Correlation between surface swab culture and tonsillar core culture in patients with recurrent tonsillitis

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Abstract

Objective: To determine the correlation between surface culture swab and culture of tonsillar core in patients with recurrent tonsillitis.

Patients and Methods: One hundred patients booked for elective tonsillectomy were studied. There were 38 females and 62 males between the ages of 3 and 35 years. Specimens from both surface and core of tonsils were cultured.

Results: Pathogens were isolated by core culture but not by the surface culture in 36 cases. In 42 cases pathogenic micro flora were identified from the core of tonsils differing from the surface bacteria. Discrepancy between surface and core culture as to the presence or absence of core pathogens was in 62 cases (62%) while it was identical in 38 cases (38%). In 20 cases (20%) pathogenic microflora was present on surface culture with normal core flora. 14 cases (14%) of the study group showed normal flora.

The principal isolate from both the tonsillar surface and core were Staphylococcus aureus followed by Group A beta hemolytic streptococci, S. pneumonia, Haemophilus influenza, Escherichia coli, Pseudomonas aeruginosa and S. viridans.

Conclusion: The study indicates that pharyngeal swab cultures do not reliably reflect the presence of pathogens in the tonsil core. The tonsil surface reflected mainly the normal flora of the oropharynx, whereas tonsil core showed growth of organisms like Hemophilus and Staph aureus, which were rarely reflected in the surface culture.

Introduction

Acute tonsillitis is a common disease. Repeated antibiotic treatment may fail leading to tonsillectomy. Superficial swab cultures do not sufficiently represent the core bacteria present. In recurrent tonsillitis, the tonsil core harbours numerous bacteria, some of which are pathogenic and may occur in great numbers. A high tissue concentration of these bacteria correlates with clinical parameters of infection and hyperplasia of the tonsils. 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. In many cases, pathogenic organisms were found in the tonsil core, despite the fact that surface cultures revealed only normal respiratory flora. Differences
between tonsil surface and core bacterial flora may explain the increasing failure rate in the eradication of the infection from the tonsil particularly by the penicillin group of antibiotics leading to chronic stage, therefore the rationale of treating chronic tonsillitis medically should be based on the knowledge of the common core pathogen\(^{5}\).

Identifying the bacterial organism within the infected tonsil for appropriate antibiotic therapy could revolutionize the management of chronic tonsillitis\(^{6}\). The aim of the present study was to determine the correlation between surface culture swab and culture of tonsillar core.

**Material and Methods**

This study was conducted in the Department of Otorhinolaryngology, Princess Haya hospital (Aqaba-Jordan). After institutional ethical committee clearance and written informed consent, one hundred patients of both sexes above 3 years of age booked for elective tonsillectomy were studied. The group included 38 females and 62 males between the age of 3 and 35 years.

The indication for tonsillectomy was recurrent tonsillitis defined as at least five attacks of acute inflammation of the tonsil during a single year. Recent upper respiratory tract infection was ruled out. The diagnosis was made on the basis of history of recurrent attacks of sore throat, odynophagia and pyrexia. On physical examination, the patients revealed erythema and debris in tonsil crypts with palpable jugo-digastric lymph nodes. The patients received no antibiotics during the 3 weeks prior to tonsillectomy. After the patient was intubated a tonsillar surface swab was obtained by rotating a sterile cotton wool swab over the surface of the tonsil not touching other parts of the oropharynx. Following this, tonsillectomy was performed by dissection technique. Immediately after excision, the tonsil was immersed in povidine-iodine solution for 30 seconds. Then it was thoroughly rinsed with sterile saline, placed in sterile tray and sectioned into two pieces with the help of sterile scalpel under strict aseptic condition. The same procedure of rubbing a sterile swab was applied to the core of the excised tonsils avoiding its outer surface. Paired samples from individual patients were put in the thioglycollate broth immediately for transport to the laboratory. In the laboratory the specimens were cultured on 5% sheep blood agar, chocolate agar and in Robertson cooked meat medium. The plates were incubated at 37°C in the presence of 5-10% CO for 24-48 h. All the isolates were identified by standard techniques\(^{2}\).

**Results**

Results of cultures from both the surface and the core of tonsils were compared. A large percentage of the patients had no correlation between organisms cultured simultaneously from the two sites. See Table 1 below.

