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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*

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I. Introduction

Odontogenic infections are frequently encountered inthe practice of oral and maxillofacial surgery.Odontogenic infection is frequently caused by dental caries,periodontitis, pericoronitis. Focal sepsis from oral infection leads tobacteraemia and spread of infection to CVS andsubacute bacterialendocarditis.The virulence of the organism plays a major role in the spread ofthe infection.The factors influencing the spread of infection rapidly into deeper planes arelowered host's resistance, virulence of microorganism, medicallycompromised patients with uncontrolled diabetes, metabolic diseases likeuraemia, chronic alcoholism, malnutrition and anaemia.

MICROBIOLOGY

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

SPREAD OF SPACE INFECTION

Staphylococci are frequently associated with abscess formation. Thesemicroorganisms produce coagulase, an enzyme that is deposited which cancause fibrin deposition in citrated or oxalated blood. Streptococci areassociated more often with cellulites, which produce enzymes such asstreptokinase (fibrinolysin), hylouronidaze, and streptodornase. Theseenzymes break down fibrin and connective tissue ground substance, and lysecellular debris, thus facilitating rapid spread of bacterial invaders. Althoughthere are barriers, these are violated by the end products of themicroorganisms and guide the infection to spread into deeper planes.

CULTURE SENSITIVITY

In the laboratory following steps were done to confirm the microflorafrom the sample. Steps for aerobic organism identification: Assaytime/turnaround time - 2 days. The pus sample wasaseptically plated onblood agar plate and on MacConkey's agar plate to make a primary well.Subsequently spreading was done by a nichrome wire loop. Both the plateswere streaked aseptically. Incubation was done for both the plates underaerobic conditions at 37°C for 24 h. The colonies on both the plates werenoted. Blood agar plate was used for all organisms and MacConkey's agarplate was for gram negative organisms.

Thioglycolate broth and Robert's cooked broth

E. Virolainen et al in 1979[1]has reported about the origin and causeof deep neck spaceinfections. The author has reported that deep cervicalinfection was caused predominantly due to odontogenic infection.

J. Daniel Labriola et al in 1983[2]studied 50 orofacial abscesses usingaerobic and anaerobic culture method and reported that 85% of specimenscontained anaerobes. He also reported that 39% of organisms are resistant topenicillin.

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 werefollowed 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 andfascial space infections of head and neck.

EXCLUSION CRITERIA:

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

Specimen Collection

Pus sample was collected intraorally or extra orally after properpreparation of site. The extra oral sites were prepared with spirit or povidoneiodine or a combination of these. Intra oral sites were prepared with betadinesaline irrigation. Disposable syringes (5 ml) with disposable needle of 18gauges were used to aspirate the pus from the abscess. The aspirated pus wasimmediately injected in thyoglycolate broth and Robert's cooked medium andtransported to laboratory. Smear studies of gram staining, Aerobic culture,Anaerobic culture was done from the acquired sample.

Gram Staining

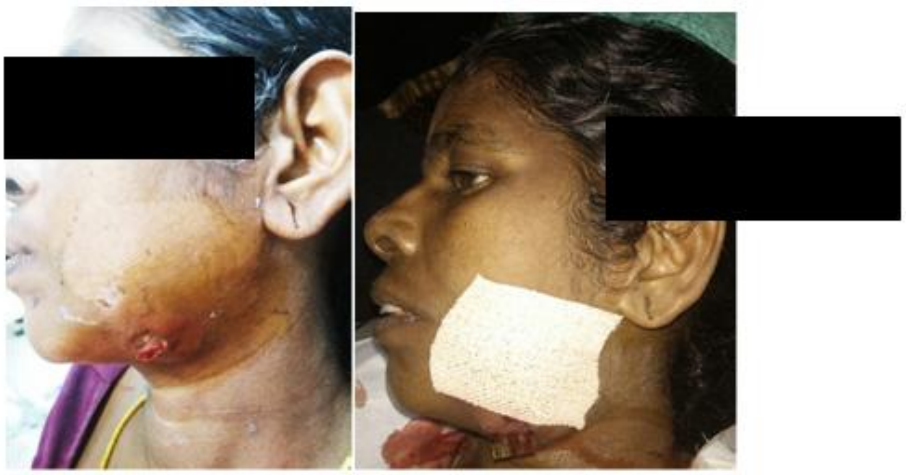
Pus sample was subjected to gram staining and different morphologicalforms of bacteria were noted.

