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Effect of Tonsillectomy on Antistreptolysin O (ASO) Titer

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Abstract

Recurrent attacks of tonsillitis are a common worldwide problem and the best treatment of choice after failure of medical therapy is a tonsillectomy. The large numbers of patients that presented with recurrent attacks of tonsillitis and associated with high antistreptolysin O (ASO) titer level due to group A beta hemolytic streptococcal (GABHS) tonsillitis will have serious complications as glomerulonephritis and rheumatic fever. **The aim of study:** to evaluate the effect of tonsillectomy on elevated ASO titer.

Patients and methods: Prospective non-randomized clinical study was performed at Al-Jumhory teaching hospital, Mosul, Iraq; for the period from January 2021 to January 2022. that included seventy patients for whom tonsillectomy was indicated. There were 45 females and 25 males, the age range from 3 to 15 years old and the mean age was 7.63 year. Positive throat swab for group A beta hemolytic streptococcal (GABHS) and elevated ASO titer level (≥ 200 IU/ml). Postoperative follow up of the patients were processed for six months.

Results: seventy patients included in the study, presented with recurrent attacks of tonsillitis, with positive throat swab for GABHS and elevated ASO titer level (≥ 200 IU/ml), age between 3 to 15 years old. Follow up of the patients for six months after tonsillectomy had been shown that there is a significant decrease in ASO titer level in comparison to preoperative level measures ($p < 0.001$)

Conclusion: The most important conclusion from the result of our study that tonsillectomy lead to significant reduction in ASO titer level.

تأثير استئصال اللوزتين على عيار أنتيستربتوليسين (ASO) O

الخلاصة

تعد النوبات المتكررة من التهاب اللوزتين مشكلة شائعة في جميع أنحاء العالم وأفضل علاج يتم اختياره بعد فشل العلاج الطبي هو استئصال اللوزتين. الأعداد الكبيرة من المرضى الذين تعرضوا لهجمات متكررة من التهاب اللوزتين والمرتبطة بمستوى عيار مضاد للستربتوليسين (ASO) O بسبب التهاب اللوزتين العقدي الانحلالي من المجموعة A سيكون لديهم مضاعفات خطيرة مثل التهاب كبيبات الكلى والحمى الروماتيزمية. الهدف من الدراسة: تقييم تأثير استئصال اللوزتين على ارتفاع عيار ASO. المرضى والطرق: تم إجراء دراسة سريرية مستقبلية غير عشوائية في مستشفى الجمهورية التعليمي ، الموصل ، العراق. للفترة من كانون الثاني (يناير) ٢٠٢١ إلى كانون الثاني (يناير) ٢٠٢٢. والتي شملت سبعين مريضاً تمت الإشارة لهم استئصال اللوزتين. كان هناك ٤٥ أنثى و ٢٥ ذكر ، تتراوح أعمارهم بين ٣-١٥ سنة ومتوسط العمر ٧.٦٣ سنة. مساحة الحلق الإيجابية للمجموعة أ من العقديات الحالة للدم بيتا (GABHS) ومستوى عيار ASO المرتفع (≤ 200 وحدة دولية / مل). تمت متابعة ما بعد الجراحة للمرضى لمدة سنة أشهر. النتائج: سبعون مريضاً شملتهم الدراسة ، تعرضوا لهجمات متكررة من التهاب اللوزتين ، مع مساحة حلق إيجابية لـ GABHS ومستوى عيار ASO مرتفع (≤ 200 وحدة دولية / مل) ، تتراوح أعمارهم بين ٣ إلى ١٥ سنة. بعد أشهر من استئصال اللوزتين تبين أن هناك انخفاضاً كبيراً في مستوى عيار ASO مقارنةً بمقاييس المستوى قبل الجراحة (P < 0.001). الخلاصة: الاستنتاج الأكثر أهمية من نتيجة دراستنا أن استئصال اللوزتين يؤدي إلى انخفاض كبير في مستوى عيار ASO.

