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BACTERIOLOGY OF TONSILAR SURFACE AND CORE IN PATIENTS WITH RECURRENT TONSILLITIS, UNDERGOING TONSILLECTOMY

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ABSTRACT:

OBJECTIVE: *To find out the most common organism affecting the surface and core of tonsil, in patients with recurrent tonsillitis undergoing tonsillectomy.*
STUDY DESIGN: *Descriptive study.*
SETTING: *E.N.T department, DUHS & Civil Hospital Karachi.*
METHODS: *In 2008, 67 patients with recurrent tonsillitis were selected for study. Surface swabs were taken before, while tonsil core swabs were taken after tonsillectomy and specimens sent with in an hour to laboratory for inoculation on to five percent sheep blood, chocolate, and MacConkey agar. Statistical analysis carried out using SPSS, version 10.*
RESULTS: *In 67 patients, mean age was 13.04 ± 6.47 years. The most common surface organisms found were Streptococcus pneumoniae and that from the core were Staphylococcus aureus and Streptococcus pneumoniae. Among 80.59 % pathogenic organisms, 46.29 % found only in tonsil core (P=0.003). Staphylococcus aureus was the most common pathogen and significantly (43.75 %) found only in tonsil core (P<0.05), while next pathogen was group A, β hemolytic streptococci and its significant (45.45 %) cases also found only in tonsil core (P<0.05). Throat swab has 47.91 % sensitivity, 68.84 % specificity, and 79.31 % positive predictive value in diagnosis of chronic tonsillitis.*
CONCLUSION: *In recurrent tonsillitis patients, surface swab is not a very good predictor of core organisms. Staphylococcus aureus and group A, β hemolytic streptococci found to be most common pathogens. While Streptococcus pneumoniae and Staphylococcus aureus were the most common surface organisms. This study shows importance of core sampling of tonsils to indicate right reflection of infection.*

KEY WORDS: Bacteriology, Tonsillitis, Tonsil surface, Tonsil core, Tonsillectomy

INTRODUCTION:

Medical management of the recurrent tonsillitis requiring good knowledge of the infecting organisms. In recurrent tonsillitis, infection may stem from the bacteria within parenchyma rather on the surface, so that surface swab of the tonsil may be misleading.[1] Surface pathogens may be colonizing the tonsil but may not predict the pathogens infecting the tonsilar core, an explanation reported in several studies. [1-6]

The most common tonsil core organisms causing infection in recurrent tonsillitis may differ in different regions but it is reported that when the type and number of the organisms isolated are taken into consideration, no difference is detected between right and left tonsils. [1]

Almadori et al, 1988 stated that surface swab cultures did reflect organisms present in the core.[7] Surface swab sensitivity, specificity and its positive predictive value in diagnosis of chronic tonsillitis remain a mater of interest for researchers to treat the condition effectively.

Moreover, coexistence of beta lactamase producing organisms such as staphylococcus aureus, H.Influenzae, and bacteriods spp. renders conventional penicillin therapy ineffective. [8,9,10]

The purpose of the study is to determine the most common surface and core organisms in recurrent tonsillitis patients undergoing tonsillectomy and deal with this condition effectively medically to avoid unnecessary surgeries and life threatening complications.

METHODS:

Study was conducted in ENT department, Dow University of Health Sciences and Civil

Hospital Karachi, which is one of the largest tertiary care hospitals of the city, in calendar year 2008 (i.e., from 1st January to 31st December 2008), 67 patients of recurrent tonsillitis undergoing tonsillectomy were selected for the study, irrespective of age and sex. Inclusion criteria were at least 03 episodes of tonsillitis in a year, for at least 3 years and none had received antimicrobial therapy for at least one week before surgery. All cases received antibiotic therapy within a week or operated for other than recurrent tonsillitis, as biopsies to exclude malignancies or peritonsillar abscesses etc excluded from the study.

Specimens were collected at the time of the elective tonsillectomy. After general anesthesia from the tonsil (right or left) surface swab taken with the help of a cotton applicator, the swab was collected in a sterile tube. For financial constraints only one swab was taken from each case alternatively from right tonsil and then in next case from left tonsil. The tonsils were removed by dissection method. Same tonsil which was surface swabbed before dissection, was placed in a sterile container. The Tonsil washed with sterile saline and placed in sterile Petri dish and after cutting the tonsil into two halves, the core swabbed was taken by sterile cotton applicator. Both surface and tonsil swab specimens were sent within an hour to microbiology laboratory. Specimens in laboratory inoculated onto 5% sheep blood, chocolate, and MacConkey agar. After incubation, isolates were tested for beta lactamase activity. Statistical analysis of the results was carried out using SPSS (statistical package for social sciences), version 10.

