Singapore Med J 2000 Vol 41(7) : 324-326

Throat Swab in the Chronic Tonsillitis: How Reliable and Valid is it?

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ABSTRACT

Introduction: The diagnostic test of swabbing the surface of the tonsil as a culture specimen for the determination of the organism responsible for the tonsil infection is still in practice, despite controversy. To date there has been no reports of establishing the reliability and validity of this common diagnostic test by appropriate statistical test of Likelihood ratios taking into consideration the specificity and sensitivity.

Aims: To assess the reliability and validity of throat swab in the diagnosis of bacterial microflora in chronic tonsillitis.

Patients and methods: A prospective study of 40 patients clinically diagnosed to have chronic tonsillitis undergoing tonsillectomy was undertaken. The reliability of the throat surface swab was then assessed and validated with the reference (gold) standard of tonsil core culture.

Results: The likelihood ratio of this diagnostic test being positive (LR +ve) was 0.84 to similar and 1.3 to general organism pathogen.

Conclusion: Routine culture of the throat by surface swab in the accurate diagnosis of bacterial flora in chronic tonsillitis is neither reliable nor valid. The clinical implications of this investigation which is still very popular is discussed.

Keywords: Throat swab, tonsil core culture, gold standard, reliability, validity, sensitivity, specificity, likelihood ratio

Singapore Med J 2000 Vol 41(7):324-326

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INTRODUCTION

Chronic tonsillitis is the commonest disease in the throat occurring predominantly in the younger age group[1]. It is due to chronic inflammation within the tonsils due to failure / insufficient penetration of antibiotics into the core or inappropriate antibiotic therapy. The diagnosis of chronic tonsillitis is mainly by history and clinical examination. However, throat swab as a main investigation is still used in most developing countries to confirm this. It is also well accepted that effective treatment of chronic tonsillitis depends on knowledge of the infecting organism. Superficial tonsil swabs are often used as a guide in the selection of this therapy in tonsillitis. However several studies[2-6] indicate a marked discrepancy in the surface and core pathogen flora.

Determination of the core bacteriology is important for several reasons. Failure to eradicate pathogens in the core, whether it is from inappropriate antibiotic choice or from insufficient penetration into the core, will allow persistence of core infection or reinoculation of initially sterilized surface. Failure to achieve bacterial level of the antibiotic inside the tonsil results in bacterial survival[2]. Many strains of bacteria which harbor within the core may produce Beta-lactamase and are therefore capable of enzymatically inactivating penicillin[7,8].

This study was thus done primarily to assess the reliability of the throat swab in chronic tonsillitis. The reference (gold) standard was the tonsil core culture. It's sensitivity, specificity and likelihood ratios were calculated[9]. Secondary goals were to identify the commonest causative organisms and their sensitivity pattern so that general guidelines could be used for rational use of antibiotics in chronic tonsillitis and to consider the possibility of developing a more reliable, valid and relative non-invasive diagnostic test in identifying the bacterial microflora.

PATIENTS AND METHODS

This prospective study included 40 consecutive patients (both adults and children) clinically diagnosed to have chronic tonsillitis (with or without adenoiditis) who underwent tonsillectomy from March 1997 to January 1998. Patients who had antimicrobial therapy 4 weeks prior to surgery, acute infection like peritonsillar abcess or suspected neoplasms for which tonsillectomy was being done were excluded from this study.

After positioning the patient under general anaesthesia the tonsil surface was swabbed and the

swabs were collected in a sterile tube. The tonsils were then dissected. The core tissue was collected in 5 ml of sterile saline in culture tubes. The tubes were then transported within 1/2 to 1 hour and processed. The tissue was inoculated into blood, chocolate and MacConkey's agar plates. Identification of the bacteria were done as per conventional procedures. The sensitivity of the organisms to common conventional antibiotics was done and when found resistant to common antibiotics special sensitivity was requested.

RESULT

There were 40 patients in this study with age ranging from 4 to 45 years. This included 22 females and 18 males. 70% were in their first and second decades (Fig. 1). 47.5% underwent tonsillectomy alone while others had simultaneous procedure (Fig. 2). In 55% patients the throat swab showed pathogens while in 72.5% patients core of tonsil contained pathogens (Fig. 3). However, similar pathogens in both surface and core were grown in 30% patients and different pathogens grown in 15% patients. In 25% patients surface had grown normal flora while the core had grown pathogens. In 15% patients normal flora was grown in both surface and core swabs (Table I). Among the pathogens isolated Beta hemolytic streptococci was grown more commonly followed by Staph. aureus (Table II).

ANALYSIS

The reliability of the culture by throat surface swab was compared to the core swab which is the gold/ reference standard. The Likelihood ratios for similar and general organism pathogen were calculated using sensitivity and specificity (Table III).

DISCUSSION

In our series of patients the surface culture had 55% pathogens, 42.5% had normal flora and 2.5% had no pathogen. This was similar to the study by Surrow et al[7] where 52.6% had normal flora in surface culture. However Rosen et al[2] noted 33% normal flora in surface culture. In our series the isolation of pathogenic bacteria from the core was 72.5%. In the remaining 27.5%, 15% had no growth on the media even after 48 hours of incubation and normal flora was seen in 12.5%. This is contrary to the study by Rosen et al[2] which revealed pathogen in 48%.

The results of the cultures of the throat swab and core were further analyzed for the likelihood ratios. For similar organism the sensitivity and specificity was 42% and 50% respectively, likelihood ratio being 0.84 (Table III). From this test result it is evident that the throat swab is neither a reliable nor valid

Fig. 1 Demographic profile of the patients.