INTRODUCTION

Tonsillectomy, is the palatine tonsils removal surgically, is advised to patients suffer from tonsillar hypertrophy or recurrent tonsillitis, because such diseases can lead to repeated use of antibiotic, chronic pain, and obstruction of the airway like secondary otitis media, or speech impairment. and obstructive sleep apnea (OSA) [1]

One of the few surgical procedures is tonsillectomy that raised from ancient times and is still carried out till now. The tonsillectomy incidence in the United States reaches 2 million in 1940s, commonly done for recurrent tonsillitis but also for many other conditions like failure to gain weight because of poor feeding, enuresis, and overbite.

Tonsillectomy continued to be a trend in the 1960s and, about two million of tonsillectomies and being adenoidectomies carried out yearly in the United States. Nowadays, still tonsillectomy is one of the predominantly carried out, with around 400,000 surgeries carried out yearly. The reduction in the tonsillectomy number is may be associated with clinical trials that concluded in clear tonsillectomy indications.[2]

ASO titer

group A beta-hemolytic streptococci (GABHS) is responsible for production of 2 hemolysins, streptolysin O (a cytolytic toxin) only the latter is antigenic and streptolysin S. Streptolysin O biologic properties composed of erythrocytes hemolysis and other eukaryotic cells; and also lead to leukocytes damage.

There will be a host production of antibody against this toxin, and the commonly used, available and standardized group A streptococcal antibody tests is the Anti-streptolysin O (ASO). But unfortunately this antibody does not give host protection role [3]. The ASO is an antibody formed against

streptolysin O which is oxygen-labile hemolytic toxin, and immunogenic that formed by most strains of group A and most strains of group C and G Streptococci .[4]

Reasons behind ASO titer increment

- Infections by *S. pyogenes* or GABHS
- pyoderma
- toxic shock syndrome
- scarlet fever
- rheumatic fever
- erysipelas
- Cellulitis
- necrotizing fasciitis
- puerperal fever
- bacteremia and sepsis [4]
- multiple myeloma
- high rheumatoid factor and hypergammaglobulinemia [3]
- Tuberculosis
- hepatic disorders may cause false positive titer of ASO [3]

Causes of low ASO titer

The low ASO values could be explained purely on lack of streptococcal antigenic stimulus which stimulate the antibody, though we would expect all these children to have experienced infections with haemolytic streptococci of groups C or G, which have low stimulation of this antibody.[5] GABHS infection in the human body produces several toxins; the one with antigenic nature is Streptolysin O. ASO is detected in the serum beyond infection with Group A Streptococcal as it is a normal immunological response. An elevation of ASO titer is probable beyond infection with Group A Streptococcal in any part of the body.[6] an increment of ASO above 200 IU/ml is considered as a raised level and represent an alarm of probable of rheumatic fever development. It obviously known that at every attack of rheumatic fever is related with an increment of ASO titer and an increased ASO titer level is one of the criteria for rheumatic fever diagnosis based on the modified Johnes criteria [7]

Aim of the study

This study aims at evaluation of the tonsillectomy effect of on ASO titer elevation.

Patients and methods

Prospective non-randomized clinical study was performed at Al-Jumhory teaching hospital, Mosul, Iraq for the period from January 2021 to January 2022. That included seventy patients for whom tonsillectomy was indicated. There were 45 (64.3%) females and 25(35.7%) males, the age range from 3 to 15 years old and the mean age of 7.63 year.

The inclusion criteria were Patients of both genders male and female include:

1. Age between 3-15 years old presented with recurrent attacks of tonsillitis for ≥ 7 attacks of tonsillitis annually for at least the last year that disabling normal life functioning.
2. ASO titer ≥ 200 IU/ml.
3. positive throat swab for GABHS.