<table>
<thead>
<tr>
<th>Surface culture</th>
<th>Core culture</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal flora</td>
<td>Pathogen present</td>
<td>36</td>
</tr>
<tr>
<td>Pathogen present</td>
<td>Pathogen present (same)</td>
<td>24</td>
</tr>
<tr>
<td>Pathogen present</td>
<td>Pathogen present (different)</td>
<td>6</td>
</tr>
<tr>
<td>Pathogen present</td>
<td>Normal flora</td>
<td>20</td>
</tr>
<tr>
<td>Normal flora</td>
<td>Normal flora</td>
<td>14</td>
</tr>
</tbody>
</table>

In a large group constituting 36 cases, pathogens were isolated by the core culture but not by the surface culture, thus surface culture did not reliably reflect the core pathogens. In 42 cases pathogenic microflora were identified from the core of tonsil, differing from the surface bacteria.

Discrepancy between surface and core culture as to the presence or absence of core pathogens was in 62 cases (62%) while in 38 cases (38%) it was identical. Therefore, one should question the value of the surface culture in predicting the real pathogens in recurrent tonsillitis.

In 20 cases (20%) pathogenic microflora were present on surface culture with normal core flora. 14 cases (14%) of the study group showed normal flora in both cultures.

The principal isolate from both the tonsillar surface and core were *Staphylococcus aureus* followed by *Group A beta haemolytic streptococci, S. pneumoniae, Haemophilus influenzae, Escherichia coli, Pseudomonas aeruginosa and S. viridans*. See Table 2.
In core cultures, *Staphylococcus aureus* was the most common pathogen. Another important organism found in core culture, which was rarely predicated in surface culture was *Haemophilus influenzae*. Four cases of polymicrobial infection were encountered in the study. In these cases the causative agent was *S. aureus* and beta *haemolytic streptococci*.

### Discussion

The pathogenesis of recurrent tonsillitis is largely unknown. Selection of appropriate antibiotic therapy for patients with recurrent tonsillitis is difficult because of the limitations of traditional methods of sampling tonsillar microflora and the increasing incidence of beta-lactamase producing bacteria in the tonsil[7].

In the present study, the commonest indication for tonsillectomy was recurrent tonsillitis. The current widely accepted criteria for surgery are of the order of seven episodes of tonsillitis in the preceding year, five episodes in each of the preceding two years or three episodes in each of the preceding three years, these were arrived at arbitrarily[8,9].

There is near unanimity regarding this indication among various authors[6,11]. Cable et al[12] found no correlation between the size of the tonsils and the indication for tonsillectomy. Barr et al[13] echoed a similar view.

In our study, the tonsillar surface and core culture swabs showed *S. aureus* in 14 and 20 cases, while Group A beta haemolytic streptococci was found in 12 and 18 cases. These findings were comparable to the findings of Ozek et al[13] who identified *S. aureus* in 33% and beta haemolytic streptococci in 30% isolates.

In a study by Surow et al[4], the tonsils of 97 children undergoing tonsillectomy were studied to determine the correlation between surface culture swab and culture of tonsillar core, *Staphylococcus* was the most common isolate from both surface and core.

In the study by Brook et al[14] specimens from both the surface and the core of tonsils from 23 children with recurrent tonsillitis were cultured for aerobic and anaerobic microorganisms. The predominant aerobic isolates were alpha-hemolytic streptococci, *Staphylococcus aureus*, beta-hemolytic streptococci, and *Haemophilus sp*.

In the present study in a large group constituting 36 cases, pathogens were isolated by the core culture but not by the surface culture. Similar observations were noted in other studies[9].

Overall surface culture was in variance as to the presence or absence of core pathogens in 62 cases (62%). Similarly, Rosen et al[15] found 48% variance between surface and core micro-organisms. These findings may explain recurrence of tonsillitis and makes the reliability of the conventional tonsillar culture questionable. Surgical extirpation of the tonsils seems to be the only treatment since deep bacteria remain unidentified and resist the antibiotic therapy that may affect only the surface microflora.

### Conclusion

The study indicates that pharyngeal swab cultures do not reliably reflect the presence of pathogens in the tonsil core. Routine culture of the throat by surface swab for the accurate diagnosis of bacterial flora in chronic tonsillitis is neither reliable nor valid. The tonsil surface reflected mainly the normal flora of the oropharynx, whereas tonsil core showed growth of organisms like *Haemophilus* and *Staph aureus* which were rarely reflected in the surface culture.

### References

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the core bacteria in inflamed tonsils. *Indian J Pathol Microbiol* 2001; 44:293-5.