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Case Report

Microbiological Approach in Management of Recurrent Dento - Buccal Space Infection - Report of Three Uncommon Cases

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Abstract

The route of facial infection usually depends on the jaw-tooth relationship factors followed by virulence and type of microorganisms. *Staphylococci* are frequently associated with abscess formation. However, at times head and neck infection with an odontogenic origin are caused by gram-negative species like *Klebsiella pneumonia* without any predisposing opportunistic infectious etiology. In this report, we presented 3 rare cases of buccal space infection associated with *Klebsiella pneumonia* without any predisposing systemic disease. Appropriate diagnosis followed by antibiotics oral cephazolin (500mg BID) and intra-muscular gentamicin (150mg BID) at adequate strength and duration has brought a significant decrease in the progression of the disease that yielded complete recovery after 10days. Thus with odontogenic infections it is appropriate to always begin with the empiric antibiotic regimen with correlation to clinical presentation thinking of the most likely suspected microorganisms, which are usually the normal flora of the region, without forgetting the importance of early surgical intervention to reduce morbidity and complications.

Keywords: Buccal space infection; Gram-Negative microbes; *Klebsiella pneumonia*; Normal flora; Space infection

Introduction

The deep neck spaces are regions of loose connective tissue occupying the areas between the three layers of deep cervical fascia (superficial, middle, and deep layer) [1]. The facial layers may limit the spread of infection. However, the spaces of the neck communicate with one another forming paths that can allow the spread of the infection from the teeth and the associated oral tissues because the pathogens can travel within the facial planes, by the spread of the related inflammatory exudates. When involved in infections, the space can undergo cellulitis, which can cause a change in the normal proportions of the face [2]. Several reports have indicated that the origins of most space infections are odontogenic infections. Odontogenic infection such as acute periapical periodontitis, alveolar abscess, and pericoronitis especially from the 3rd mandibular and maxillary molars or as an extension of peritonsillar cellulitis, may involve several spaces in the head and neck region including, Buccal space, Buccinator space, Parapharyngeal space, Submandibular, Sublingual, lateral pharyngeal and Pterygoid space [3].

The route of facial infection usually depends on the jaw-tooth relationship factors such as configuration of roots, position of roots in the bone, thicknesses of bony plates followed by virulence and type of microorganisms involved through root apex or periodontal pockets [4]. Fascial space infections are associated with life threatening complications such as obstruction of the airway, intracranial spread, hematogenous dissemination and pleural extension. *Staphylococci* are frequently associated with abscess formation. These microorganisms produce coagulase, an enzyme that is deposited which can cause fibrin deposition in citrated or oxalated blood. *Streptococci* are associated more often with cellulites, which produce enzymes such as streptokinase (fibrinolysin), hylouronidaze, and streptodornase. These enzymes break down fibrin and connective tissue ground substance, and lyse cellular debris, thus facilitating rapid spread of bacterial invaders [5]. Studies have shown that gram-negative *Klebsiella pneumonia* (*K. pneumoniae*) is usually related to opportunistic infections in the respiratory or hepatobiliary systems. However, at times head and neck infection with an odontogenic origin are caused by these species without any predisposing opportunistic infectious etiology [6]. In this case, series, we report 3 rare cases of buccal space infection associated with *Klebsiella pneumonia* without any systemic disease.

Case Presentation

Case 1

An 18-year old boy reported to the outpatient department with a chief complaint of severe pain and swelling in his lower left facial region with inability to fully open his mouth since 3days. No associated symptoms like fever, cough and dysphagia. Upon physical examinations, vital signs were normal with no other specific systemic diseases as described by the patient. On extra oral examination, a diffuse swelling of about 4 x 4 cm approximately extending superior-inferiorly from the line joining the zygomatic process of maxilla to the commissure of the lower lip and anterio-posteriorly from alar region to the anterior border of the masseteric muscle, soft in consistency and tender on palpation with no associated sinus or fistula or any local rise in temperature. On intra oral examination, lower left first molar (36) was tender on percussion presenting with deep dental caries (Grossly decayed tooth) with diffused collection of pus in the

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Figure 1:

surrounding tissue showing vestibular tenderness extending into the buccal mucosa. Intraoral periapical radiograph revealed diffuse periapical radiolucency into the surrounding tissue with no obvious bony changes. Orthopantamograph also revealed diffuse radiolucency in the buccal space region. A provisional diagnosis of buccal space infection secondary to deep dental caries in associated with 36 was given (Figure 1).