The exclusion criteria were :

1. Patients not met the indications for tonsillectomy.
2. Negative throat swab for GABHS.
3. ASO titer less than 200 IU/ml.
4. Any infection apart from tonsillitis that can cause elevated ASO titer .
5. peritonsillar abscess or tumour.
6. bleeding disorders.

Prior to study performance an informed consents were taken from the parents of the patients and this done after understanding the purpose and nature of study that explained (by the researcher), also consent was taken from Nineveh Health Directorate and administration of AL-Jamhory Teaching Hospital. This study carried out after taking an ethical approval from medical research ethics committee, Mosul college of medicine in reference number UOM/COM/MREC/21-22(31) at 8/2/2022.

Assessment of patients

History and physical examination
A detailed history and careful physical examination complete ENT examinations and the counseling of patients parents

regarding the expected outcome. History was including patient's name, age, gender , about number of sore throat, fever , the history was taken from the parents in most of cases.

Clinical examination.

1. examination of general condition of the patients and vital signs (weight, paler, jaundice, temperatures, pulse rate, respiratory rate, cyanosis)
2. examination of the oral cavity and oropharynx by the use of tongue depressed to see the state of tonsils like size of tonsils, color of the mucosa of tonsils and posterior pharyngeal wall, anterior and posterior pillars, see if there is bifid uvula, submucous cleft palate .
3. examination of neck for lymphadenopathy especially jugulodigastric group and look for rash distribution in body.

Laboratory investigations

Hematological investigations

Routine blood and virology screening tests (HBV,HCV,HIV). Lab examination of blood in terms of total number of white cell and differential count, haemoglobin, Erythrocytes sedimentation rate (ESR) bleeding time (BT) general urine examination (GUE) prothrombin time(PT) activated partial thromboplastin time (APTT) blood group and rhesus group,covid19 test by polymerase chain reaction (PCR)

Throat swab
Swab from Throat was taken from tonsil mucosal surface through a sticks of sterile swab and then sent for culture to identify the organism.

ASO titration

Sample of blood was taken and sent for laboratory to be examined for ASO titer before surgery, 2.5ml of fresh blood are used.

Tonsillectomy

Tonsillectomy under general anaesthesia performed for all patients with maintenance of the airway using either

cuffed or uncuffed orotracheal tube. The tube is fixed carefully by use of the plaster to one side or in the center of the pharynx when we use a tongue blade and care is taken not to be encroached between the tongue and mouth gag. Put the patient in a prone position (patient in supine position with neck extension). Good exposure of the tonsils done by opening the mouth is usually performed with a Boyle Davis mouth gag, with extended head, elevated mouth gag and with Mayo stand connection on that the instruments to carry out the tonsillectomy are put and it is important that wet gauze put into hypopharynx not to allow the oxygen escape and escape of the agent of anaesthetic drug from the endotracheal tube through the operation and also prevent the blood from escape to the stomach during procedure. Cold steel dissection technique was performed in all patients; Before starting the procedure, the palpation of the hard and soft palate was performed for submucous cleft palate exclusion because this that may increase the risk of velopharyngeal insufficiency postoperatively. Once the mouth gag blade in a position and tongue are centered. An opening of the mouth gag is done, an examination carefully done ensure perfect the following; protection of the tube, not entrapping the upper lip, coverage of the base of the tongue by the tongue blade.

The procedure of tonsillectomy is begin with an incision at anterior pillar just lateral to the mucosal reflection of the surface of the tonsil. This become easy by use of Dennis Browne tonsil holding forceps to catch the tonsil and pulling it medially with slight inferiorly to place the mucosa of the anterior pillar under tension. The tonsil is retracted inferiorly, when the capsule of the superior pole of the tonsil has been determined. This step usually helped by tonsil repositioning by a holding forceps. The tonsil can be removed easily by using snare, if the lower pole of the tonsil has been reached.

