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REAL TIME PCR ANALYSIS & ANTIBIOTIC SENSITIVITY OF BUCCAL SPACE INFECTION OF PERIODONTAL ORIGIN: A CASE REPORT

Dental Science

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ABSTRACT

Background: Microbiology of odontogenic infections was inconsistent. It was difficult to compare various bacteriological investigations because of different methods and materials used. Streptococci which can be seen in the composition of microbial dental plaque may cause inflammatory periodontal disease and dental caries. Microbiological isolation helped in identifying the organisms and advocating antibiotics.

Case report: We present a case of buccal space infection in a 51-year-old patient presented with a swelling in the upper left cheek region. He was on antibiotics as prescribed by a dentist for toothache for a week. It was diagnosed as a buccal space infection due to periodontal origin. Intra orally there was chronic generalized periodontitis with 9mm probing pocket depth, clinical attachment loss of 6 mm, mobility & exudation in upper left first and second molar. Pus sample was collected and sent for Culture & antibiotic sensitivity. The culture revealed E. coli & streptococcus species. The testing revealed resistance to Ampicllin//trimethoprim/ciprofloxacin/nalidixic acid. PCR analysis was done for Streptococus pyogenes & P. gingivalis. PCR analysis revealed the presence of Streptococcus pyogenes.

Conclusion: It is always appropriate to begin the empiric antibiotic regimen with correlation to clinical presentation thinking of the most likely suspected microorganisms involved in the infections, which are usually the normal flora of the region, without forgetting the importance of early surgical intervention to reduce morbidity and complications.

KEYWORDS

Space infections, streptocccoccus pyogenes, P.gingivalis, Polymerase Chain reactions, antibiotic sensitivity

Introduction:

Space infections arise either from dental caries or periodontal infections that have extended beyond the alveolar bone to involve the fascial spaces around the face and oral cavity. These infections tend to spread along planes of least resistance from the supporting structures of the affected tooth. In the maxilla, the alveolar bone is weakest on the buccal side throughout. In the mandible, the alveolar bone is weakest in the lingual aspect posteriorly affecting the molar teeth, and on the buccal side more anteriorly involving the incisors and canine teeth. Thus, the location of the affected tooth predicts the route of spread and which orofacial spaces become infected. If pus perforates through either the maxillary or mandibular buccal plate inside the attachment of the buccinator muscle, the infection will be intraoral; if the perforation is outside this muscle attachment, the infection will be extraoral. Thus, infection of the upper and lower molars, lower incisors, and lower canine teeth are often accompanied by extraoral manifestations. Buccal space infections – These arise primarily from mandibular or maxillary bicuspid or molar teeth, the apices of which lie outside of the buccinator muscle attachments. They are readily diagnosed because of marked cheek swelling but with minimal trismus or systemic symptom In spite of a wide array of antibiotics, microorganisms do offer some resistance. There is a 100% sensitivity to amoxicillin and Clavulanic acid. Amoxicillin and Clavulanic acid Also, there is an increased prevalence of anaerobic bacteria over aerobic bacteria. (Mamta et al)[1]

This case report presents a PCR analysis and antibiotic sensitivity to buccal space infection of periodontal origin
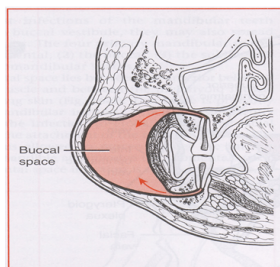
The **Buccal Space** lies between the *Buccinator* muscle and overlying skin and the superficial fascia. This potential space may become involved via upper jaw or lower jaw molars (*arrows*)

Figure 1: Extension of Buccal Infection

Fig1: Route of spread of infections due to

- higher level of matrix metalloproteinase
- trypsin-like enzyme
- Gingipains which are also considered important in its capacity to degrade antibacterial peptides antibacterial peptides, such as neutrophil-derived α-defensins, complement factors, such as C3 and C4, T cell receptors
- protease-activated receptor (PAR)-2

Case Report:

