Evaluation of the Validity of High Serum Antistreptolysin O Titre Only, as an Indication for Tonsillectomy

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Abstract Serum Antistreptolysin O (ASO) titre is raised when there is infection of any organ of the body, by Group A beta haemolytic streptococci (GABHS), Group C or Group G streptococci [1]. Increased serum ASO titre should not be the only deciding criterion for tonsillectomy if GABHS is not present in the palatine tonsils. In this study, we evaluate the rationality of performing tonsillectomy in raised serum ASO titre only, in absence of GABHS in palatine tonsil. The study was designed as a prospective cohort study in which the main outcome measure is to find out: The main outcome measure is to find out whether only the raised serum ASO titre is to be considered to perform tonsillectomy or not. Fifty consecutive patients (both children and adults) clinically diagnosed to have chronic tonsillitis were included in this prospective cohort study. Throat swab culture, tonsillar core tissue culture and Serum ASO titre tests were performed in all the patients. The results showed that out of the 50 patients 45 had raised ASO titre and 5 patients had normal ASO titre. GABHS was found in 5 cases (10 %) in throat swab culture and 8 cases (16 %) in FNA of tonsil core culture. The sensitivity of throat swab culture as compared to FNA Tonsil core culture was 62.5 % and positive predictive value was 100 %. The sensitivity of ASO titre as compared to core culture was 100 % and positive predictive value was 17.8 %. Specificity was only 12 %. From the results of this

study, it is evident that FNA culture of the tonsil core is a valid and a reliable test for the diagnosis of bacterial micro flora in recurrent tonsillitis. One should perform throat swab culture and FNA culture from tonsil core along with ASO titre before doing tonsillectomy in absence of any other indications. Identifying GABHS in the tonsil by FNA test and/or in the throat swab culture along with high serum ASO titre may be one of the ideal indications for tonsillectomy.

Keywords GABHS · Chronic tonsillitis · ASO titre · Throat swab culture · FNA of tonsil core culture

Introduction

Tonsillitis is a common disorder in children and to a lesser extent in the older age group. The life time prevalence of recurrent tonsillitis was 11.7 % with significant predominance of female cases. There is evidence for a substantial genetic predisposition for recurrent tonsillitis [2]. On the other hand a virus may be the sole agent responsible [2]. Of the bacteria causing tonsillitis, *Beta haemolytic Streptococci*, *Staphylococcus aureus*, *Haemophilus influenzae*, *Klebsiellae*, *Streptococci pneumoniae* are the most common organisms. Of all these strains, Group A Beta haemolytic Streptococci (GABHS) is the only organism which gives rise to systemic complications in the form of Rheumatic heart disease, Glomerulonephritis, Arthritis eye diseases etc. But GABHS is only responsible for 5–15 % of all the sore throat cases.

Otolaryngologists, nowadays, consider tonsillectomy only in fewer indications like:

- (1) Obstructive sleep apnoea syndrome due to tonsillar enlargement

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- (2) Neoplasms of the tonsil
- (3) Recurrent tonsillitis (SIGN CRITERIA)
 - (a) Sore throat due to tonsillitis
 - (b) Five or more episodes of tonsillitis per year
 - (c) Symptoms for at least one year
 - (d) When the episodes of sore throat are disabling and prevent normal functioning.

Colonization in the tonsils by GABHS is also an important indication for tonsillectomy. To establish the carrier state of GABHS in the tonsils, different investigations have been advocated:

- (1) Throat swab culture
- (2) Fine needle aspiration (FNA) culture from the core of the tonsil
- (3) Serum anti Streptolysin O (ASO) titre
- (4) Core culture of the dissected tonsil (after tonsillectomy).

An infection with GABHS in the human body produces different toxins; Streptolysin O is one of them and antigenic in nature. As a normal immunological response, antibodies against it i.e. Anti-Streptolysin O (ASO), are detected in the serum after Group A Streptococcal infections. An increase in the serum ASO titre is possible after an infection with GABHS in any part of the body. Only 20 % cases of Rheumatic fever in early stage may present with normal ASO titre. Tuberculosis and liver disease may sometimes present with false positive ASO titre.

Aims and Objectives

To evaluate the validity of tonsillectomy in patients with raised serum ASO titre only and to correlate between the raised serum ASO titre, throat swab culture and FNA culture of tonsil.

Materials and Methods

This prospective study was conducted in the department of ENT and Head-Neck surgery, Vivekananda Institute of Medical Sciences, Ramakrishna Mission Seva Pratishthan, Kolkata. The patients were randomly selected from the ENT out-patient department between July 2008 to July 2010. Fifty consecutive patients (both children and adults) clinically diagnosed to have chronic tonsillitis were included in the study.