After the completion of this procedure, normal saline solution irrigation of the pharynx was carried out. To ensure that bleeding is not being controlled merely by mouth gag compression, the mouth gag closed and opened once or twice.

After the end of operation the patient is shifted to the ward after awakening from anaesthesia and confirming that there was no bleeding. In day zero postoperatively the patient checked for presence any bleeding and recommended to have cold soft diet and fluids, with a course of antibiotics (amoxicil vial 500mg each 8hours for 3 days or azithromycin syrup 10mg/kg once daily) and analgesia was given for one week duration postoperatively for all patients.

Parents or relatives of the patient are recommended to return to hospital if there is any bleeding or inability to swallow due to severe pain or any other problems for re-evaluation and emergency intervention once, required. Most of the patients were day case ,so, we discharge the patients to home after about 5 to 6 hours later.

Follow up of the patients after tonsillectomy

Estimation of ASO titer level was performed after first month, third months and sixth months after tonsillectomy.

Statistical analysis

The statistical package for social sciences (SPSS) version 22 for windows is used for processing and analysing study data statistically. The data were Described statistically in terms of mean \pm standard deviation (SD) and frequencies as percentages-tables test was use for continuous variables. Correlation was assessed using the Pearson(R correlation coefficient), the statistically significance of data considered when P-value of <0.05 .

Results

Tonsillectomy was performed for 70 patients with positive ASO titer ≥ 200 IU/ml. and positive throat culture for GABHS. Their age ranging from 3 to 15 years old. The mean was 7.63 years; the (\pm SD) was $3.27\pm$.

Around one third of the sample 32.9% aged 6-8 years and one third of the

sample 35.7% were males and Around one third of the sample 31.4 was rural area. The means of ASO titer measured,first,third,sixth month post-operatively were significantly less than the mean ASO titer 421.86 measured preoperatively $p < 0.001$.

Table-1: Distribution of sample by age, gender ,residency

Parameters		No	Percent
Age group	3-5 y	22	31.4
	6-8 y	23	32.9
	9-11 y	14	20.0
	>12 y	11	15.7
	Total	70	100.0
Gender	Male	25	35.7
	Female	45	64.3
	Total	70	100.0
Residency	Rural	22	31.4
	Urban	48	68.6
	Total	70	100.0

Table- 2 The means of ASO titer level.

Pre-operative ASO titer		First month post-operative		Third month post-operative		Sixth month post-operative	
Mean	SD	Mean	SD	Mean	SD	Mean	SD
421.86	185.30	332.71	149.96	267.43	118.39	222.29	77.16
R		0.944**		0.888**		0.855**	
P-value		<0.001		<0.001		<0.001	

Whole the patients were ASO titer positive before tonsillectomy, and the positivity decreased to 75.7% one month post-operatively and decreased to 51.4 % three months after the operation, and then decreased to 25.7 % six months after the operation.

Table- 3: The positivity of ASO titer level.

	ASO titer 1 st month post-op		ASO titer 3 rd month post-op		ASO titer 6 th month post-op	
	No	Percent	No	Percent	No	Percent
Negative	17	24.3	34	48.6	52	74.3
Positive	53	75.7	36	51.4	18	25.7
Total	70	100.0	70	100.0	70	100.0

