and method: This prospective study was conducted to analyze the consequence of tonsillectomy on 43 patients with raised antistreptolysin O (ASO) titer out of 220 patients with acute recurrent tonsillitis, for the period from October 2015 to October 2016 at Otolaryngology department, Tertiary referring hospital at Erbil, Kurdistan/Iraq. Their Demographic characteristics, medical, drug and family history and disease extent were analyzed. Postoperative follow up were processed.

Results: The study included 43 patients between 3 to 16 years suffering from acute recurrent tonsillitis, elevated ASO titer (≥200 IU/ml) and positive throat swab for GABHS were included in the study. Six months postoperatively had been shown that there is a significant reduction in ASO titer in comparison to preoperative measures ($p < 0.001$) and this is also applicable to the number of sore throat episodes.

Conclusion: The main conclusion from this study is significant effect of tonsillectomy on decreasing ASO titer which reveals the reduction in postoperative GABHS throat infection, this supported by reduction of postoperative sore throat episodes.

Keywords: Acute recurrent tonsillitis, ASO titer, Sore throat, Tonsillectomy.

Introduction

One of the frequent clinical issues in the field of otolaryngology is acute recurrent tonsillitis. The major agent in charge of this is Streptococcus. Due to

the undervaluation of the significance of early detection of streptococcal throat infection and adequate response, rheumatic fever and glomerulonephritis are significant non-suppurative consequences of streptococcal tonsillitis. The most used test is the ASO titer test. Due to its accessibility in our nation, low cost, and suitable sensitivity, it is more well-liked. Even if penicillin is an excellent medical treatment, tonsillitis is only partially resolved when it recurs frequently. Surgery is therefore still the only effective treatment [(1)]. Since acute recurrent tonsillitis can result in chronic pain, repeated antibiotic use, airway obstruction, such as obstructive sleep apnea syndrome (OSAS), secondary otitis media, or speech impairment, tonsillectomy, or the surgical removal of the palatine tonsils, is advised for patients [(2)].

Only the hemolysin O produced by group A streptococci is antigenic in the anti-streptolysin O test. Group A streptococci produce the cytolytic toxin known as streptolysin O. Its biological characteristics include hemolysis of erythrocytes and other eukaryotic cells; leukocytes may also be harmed. The most popular and standardized test for group A streptococcal antibody is the one made by the human host against this toxin, known as ASO [(3)].

Causes of elevated ASO titer:

a. Infections by *S. pyogenes* or GABHS:

The most prevalent infection caused by *hemolytic S pyogenes* is streptococcal sore throat. Other conditions caused by these bacteria include pharyngitis, toxic shock syndrome, scarlet fever, rheumatic fever, glomerulonephritis, erysipelas, necrotizing fasciitis, puerperal fever, bacteremia, and sepsis [(4)].

b. Other causes :

Hypergammaglobulinemia, multiple myeloma, and people with elevated rheumatoid factor concentrations in their sera [3]. False positive ASO titres occasionally indicate the presence of liver illness or tuberculosis [5].

Streptolysin O, an immunogenic, oxygen-labile hemolytic toxin generated by the majority of group A streptococci and a large number of additional group C and G streptococci, is what is known as ASO [6]. In children and adults, respectively, *Streptococcus pyogenes* (group A streptococcus, GAS) causes 20 to 30% and 5 to 15% of acute tonsillitis/pharyngitis. Acute rheumatic fever, peritonsillar abscess, and post-infectious syndromes such glomerulonephritis, acute rheumatic fever, and post-streptococcal reactive arthritis can all result from it in addition to causing acute sickness [6]. A single titer of 200 IU/ml or more is regarded as having an elevated value. A rise in ASO titer, in the opinion of Read SE and Zabrinskie, signals the potential emergence of rheumatic fever. Every case of rheumatic fever is known to be accompanied by an increased ASO titer. The amended Johnes criteria require a higher ASO titer level in order to diagnose rheumatic fever [1].

The goal of this study is to determine how tonsillectomy affects ASO titer in patients between the ages of 3 and 16 who have acute recurrent tonsillitis with at least five episodes in the previous year that have interfered with their ability to carry out their normal daily activities, an ASO titer of less than 200 IU/ml, and a positive throat culture for GABHS.

Materials and methods:

Study setting and design

This prospective non-randomized study was carried out during the period from 1st January 2016 till 1st January 2017 at otolaryngology department, tertiary referral hospital in Erbil, Kurdistan-Iraq. This study included 43 (19.54%) out of 220 patients in whom tonsillectomy was done, those patients suffered from recurrent

attacks of acute tonsillitis with elevated ASO titer and positive throat culture for GABHS.