We present a case of buccal space infection in a 51-year-old patient presented with a swelling in upper left cheek region. He was on antibiotics as prescribed by a dentist for toothache for a week. It was diagnosed as a buccal space infection due to periodontal origin. Intra orally there was chronic generalized periodontitis with 9mm probing

pocket depth, clinical attachment loss of 6 mm, grade 3 mobility & exudation in upper left first and second molar. Pus sample was collected from 26 and sent for Culture & antibiotic sensitivity. The culture revealed E. coli & streptococcus species. The antibiotic testing revealed resistance to Ampicllin// trime thoprim/ cipro floxacin/ nali dixic acid. PCR analysis was done for Streptococus pyogenes & P. gingivalis. PCR analysis revealed the presence of Streptococcus pyogenes.

Case Discussion:

The most commonly involved space in both the diabetic and nondiabetic patients in this study was the submandibular space, followed by the buccal space and submasseteric space. In a few studies, the parapharyngeal space was the most commonly involved space in diabetic patients, whereas the submandibular space or the buccal space was found to be more involved in nondiabetic individuals (Rao et al)[2]. Escherichia coli is a Gram-negative, facultative aerobic, rod-shaped, coliform bacterium of the genus Escherichia that is commonly found in the lower intestine of warm-blooded organisms. Streptococcus pyogenes is a Gram-positive bacterium in the genus Streptococcus. These bacteria are aerotolerant and an extracellular bacterium, made up of non-motile and non-sporing cocci clinically important for humans. Infrequent, pathogenic, part of the skin microbiota. *Streptococcus pyogenes* (GAS) is a human pathogen that causes over 600 million infections worldwide that result in over 500,000 deaths a year. GAS causes mild infections of the skin and mucosal surfaces but is also able to cause severe, life-threatening invasive diseases such as streptococcal toxic shock syndrome (STSS) or necrotizing fasciitis (NF). P. gingivalis has a higher level of matrix metalloproteinase has trypsin-like enzymes. Gingipains are also considered important in its capacity to degrade antibacterial peptides, such as neutrophil-derived α-defensins, complement factors, such as C3 and C4, T cell receptors and has protease-activated receptor (PAR)-2 (Yan et al)[3]. A real-time PCR assay to detect SDSE and differentiate it from GAS should enable more detailed investigations of its prevalence and clinical importance and is an improvement over current presumptive identification methods. It has improved analytical sensitivity compared to a rapid immunoassay and demonstrated clinical sensitivity of 91.7% and clinical specificity of 100% compared to standard culture in an analysis of 96 throat swabs. *E. coli*, *E. faecalis*, *P. aeruginosa* and *S. aureus* were significantly more prevalent and detected in higher counts in diseased sites of patients with periodontal disease compared to healthy subjects ($p < 0.05$). *E. coli*, *E. faecalis*, *P. aeruginosa* and *S. aureus* were significantly more prevalent and detected in higher counts in diseased sites of patients with periodontal disease compared to healthy subjects ($p < 0.05$).[4] Cultures and sensitivities commonly showed greater growth in aerobes (65.7%) than in anaerobes. Gram positive cocci and gram negative rods had the greatest growth percentage in cultures. [4,5,6,7,8]

Summary and Conclusion:

• Microbial isolation & antibiotic sensitivity are vital segments of diagnosis & guidance at the treatment plan
• PCR helps in the identification of the key pathogens

This can be used on an everyday basis for identification & proper treatment planning

Picture1: Frontal view of patient showing buccal space infection

Figure 2: Intra-oral picture of the patient

**Figure 3: DNA extraction kit for PCR analysis**

Figure 4: Analysis that may be required for the oral sample

Figure 5: Loading the ring PCR

• most common format for molecular-based pathogen testing, capital equipment costs can be prohibitive for smaller laboratories
• The real time PCR assays were easily converted to function in a low-density microarray format, and the entire process (from specimen extraction through detection) was performed in less than 4 hours
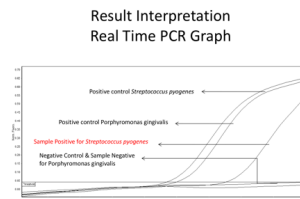
Figure 6: PCR analysis report

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