A detailed history of each subject was taken which included the chief complaints, history of present illness, history of past illness and their personal history. The onset, duration and progress of the symptoms were enquired

upon. Serum ASO titre, throat swab cultures and Fine Needle Aspirations from the core of the tonsils under local anaesthesia were performed in all the patients. Consent for all these procedures were obtained from the patients and the guardians in case of children. Patients who had antimicrobial therapy for 4 weeks prior to surgery, an acute infection such as acute tonsillitis, peritonsillar abscess or suspected neoplasm were excluded from this study.

Determination of ASO titre

Geometric dilution of the patients' sera were carried out by the tube dilution method [3]. The dilutions used were in the range from 1:100–1:744.

Throat Swab

Throat swabs were cultured for pyogenic organisms from the surface of the tonsil using sterile swab sticks (Fig. 1). Then the swab was immediately inoculated into nutrient agar, blood agar and McConkeys agar plates. Identification of the bacteria was done after isolation as per the standard procedure.

FNAC of Tonsil Core

Fine Needle Aspirations of the tonsillar cores were performed using a 20 gauge needle which was fixed to a 10 ml sterile plastic syringe (Fig. 2). The needle was moved back and forth (approx depth 4 mm–6 mm) within the tonsil along the same plane [4]. The needle was then removed and the collected materials injected onto a sterile swab stick and sent for processing in a sterile culture tube. This procedure was done under local anaesthesia. Topical xylocaine spray (10 %) was used as an anaesthetic agent.

In both the procedures the cultured organisms after isolation were recorded separately. A proforma was made for recording the details of each and every patient. Sensitivity and specificity of the tests were determined by using

Fig. 1 Throat swab being taken

Fig. 2 FNA being taken

Fig. 3 Shows the result of GABHS in throat swab culture and tonsil core culture

standard statistical methods. Approval from the Ethical committee of our institution was obtained for the project.

Results

The total number of patients in this study were 50 ($n = 50$) with ages ranging from 6 to 36 years. Of these 27 were males and 23 females. Out of 50 patients 45 showed raised ASO titre and 5 patients showed normal ASO titre. GABHS was found in 5 cases (10 %) in swab culture and 8 cases (16 %) in FNA tonsil core culture respectively.

Ten percent patients (5/50 patients) showed similar micro-organisms i.e. GABHS both in throat swab and in tonsil core culture. Dissimilar growth was found in three patients in FNA core culture and in these three patients throat swab culture showed *Staphylococcus aureus* (Fig. 3; Table 1).

The sensitivity of Throat swab culture as compared to Core culture was 62.5 % and the positive predictive value was 100 %.

Comparison between serum ASO titre and tonsil core culture shows that 45 out of 50 patients had raised ASO titre and only eight patients showed GABHS positive in core culture (Table 2).

The sensitivity of ASO titre as compared to Core culture was 100 % and the positive predictive value was 17.8 %. Specificity was very low, only 12 %.

Discussion

Nowadays tonsillectomy is rarely performed for obvious reasons. Two to three decades back tonsillectomy was the main operation to be performed by the otolaryngologists. This may be due to engagement and involvement of the ENT surgeons in more and more micro-ear surgery, Head and Neck surgeries and other newly evolved surgeries like endoscopic sinus surgery, phonosurgery, skull base surgery etc.

However the indications for tonsillectomy have been considerably limited to a very few diseases. It has become a common tendency by some of us to decide about tonsillectomy on the basis of high serum ASO titre alone, without knowing about the presence of Group A beta-haemolytic streptococcus (GABHS) in the tonsils. Many a times we observe that the relevant tests do not show the growth of GABHS in patients having very high ASO titre in their serum. If tonsillectomy is done in these patients there won't be any satisfactory improvement in symptoms. The observations and results of this study have highlighted that, if tonsillectomy is done in these patients, it would not help lower their serum ASO titre, nor will they improve symptomatically if chronic tonsillitis is due to any other reasons apart from GABHS infection.

To establish the upper respiratory tract carrier state in patients, different investigation modalities have been suggested in the literature [5, 6]. Of these, the throat swab culture and serum ASO titre are most commonly practiced.

Group A (*S. Pyogenes*) are one of the most important human pathogens. They cause disease by three mechanisms.

- *Pyogenic inflammation*, which is induced locally at the site of the organism in the tissue,
- *Exotoxin production*, which can cause widespread systemic symptoms in areas of the body where there are no organisms, and
- *Immunologic*, which occurs when antibody against a component of the organism cross react with the normal tissue or form immune-complexes that damage normal tissues (heart muscle, kidney, skeletal joints etc.).