Ethical Considerations:

Informed consent was taken from each patient after explaining the purpose of the study (by the researcher).

Inclusion criteria:

Patients between the ages of 3 and 16 presented with acute recurrent tonsillitis, at least five bouts of which had interfered with their ability to carry out their normal daily activities, an ASO titer of less than 200 IU/ml, and a positive throat culture for GABHS.

Exclusion criteria:

Patients who do not meet the criteria for tonsillectomy include those with a throat swab test for GABHS that is negative, an ASO titer of less than 200 IU/ml, and any infection other than tonsillitis that can raise the ASO titer.

Preoperative evaluation:

A thorough ENT examination, an in-depth history and physical examination, and counseling of patients (or their relatives) with the anticipated outcome. In order to find the criteria of tonsillitis as an indication of a tonsillectomy, the history included the patient's name, age, gender, and date of examination.

Specifically, the total white cell count, differential counts, hemoglobin, bleeding and clotting times, blood group, and rhesus group were all examined as part of the normal blood and virology screening procedures. Using sterile swab sticks, a throat sample was collected from the tonsil surface and sent for culture to identify the pyogenic organisms. The swab was then promptly infected, and the bacteria were identified. The latex agglutination test was used to determine the ASO titer because serum-bound ASO antibodies react with latex particles coated in streptolysin O. Agglutination took place when the serum's antibody concentration

reached 200 IU/ml. The rapid testing period is a benefit of this test, however the qualitative and semi-quantitative tests are a drawback [3].

Tonsillectomy:

Under general anesthesia all the patients underwent tonsillectomy by cold steel method.

Postoperative follow up:

1. Counting the number of sore throat episodes, if any, should be recorded.
2. Estimations of the ASO titer were made one month, three months, and six months after surgery.

Statistical analysis

The Statistical Package for Social Sciences (SPSS, version 19) was used to analyze the data. In order to compare proportions, the Chi Square Test of Association was utilized. Fisher's exact test was performed when the predicted count of more than 20% of the table's cells was less than 5. The means of the two study groups were compared using a Student's t test on two independent samples. The means (of the same sample) before and after the procedure were compared using the paired t test. Statistical significance was defined as a p value 0.05.

Results and discussion:

Tonsillectomy was done for 43 patients with positive ASO titer and positive throat culture for GABHS out of 220 tonsillectomized patients who were approximately equal to 19.54%. Their mean age (±SD) was 6.86±3.6 years, ranging from 5 to 9 years. The median was 6 years. The mean duration of the disease was 2.02±0.988, ranging from 1 to 5 years, with a median of 2 years.

Table (1): **Distribution of sample by age, gender, and residency.**

Variables	Categories	No.	%

Age (years)	3-5	20	46.5
	6-8	11	25.6
	9-11	5	11.6
	≥ 12	7	16.3
Gender	Female	17	39.5
	Male	26	60.5
Residency	Rural	15	34.9
	Urban	28	65.1
Total		**43**	**100.0**

Comparison between mean of pre-operative ASO titer with the ASO titer means measured one, three, and six months post-operatively.

