Clinical Study for Evaluation of Most Prominent Bacteria Seen In Various Orofacial Space Infections

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Abstract: Odontogenic infections are frequently encountered in the practice of oral and maxillofacial surgery. The predominant organism which are found in odontogenic infection are streptococci and staphylococcus. The prevalent odontogenic infections may spread and involve the potential spaces in head and neck region leading to fascial space infection. This article deals with the various microorganisms encountered in orofacial space infection and their incidence and prevalence

Keywords: Space Infection, Microorganisms, Aerobic, Anaerobic

I. Introduction

Odontogenic infections are frequently encountered in the practice of oral and maxillofacial surgery. Odontogenic infection is frequently caused by dental caries, periodontitis, pericoronitis. Focal sepsis from oral infection leads to bacteremia and spread of infection to CVS and subacute bacterial endocarditis. The virulence of the organism plays a major role in the spread of the infection. The factors influencing the spread of infection rapidly into deeper planes are lowered host’s resistance, virulence of microorganism, medically compromised patients with uncontrolled diabetes, metabolic diseases like uremia, chronic alcoholism, malnutrition and anaemia.

MICROBIOLOGY

The aerobic bacteria found in odontogenic infection are primarily Gram positive cocci, most are viridians streptococci species, include strep. milleri, strep. sanguis, strep. salivarius, strep. mutans. These oral streptococci are also known as α-hemolytic streptococci, which account for about 80% of aerobic bacteria found in odontogenic infection. Some anaerobic cocci appear similar, morphologically, to staphylococci.

SPREAD OF SPACE INFECTION

Staphylococci are frequently associated with abscess formation. The semicroorganisms produce coagulase, an enzyme that is deposited which causes fibrin deposition in citrated or oxalated blood. Streptococci are often more associated with cellulites, which produce enzymes such as streptokinase (fibrinolysin), hyaluronidase, and streptodornase. These enzymes break down fibrin and connective tissue ground substance, and lyse cellular debris, thus facilitating rapid spread of bacterial invaders. Although there are barriers, these are violated by the end products of the microorganisms and guide the infection to spread into deeper planes.

CULTURE SENSITIVITY

In the laboratory following steps were done to confirm the microflora from the sample. Steps for aerobic organism identification: Assaytime/turnaround time ~ 2 days. The pus sample was aseptically plated on blood agar plate and on MacConkey’s agar plate to make a primary well. Subsequently spreading was done by a nichrome wire loop. Both the plates were streaked aseptically. Incubation was done for both the plates underanaerobic conditions at 37°C for 24 h. The colonies on both the plates were noted. Blood agar plate was used for all organisms and MacConkey’s agar plate was for gram negative organisms.
Thioglycolate broth and Robert’s cooked broth

E. Virolainen et al in 1979 has reported about the origin and cause of deep neck space infections. The author has reported that deep cervical infection was caused predominantly due to odontogenic infection. J. Daniel Labriola et al in 1983 studied 50 orofacial abscesses using aerobic and anaerobic culture method and reported that 85% of specimens contained anaerobes. He also reported that 39% of organisms are resistant to penicillin.

II. Materials And Methods

A total of 50 patients within the age group of 16 years to 60 years male and female patients with swelling, cellulitis of face, abscess intraoral or extraoral, trismus and pain due to infection of odontogenic origin were included in the study. Routine blood investigations were done for all the patients. All the patients were started with empirical antibiotics. Surgical management included extraction of offending tooth intraoral and extraoral incision drainage of abscess was done case specifically. (patients who did not respond to the treatment required intravenous administration of antibiotics) Patients were followed up until regression of infection. All the patients were recalled and reviewed the day after the procedure and until the infection regressed. All the participants were informed about the study. The patients were explained about the diagnostic investigations, treatment plan and sample collection to be done. A written informed consent form was signed by all the patients for both the surgical procedure and the radiological investigations and follow up.

INCLUSION CRITERIA:
Patients of 16 years to 60 years age groups, with odontogenic and fascial space infections of head and neck.

EXCLUSION CRITERIA:
Immuno-compromised patients (e.g. steroids therapy and human immunodeficiency virus (HIV) Patients undergoing anti-coagulant therapy, cardiac vascular diseases. Patients with uncontrolled diabetes (RBS value > 200) and patients who are not under medication.