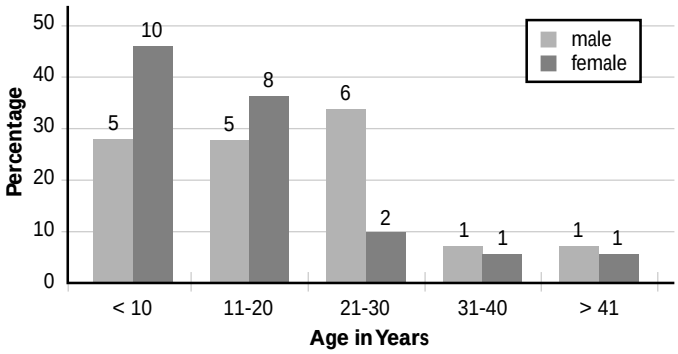

Fig. 2 Distribution of operative procedures.

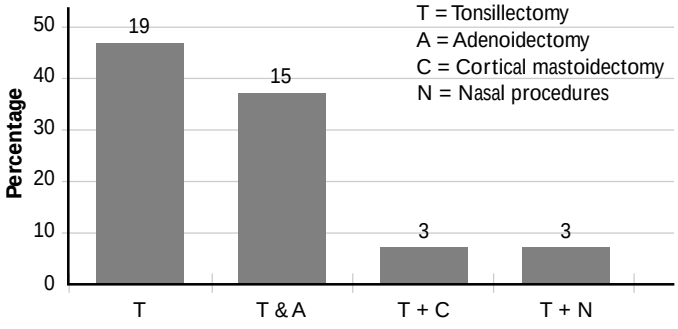

Fig. 3 Pathogen of surface and core.

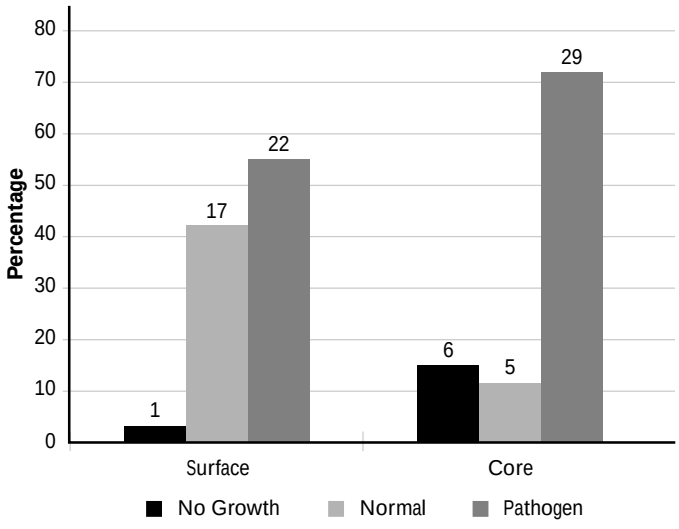

Table I. Comparison of cultures.

Surface	Core	Total No. of Patients	Percentage (%)
Normal flora	Normal flora/No growth	6	15
Normal flora	Pathogen	10	25
Pathogen	Pathogen (different)	6	15
Pathogen	Nonnal flora/No growth	6	15
Pathogen	Pathogen (same)	12	30
		40	100

Table II. Comparison pathogenic microflora.

Organisms (isolated)	Surface	Core
Staph. Aureus	9	11
H. influenzae	0	4
Beta hemolytic streptococci	11	13
Ps. Aerugionsa	1	0
H. para influenzae	2	6
E. Coli	2	0
Klebsiella species	2	6
Fungus	1	0

Table III. Similar Organism Pathogen and General Organism Pathogen.

Similar Organism Pathogen			
Throat swab	Core+	Core-	Total
Same pathogen +	12	6	18
Different pathogen -	16	6	22
Total	28	12	40

Sensitivity = 12/28 = 42%
Specificity = 6/12 = 50%
Likelihood ratio = 0.84

General Organism Pathogen			
Throat Swab	Core +	Core -	Total
Any organism +	18	6	24
Any organism / Normal flora -	10	6	16
Total	28	12	40

Sensitivity = 18/28 = 64%
Specificity = 6/12 = 50%
Likelihood ratio = 1.3

diagnostic test for representing the growth of the same bacterial microflora as the tonsil core. On analyzing for general pathogen the sensitivity and specificity was 64% and 50% specificity respectively with a likelihood ratio of 1.3 (Table III). This test result also shows that the throat swab is neither a reliable nor valid in the diagnosis of chronic bacterial infection of the tonsil. The statistical significance may have improved if more patients had been included in the study.

Microbiological study of both surface and core of the tonsil revealed that the most common organism was Beta haemolytic streptococcus followed by Staphylococcus aureus. This was similar to the reports by Brook et al[4] and Cowan & Hibbert[10]. Haemophilus influenza, Haemophilus parainfluenza and Klebsialla were relatively less common contrary to the report by Rosen et al[2]. Thus the use of superficial swabs failed to recognize the presence of Haemophilus species in a significant number of patients. This may illustrate the basic problem using the results of surface culture for the treatment and poor response to medical therapy in chronic tonsillitis. This is also an additional therapeutic dilemma for patients with chronic tonsillitis who are not willing to undergo surgical management in spite of not responding to routine medical treatment.

CONCLUSION

From our study it is evident that routine culture of the throat by surface throat swab is neither a reliable nor a valid test in the diagnosis of bacterial flora in chronic tonsillitis. Hence, the consideration of a more reliable and valid diagnostic test appears to be necessary. In patients with chronic tonsillitis not responding to initial penicillin therapy the role of fine needle aspiration of the tonsil core under local anaesthesia for the identification of bacterial flora is a possibility for consideration and evaluation.

ACKNOWLEDGEMENT

This study was possible with a grant from the Research Committee, Christian Medical College & Hospital, Vellore, India.

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