Group A organisms produce five important toxins and haemolysins. Streptolysin O is one of them and antigenic in nature. So antibodies to it i.e. ASO develop after Group A Streptococcal infections. An increase in the serum ASO titre is possible after an infection with GABHS, in any part of the body, even adenoids may harbour these pathogens

Table 1 Comparison between throat swab culture and tonsil core culture

Throat swab culture	Tonsil FNA core culture		Total
	GABHS growth	Other micro-organism	
GABHS growth	05	00	05
Other micro organism	03	42	45
Total	08	42	50

Table 2 Comparison between ASO titre and core culture

ASO titre	Tonsil core FNA		Total
	+ve for GABHS	–ve for GABHS	
Positive (>200 IU/ml)	8	37	45
Negative (≤200 IU/ml)	0	5	5
Total	8	42	50

Table 3 Role of ASO titre; Throat swab culture and FNA culture in decision making for tonsillectomy

ASO titre (IU/ml)	Throat swab culture	FNA culture	Tonsillectomy to be done (yes/no)
>200	GABHS present	Not done	Yes
>200	GABHS absent	GABHS present	Yes
>200	GABHS absent	GABHS absent	No
<200	GABHS present	GABHS present	Yes

[7]. Group C and Group G streptococci infrequently cause human disease and are not so important pathogens clinically. However Group C and Group G Streptococci are also responsible for a rise in the serum ASO titre [1]. Only the tonsils cannot be stamped responsible for the rise in the serum ASO titre. Moreover even after complete eradication of GABHS from the body by proper antimicrobial therapy, the serum ASO titre may remain raised for a considerable period of time due to the immunoglobulin G (IgG) nature of the antibody.

In this study the validity of the ASO titre was calculated. The sensitivity of the test was 100 % and the specificity was only 12 % and the positive predictive value was 17.8 %.

The specificity and positive predictive value of ASO titre were very poor. So this is not a valid test for identifying the presence of GABHS specifically in the tonsil alone (Table 2).

The diagnostic test of swabbing the surface of the tonsils as a culture specimen for determination of the organisms responsible for tonsillitis is well in practice but several

studies indicate a marked discrepancy in the surface and core pathogens [8–12]. This study conforms with the statement by the above mentioned authors that the throat swab is not a reliable diagnostic test for identifying the bacterial micro flora in recurrent/chronic tonsillitis if it is not associated with high serum ASO titre and FNA culture. This study showed that the sensitivity and positive predictive value of throat swab culture were 83 and 92.8 % respectively (Table 1).

The gold standard for identifying the organisms is taken to be the dissected tonsillar core culture. Fine needle aspirations (FNA) provides equivocal histopathological diagnosis and has been popularized in medicine since the early 1980s. The role of FNA in recurrent/chronic tonsillitis had been reported by Timon et al. in 1991 and Kurien et al. in 2003. These studies showed a 100 % correlation between the FNA and dissected core culture. However, this procedure (FNA) was not popularised as there was a controversy regarding the tolerance of this procedure in awake patients. In all the patients in this study FNA of the tonsillar core was performed under local anaesthesia. From the analysis of this test it is evident that it has excellent sensitivity and positive predictive values. Besides this the patients have tolerated this procedure under local anaesthesia very well. In an article by Gaffney and Cafferkey the accuracy of this test has been suggested although not validated [4].

The role of ASO titre; throat swab culture and FNA culture in decision making for tonsillectomy has been depicted in Table 3.

Microbiology of both surface and core of the tonsil in this study revealed that the most common isolated organism was *Staphylococcus Aureus* followed by Group A Beta haemolytic *Streptococcus* and *Haemophilus* species. This conforms to the reports of Loganathan 2006 and Inci 2003. The use of surface swab culture (throat swab) failed to recognize GABHS in a significant number of patients in this study. This illustrates the basic therapeutic dilemma in using the results of ASO titre and throat swab culture for the treatment of recurrent/chronic tonsillitis.

Conclusion

- 1) Depending mainly on high serum ASO titre for tonsillectomy is neither reliable nor acceptable. From this study it is evident that FNA culture of the tonsil core is a valid and a reliable test for the diagnosis of bacterial micro flora in recurrent tonsillitis. One should perform throat swab culture and FNA culture along with ASO titre before doing tonsillectomy if no other indications are present. Identifying GABHS in the tonsil by FNA test and/or in the throat swab culture along with high

serum ASO titre may be one of the ideal indications for tonsillectomy.

- 2) This test can be done safely under local anaesthesia in older children and adults as an out-patient procedure.

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