Case 2

A 38-year old female patient reported to the outpatient department with a chief complaint of severe pain and swelling in her upper right facial region with inability to fully open his mouth since one week. No associated symptoms like fever, cough and dysphagia. Upon physical examinations, vital signs were normal with no other specific systemic diseases as described by the patient. On extra oral examination, a diffuse swelling of about 5 x 4 cm approximately extending superior-inferiorly from the right infraorbital region to the commissure of the lower lip and anterio-posteriorly from angle of the mouth to the anterior border of the masseteric muscle, soft in consistency and tender on palpation with no associated sinus or fistula or any local rise in temperature. On intra, oral examination upper right first molar (16) was tender on percussion presenting with grossly decayed tooth structure and diffused collection of pus in the surrounding tissue showing vestibular tenderness extending into the buccal mucosa. Intraoral periapical radiograph revealed diffuse periapical radiolucency into the surrounding tissue with no obvious bony changes. Orthopantamograph also revealed diffuse radiolucency in the buccal space region. A provisional diagnosis of buccal space infection secondary to deep dental caries in associated with 16 was given (Figure 2).

Case 3

A 54-year old female patient reported to the outpatient department with a chief complaint of severe pain and swelling in his lower left facial region with inability to fully open his mouth since 5 days. No associated symptoms like fever, cough and dysphagia. Upon physical examinations, vital signs were normal with no other specific systemic diseases as described by the patient. On extra oral examination, a diffuse swelling of about 6 x 4 cm approximately extending superior-inferiorly from the left infraorbital region to the lower border of the mandible and anterio-posteriorly from alar region to the anterior border of the masseteric muscle, soft in consistency and tender on palpation with no associated sinus or fistula or any local rise in temperature. On intra oral examination, lower left second molar (37) was tender on percussion presenting with deep dental caries (Grossly decayed tooth) with diffused collection of pus in the surrounding tissue showing vestibular tenderness extending into the buccal mucosa. Intraoral periapical radiograph revealed diffuse periapical radiolucency into the surrounding tissue with no obvious bony changes. Orthopantamograph also revealed diffuse radiolucency in the buccal space region. A provisional diagnosis of buccal space infection secondary to deep dental caries in associated with 37 was given (Figure 3).

Diagnostic approach

All the above-mentioned 3 cases showed buccal space infection secondary to deep dental caries (odontogenic infections) at various sites. Emergency access opening was done under local anesthesia to create a drainage path and the patient was kept on antibiotics for five days and was recalled. During the subsequent visit, the swelling was still evident and no response was observed to the antibiotic prescribed. It was therefore decided to drain the pus extra-orally. Patient was prepared after taking a thorough consent from the parents. Proper aseptic protocol was taken to ensure no infection occurred concurrently. The purulent discharge was collected and sent for further investigations like gram staining and antibiotic sensitivity. After draining the discharge, taping was done and the patient was discharged and was continued on same medication until the sensitivity report was sought.

Figure 2:

Figure 3:

Figure 4:

Culture characteristics

The purulent discharge was collected and sent for further investigations showed gram negative, non-motile, encapsulated, lactose fermenting, facultative anaerobic, rod shaped bacterium. In Blood Agar medium colonies are non-hemolytic i.e. shows Gamma Hemolysis (γ-hemolysis). Further culture was performed on MacConkey Agar medium that showed pink colored colonies due to the lactose fermentation which differentiates Gram-positive bacteria and Salmonella species which are non-lactose fermentors and gives colorless colonies on MacConkey agar medium (Figure 4).

Post-surgical follow up

In these present cases oral cephazolin (500mg BID) and inj. gentamicin (150mg BID) were administered that yielded complete recovery after 10 days.

Discussion

Odontogenic infections were the most common cause in our series 65%, followed by the disease in oropharynx compared with other studies, which report dental infections 31-80 %, and tonsillar origin in 1.5-3.4 % [7]. Odontogenic orofacial infections arise either from dental caries or from 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 [8]. 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, location of the affected tooth predicts the route of spread and which orofacial spaces become infected [9]. Jurgen et al. reported *Streptococci*, *S aureus* and Anaerobes as the most common organisms [10]. Bakir et al. showed that 20 (58.8%) of culture positive patients had polymicrobila growth and the most common organisms were *Peptostreptococcus* (21.3%), *S epidermidis* (19.7%) [11]. *K. pneumoniae* is not a common pathogen in head and neck space infections however in certain conditions or compromised host defense will influence a normal bacterial flora like *K. pneumonia* to cause opportunistic infections [12].

Although surgical drainage of loculated pus and dental extraction are the mainstay of therapy, antibiotic treatment is required to halt local spread of infection and prevent hematogenous dissemination [13]. The choice of specific antimicrobial regimens for odontogenic orofacial infections is empirical based on anticipated causative pathogens and immune status of the host. This is because specimens obtained extraorally to avoid contamination by the oral commensal flora are rarely available. Odontogenic orofacial space infections are usually polymicrobial involving both strict anaerobes and facultative bacteria within unique ecosystems of the dental plaque and gingival crevice [14]. According to previous studies, most *K. pneumoniae* strains have been uniformly resistant to penicillin and are susceptible to cephalosporin and aminoglycosides [15]. In these present cases cephazolin and gentamicin were administered that yielded complete recovery.

Conclusion

Therefore, with odontogenic infections it is always appropriate to always begin with 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.

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