Specimen Collection

Pus sample was collected intraorally or extra orally after proper preparation of site. The extra oral sites were prepared with spirit or povidone-iodine or a combination of these. Intra oral sites were prepared with betadine saline irrigation. Disposable syringes (5 ml) with disposable needle of 18gauges were used to aspirate the pus from the abscess. The aspirated pus was immediately injected in thyoglycolate broth and Robert’s cooked medium and transported to laboratory. Smear studies of gram staining, Aerobic culture, Anaerobic culture was done from the acquired sample.

Gram Staining

Pus sample was subjected to gram staining and different morphological forms of bacteria were noted.

Aerobic Culture

For aerobic culture the samples were aseptically inoculated on Mac-Conkeys agar and blood agar and incubated at 37 o C for 18–24 h. The plates were observed for growth of organisms after 24 hours. The blood agar plate is used for identification of all organisms. MacConkey’s agar plate is exclusively used for gram negative bacteria culture. Gram’s staining, standard biochemical tests and antimicrobial susceptibility testing was done by Kirby-Bauer method.
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Anaerobic Culture

For anaerobic culture, sample in thioglycolate broth was inoculated in the same and incubated at 37°C overnight. Subculture was done by inoculating into plain blood agar and incubated anaerobically at 37°C, using gas pack, in anaerobic jar with an indicator for 48 hours. The plates were observed for growth of organisms. The organisms were identified by gram’s stain and morphology. If no growth occurs on aerobic culture, the organism is presumptively identified by means of gram reaction, colony characters, and available biochemical tests. If required antimicrobial susceptibility is done on blood agar with disc diffusion technique.
III. Results

This study evaluated 50 patients who reported to the outpatient department with pain and swelling caused by odontogenic infection. Of those 50 patients 30 were male (60%) and 20 patients were female (40%), ranging from age of 21-60 with the mean age of 42.67 years.

Gram positive cocci were found most frequently (69.7%) followed by gram negative bacilli (22.3%). Out of 50 patients considered in this study the pus sample from 35 patients showed mixed aerobic and anaerobic growth of microorganisms (69.23%), whereas pus sample from 15 patients showed purely anaerobic growth (30.77%). None of the 50 samples tested showed purely aerobic growth. Anaerobic growth was found in all 50 cases.

In our study the aerobes isolated were 36% of the total isolate. Of the aerobes isolated from the culture α haemolytic streptococci (21.5%) were predominantly present, 7.3% of Pseudomonas aeruginosa was seen, 4.5% of Staphylococcus aureus was isolated and 2.8% of Klebsiella.

In our study the anaerobes isolated were 34.9% of anaerobic streptococci, 11.4% of Bacteroides, 5.60% Fusobacterium and 6.9% Porphyromonas Gingivalis, 2.7% Anaerobic staphylococci, and 2.4% Pervotella melaninogenica respectively were found.

IV. Summary

In our study the aerobes isolated were predominantly Gram positive cocci which comprised of 69.7%, 21.5% of α hemolytic streptococci were isolated followed by, 7.3% Pseudomonas aeruginosa, 4.5% staphylococcus aureus, 2.8% Klebsiella. These results are similar to the results reported by Sanchez et al., Wang et al.2014 and other authors. The anaerobic organisms isolated were predominantly anaerobic streptococci present in 21.5% of isolates which is comparable to studies reported by Storoe et al.,2001 and other authors.28 Other organisms like Pervotella seen in 2.4% of isolates, Porphyromonas gingivalis seen in 6.9% of isolates. Fusobacterium was seen in 5.6% of the isolated. Anaerobic staphylococcus was seen in 2.7% of isolates. Bacteroides were present in 11.4% of isolates. These results are similar to the results reported by Sanchez et al.60 and other authors.5,6,7
V. Conclusion

Odontogenic infection is generally polymicrobial. It is commonly treated with empirical antibiotics and extraction of offending infectious tooth. Surgical management initiated with incision, drainage and decompression at early course of disease with appropriate oral or intravenous antibiotics avoids the spread of infection into multiple fascial spaces of head and neck.

References


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