Table: 01
No of Cases = 67

AGE DISTRIBUTION

S. No.	Age Groups/ Range	Number	%	Mean ± SD
1	≤ 12 years (Children)	40	59.70	8.7 ± 1.78
2	< 12 years (Adults)	27	40.29	19.4 ± 5.5
3	Range = 28 (06 - 34 Years)	67	100	13.04 ± 6.47

Total mean age = 13.04 ± 6.47 (Standard deviation-SD) years.

Table: 02

No of Cases 67

ORGANISMS ISOLATED FROM THROAT SWAB AND TONSIL CORE

Organisms	Throat Swab Only**	Throat Swab** & Tonsils core only	Tonsils Core Only*	Cases Yielding that Organism	
	Number	Number	Number	Number	%
Pathogens:					
- Staph. aureus	03	15	14	32	47.76
- β.hemolytic strept.(A)	02	04	05	11	16.41
- H.influenza	-	02	02	04	05.97
- Bacteroides spp.	-	-	04	04	05.97
- Pseudomonase spp.	-	01	-	01	01.49
- Klebsiella pneumoniae	01	01	-	02	02.98
Others:					
- Strep.pneumoniae	29	29	-	58	86.56
- Candida albicans	05	-	-	05	07.46

*** Significant 46.29 % (25/54 cases) pathogenic organisms were found in only Tonsil core (Chi-Square test of significance applied, p = 0.003, i.e. p < 0.05)**
****Throat swab found to have 47.91 % sensitivity, 68.42 % specificity, and 79.31 % positive predictive value in diagnoses of chronic tonsillitis**

RESULTS:

In 67 patients selected for study, 40 were children (up to 12 years of age) and 27 were adults (> 12 years of age). Total mean age was 13.04 ± 6.47 (Standard deviation-SD) years; ranged from six years to 34 years, with median age 11 years and mode 08 years. In children, mean age was 8.7 ± 1.78 (SD) years and in adults, mean age was 19.4 ± 5.5 (SD) years (Table 1).

Among 67 patients, 63% were male and 37% were female, having male to female ratio 1.7:1.

Tonsil surface isolates 32.83 % (22 cases) had more than one organism i.e., had mixed infection, while core isolates mixed infection seen in 22.38 % (15 cases). Single surface isolate found in 67.16 % (45 cases) and the single core isolates were 77.61 % (52 cases). The most common surface organism was found streptococcus pneumoniae 86.56 % (58 cases), followed by staphylococcus aureus 26.86 % (18 cases). The most common core organism found were staphylococcus aureus and streptococcus pneumoniae 43.28 % (29 cases) each, followed by group A beta hemolytic streptococci 13.43 % (09 cases)(Table 2). Beta lactamase producing organisms found in 38.80 % (26 cases).

Among tonsil surface & core organisms, 80.59 % (54 cases) were pathogens, of which very significant 46.29 % (25/54 cases), pathogenic organisms were found in only tonsil core, despite the fact that surface culture revealed normal respiratory flora ($p = 0.003$, i.e. $p < 0.05$). Among pathogens, staphylococcus aureus was the most common organism 59.25 % (32/54 cases) and its significant 43.75 % (14/32 cases) found only in tonsil core ($p < 0.05$). Similarly next common pathogen was â-hemolytic Streptococci (group A) 20.37 % (11 cases) and its significant 45.45 % (05/11 cases) found only in tonsil core ($p < 0.05$).

On statistical analysis of tonsil surface & core swab culture results for similar organisms, throat swab found to have 47.91 % sensitivity, 68.42 % specificity, and 79.31 % positive predictive value in diagnoses of chronic tonsillitis.