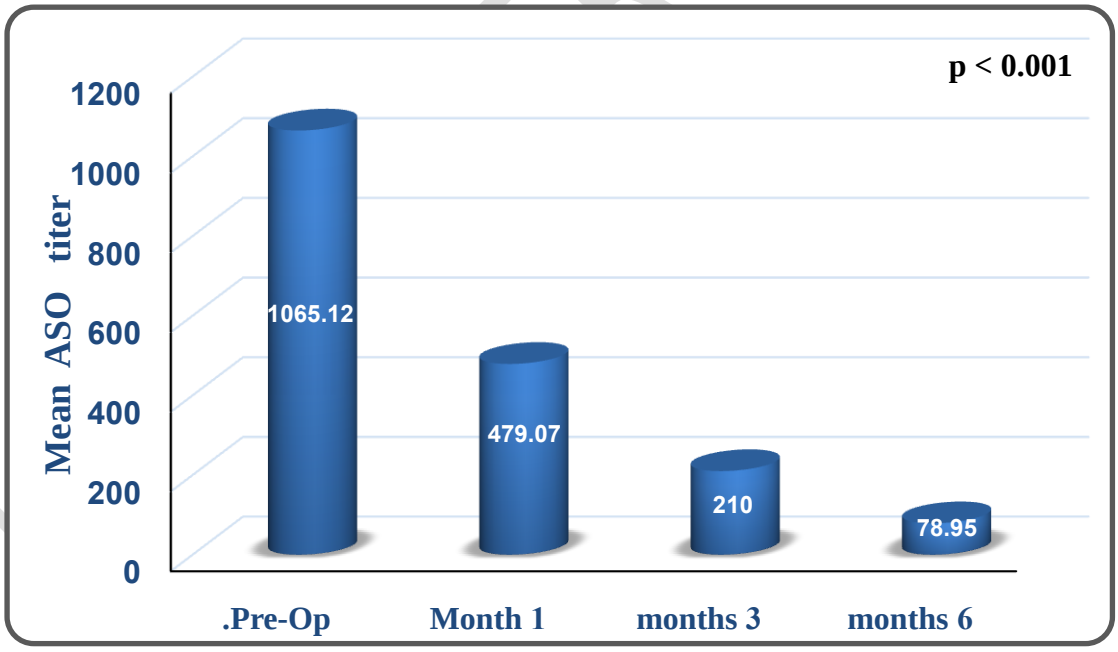

Figure (1): Mean ASO titer.

After tonsillectomy, Viswanathan *et al.* (2000) [7] discovered a substantial decrease in ASO titer. After a tonsillectomy, 22% of patients tested negative for ASO titer after one month, 62% after three months, and 78% after six months (p

0.001). The majority of the results mentioned above are very close to ours.

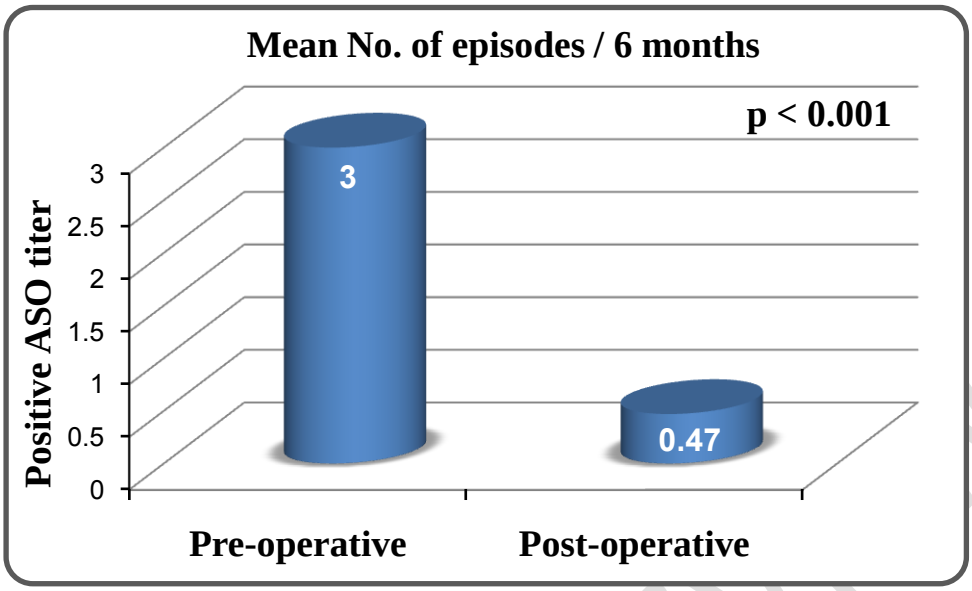

Figure (2): Mean number of episodes of sore throat before and after the operation.

Patients who had undergone surgery had a decreased rate of sore throat, according to Matanoski *et al.*, (1968) [8]. Additionally, Paradise *et al.* (1984) [9] discovered that throat infections significantly decreased following tonsillectomy.

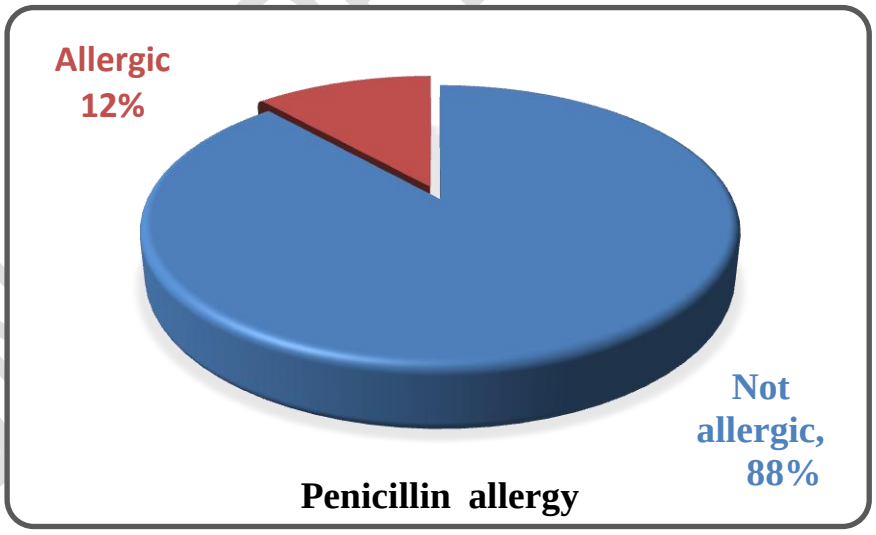

Figure (3): History of penicillin allergy.