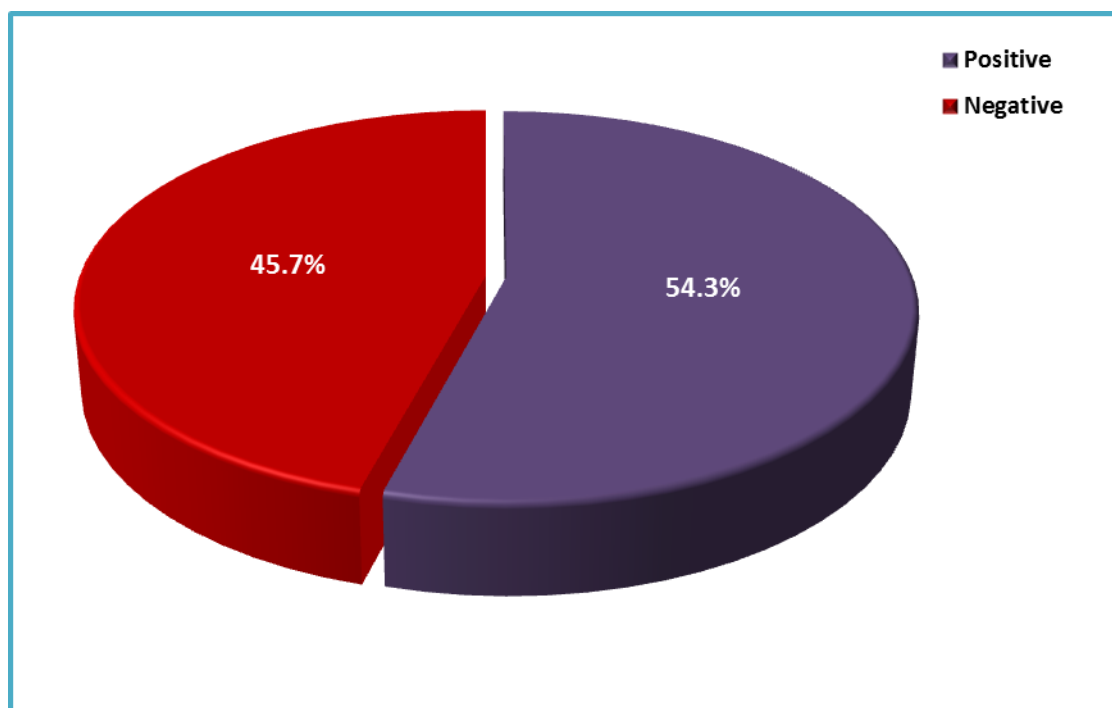


Figure- 1 -family history of tonsillitis.

Discussion

Rheumatic fever and glomerulonephritis are serious non supportive complications of streptococcal tonsillitis due to the underestimation of the value of precocious determination of throat infection with streptococcal and early efficient therapeutic interference. ASO titer test is the most widely used test. It is more popular because of its availability in our country, less cost and reasonable sensitivity. [3]

The study was performed on 70 patients between 3 to 15 years old presented with recurrent attacks of tonsillitis, high ASO titer level (≥ 200 IU/ml) and positive throat swab for GABHS for whom tonsillectomy was performed.

The most of our sample were females (64.3%), this sex distribution

is approximate to the sex distribution reported in a study performed by Essam A. Abo El-magd et al 2016[8] in which the female patients was 57%.

The principle of this study explained that the means of ASO titer level and the percentage of sample study with negative ASO titer level measured 1st month post tonsillectomy were (332.71) (24.3%) , 3rd month post-tonsillectomy (267.43) (48.6%), and 6th month post-tonsillectomy (222.29) (74.3%) respectively were significantly less than the mean of ASO titer level (421.86) measured pre-operatively.

Bakir S.S. at 2017 [9] found a significant reduction in ASO titer level post-tonsillectomy. At the 1st month post-tonsillectomy about 23.3% were negative for ASO titer level. At the 3rd months

post-tonsillectomy about 52.5% became negative for ASO titer level. After 6 months of tonsillectomy 73.7% became negative for ASO titer level. Whole of the above results are nearly similar to ours results.

In our study the positive family history of tonsillitis were 54.3% and this agree with study done by Khasanov SA et al (2006) [10] found that about 53.3% of family history of tonsillitis having positive history of recurrent attacks of tonsillitis. Bakir S.S.at 2017 [9] found positive family history of tonsillitis about 51%, and this agree with our study.

Conclusion:

The most important conclusion from the result of our study is that tonsillectomy lead to significant reduction in ASO titer level.

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