Aerobic Culture

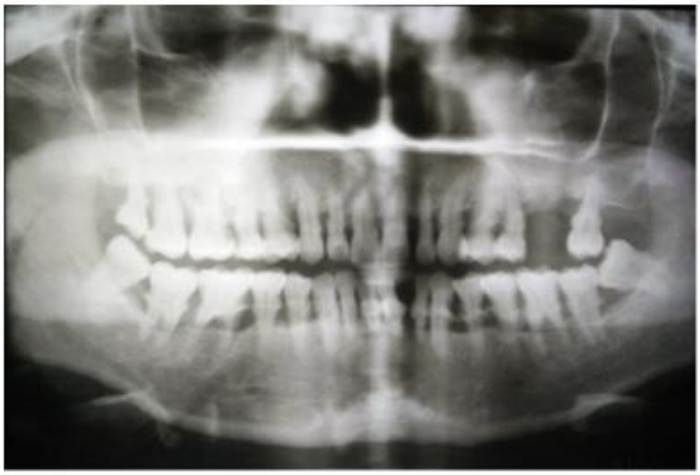
For aerobic culture the samples were aseptically inoculated on Mac-Conkeys agar and blood agar and incubated at 37 o C for 18–24 h. The plateswere observed for growth of organisms after 24 hours. The blood agar plate isused for identification of all organisms. MacConkey's agar plate is exclusivelyused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

Anaerobic Culture

For anaerobic culture, sample in thioglycolate broth was inoculated in the same and incubated at 37o C overnight. Subculture was done by inoculating into plain blood agar and incubated anaerobically at 37o C, usinggas 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.



Odontogenic infection involving buccal and submandibular space infection

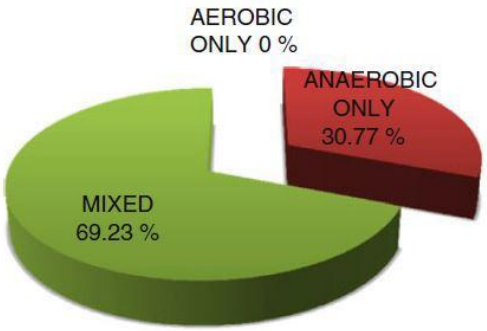


18-gauge needle with syringe, cotton swab, thioglycolate broth, Robert's cooked broth

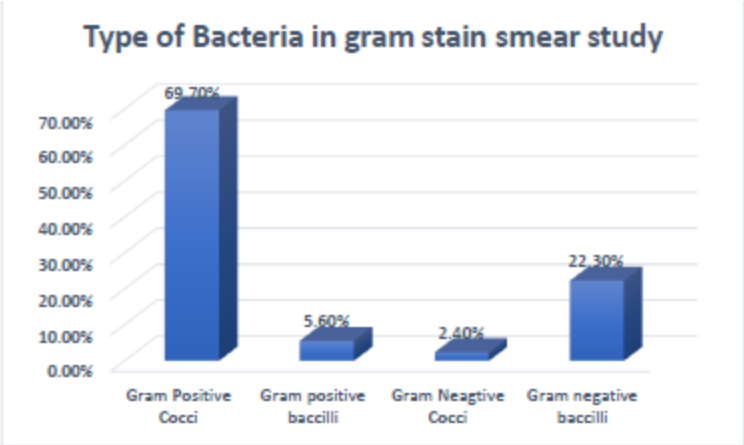
III. Results

This study evaluated 50 patients whoreported to the outpatient departmentwith pain and swellingcaused by odontogenic infection. Of those 50 patients 30 were male (60%) and20 patients were female (40%), ranging from age of 21-60 with the mean ageof 42.67 years.

Gram positive cocci were found most frequently (69.7 %)followed bygram negative bacilli (22.3 %). Out of 50 patients considered in this study thepus sample from 35 patients showed mixed aerobic and anaerobic growth ofmicroorganisms (69.23 %), whereas and pus sample from 15 patients showedpurely 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 total isolate. Of theaerobes isolated from the culture α haemolytic streptococci (21.5%) werepredominantly present, 7.3% of Pseudomonas aeruginosa was seen, 4.5% ofStaphylococcus aureus was isolated and 2.8% of Klebsiella.



The anaerobic bacteria predominantly isolated were 34.9% ofanaerobic streptococci, 11.4% of Bacteroides, 5.60% Fusobacterium and 6.9%Porphyromonasgingivalis, 2.7% Anaerobic staphylococci, and 2.4%Pervotellamelaninogenica respectively were found.

IV. Summary

In our study the organisms isolated from the pus aspirated from thepatients predominantly were 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[3], Wang et al2014[4]and other authors.[4,5]The anaerobic organisms isolated were predominantly anaerobicstreptococci present in 21.5% of isolates which is comparable to studiesreported by Storoe et al [20016and] other authors28. Other organisms likePervotella seen in 2.4% of isolates, Porphyromonasgingivalis seen in 6.9% ofisolates. Fusobacterium was seen in 5.6% of the isolated. Anaerobicstaphylococcus was seen in 2.7% of isolates. Bacteroides were present in11.4% of isolates. These results are similar to the results reported by Sanchezet al60 and other authors.[5,6,7]

V. Conclusion

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

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