In this study there were 12% allergic to penicillin, this result is nearly comparable to the result obtained by Pichichero *et al.*, (2005) [10] who found that the true incidence of penicillin-allergy among patients with that history is likely to be less

than 10%. The present result is also comparable to Solley *et al.*, (1982) [11] who were found that penicillin allergy is 14%.

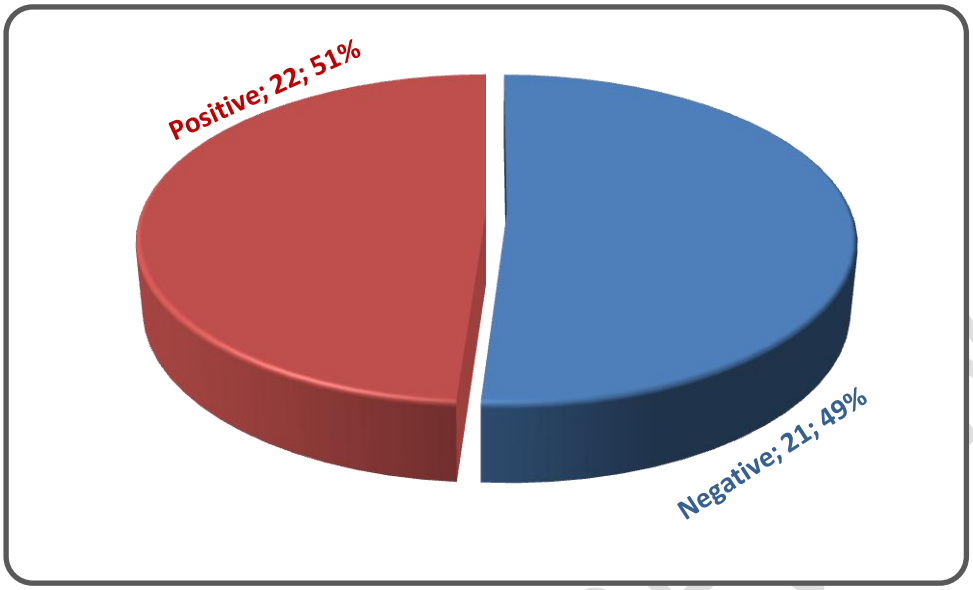

Figure (4): Family history of tonsillitis.

Khasanov *et al.*, (2006) [12] found that 53.3% of children having positive family history of tonsillitis which is nearly approximate to ours (51.2%).

Table (2): Means of ASO titer and number of episodes by family history.

	Positive family history		Negative family history		P value
	Mean	**SD**	**Mean**	**SD**	
Pre-op. ASO titer IU/ml	1218.18	440.39	904.76	398.09	0.019
ASO titer after 6 months IU/ml	95.24	149.92	58.82	137.20	0.445
Pre-op episodes 6 months	3.34	0.59	2.71	0.34	< 0.001
No. of post-op. attack of sore throat	0.82	0.85	0.10	0.30	0.001

These results are comparable to Kvestad *et al.*, (2005) [13] and Schilder *et al.*, (1992) [14] those showing that there is positive correlation between family history and tonsillitis, this can be explained by the presence of genetic, environmental and anatomical predisposition for tonsillitis.

Table (3): Means of ASO titer and number of episodes by residency.

	Urban		Rural		P value
	Mean	SD	Mean	SD	
Pre-op. ASO titer IU/ml	1092.86	437.10	1013.33	468.84	0.582
ASO titer after 6 months IU/ml	96.00	164.52	46.15	87.71	0.317
Pre-op episodes 6 months	3.04	0.58	3.03	0.58	0.990
No. of post-op. attack of sore throat	0.54	0.74	0.33	0.72	0.396

This can be explained by the effect of environmental factors (smoking, air pollution….etc.) as found in the studies done by Schilder *et al.*, (1992) [(14)] and Renner *et al.*, (2012) [(15)].

Conclusions:

The main conclusion from this study is significant effect of tonsillectomy on decreasing ASO titer which reveals the reduction in postoperative GABHS throat infection, this supported by reduction of postoperative sore throat episodes. There is strong evidence that there is a clear relation between family history of recurrent tonsillitis and ASO titer as well as number of sore throat episodes. Tonsillectomy is the definitive treatment for group A beta hemolytic streptococcus tonsillitis.

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