DISCUSSION:

In younger age group, the most common throat disease is recurrent tonsillitis due to insufficient antibiotics penetration into core or inappropriate antibiotic therapy. [11] The surface and core tonsillar pathogenic flora may be different in recurrent tonsillitis as indicated by several studies. [1-6]

Surow et al., (1989) noted, the tonsillar disease may arise from the bacteria within

the substance of the tonsil, rather than bacteria identified on the surface. They added that the surface of the tonsils consistently exposed to secretions with their attendant flora. Tonsillar surface culture is likely to grow these organisms. [12] Therefore, it is a matter of emphasis since last few decades that real pathology within the tonsil core does not always predict by routine throat swab and bacteriology of recurrent tonsillitis may differ in different regions.

In this study, mean age was 13.04 ± 6.47 (slandered deviation) years, ranged from six to 34 years. In comparison Anwar-us-salm local study revealed mean age 14.8 years and range six to 30 years. [13] In contrast Abdul Rehman study age range from 2 to 9 years patients, [14] Gulsen hascelik study shows age range from two to 33 years, mean age 7 years 8 months ± 4 years 9 months, [1] Usamah Hadi study shows range two to 30 years with mean age of 6 years. [15]

Male to female ratio in our study was 1.7:1, in comparison Bista M [16] study also showed 1.7:1, Gulsen hascelik study [1] showed 1.16:1. In contrast, Usamah Hadi study [15] showed 3:2, and Abdul Rehman [14] & Anwar-us-salm study [13] showed ratio about 1:1

Mix (more than one organism) infection seen in 32.83 % of tonsil surface and 22.38 % of tonsil core. Anwar-us-salm, Usamah Hadi, Brook I, Gulsen hascelik in their study also revel mixed infection. [13, 15, 3, 1]

The most common surface organism was Strep.pneumoniae 86.56 % followed by Staph. Aureus 26.86 %, while most common core organisms were Strep. pneumoniae and Staph. Aureus 43.78 % each, and then GABHS. Bista M study showed Strep.viridans and Strep. pneumoniae as commonest organisms.[16] Brook I study showed GABHS and Staph. Aureus as commonest organisms from tonsil core and á hemolytic streptococci and ã hemolytic streptococci from tonsil surface.[3]

In our study â lactamase producing organisms were 38.80 %, while Mitchelmore I J [17] study shows 82 %, Gulsen hascelikin study[1] shows 58.3 % and Brook I [3] study shows â lactamase producing organisms in tonsil core 75 % and tonsil surface 52 %.

In our study among 80.59 % pathogens, significant 46.29 % found in only tonsil core ($P<0.05$), while Staph. Aureus was most common 59.25 % and its significant 43.75 % cases found only in tonsil core ($P<0.05$), the next common pathogen was GABHS 20.35 % in its significant 44.45 % found only in tonsil core ($P<0.05$). Abdul Rehman study[14] shows 44.4 % pathogenic organism in tonsil surface while 81.5 % in tonsil core, Staph. Aureus was most common, its significant 47.61 % found in core only, next common organism was GABHS, and its significant 80 % found in tonsil core only. Staph. Aureus and GABHS were also commonest core pathogens in Brook I study[3]. Syrylo A study [18] also shows high detectability of â hemolytic streptococci in tonsil core. Jeong JH study [19] showed Staph. Aureus 30.3 %, H.influenza 15.5 % and GABHS 14.4 % as most common pathogen. Surow JB study also shows H.influenza and Staph. Aureus as commonest tonsil core organisms, which not detected on tonsil surface swab.[12]

This study reveals throat swab sensitivity 47.91 %, specificity 68.42 %, and positive predictive value 79.31 % in diagnosis of chronic tonsillitis. Abdul rehman study[14] shows sensitivity 39.9 %, specificity 33.3 %, and positive predictive value 63.3 %. Kurien study noted sensitivity 42 % and specificity 50 %.[11]

The current study shows non-reliability of the throat swab in diagnosis of recurrent tonsillitis. This important agreement also revealed in other studies. A disagreement of the fact has found in Almadori study[7], which emphasize that certain degree of homogeneity found in bacterial flora of tonsils, so sampling of any single area may be reflective of the entire tonsil.

CONCLUSION:

The most common pathogenic organisms found on the tonsil surface were Staph. Aureus and β hemolytic streptococci (Group A), while among the non-photogenic commensals Strep. pneumoniae was most common not only in surface but also in tonsil core cultures. Staph. Aureus and β hemolytic streptococci (Group A) were also most common pathogenic isolates from tonsil core. This study reveals tonsil surface swab is not a very good predictor of tonsil core organisms, as a significant number of pathogens found only in tonsil core cultures not detected by tonsil surface swab.

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