



Knowledge and Practice towards Management of Space Infections among Dental Practitioners

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ABSTRACT

An odontogenic infection is an alveolar, jaw, or facial infection that is caused by a tooth or its supporting structures and is one of the most common infections. Dental caries, heavy restorations or unsuccessful endodontic treatment, pericoronitis and periodontal infection are by far the most likely reasons for odontogenic infections. Infections are typically clustered around teeth and may stay concentrated to the region where it began, and may propagate to neighbouring or distant locations. The questionnaire included questions regarding essential knowledge and understanding of the Management of odontogenic space infections. Responses were obtained, and the data were analyzed. 72% of the respondents have said streptococcus viridans is the most common microorganisms in odontogenic infection, 57% said they would give antibiotics, incision and drainage for canine space infection, 63% said they would give antibiotics, incision and drainage for submandibular infection space infection, 57% said their first choice of antibiotic in managing space infection is Amoxicillin, and 53% said clindamycin is the choice of antibiotics in patients allergic to Amoxicillin. Most of the dental practitioners in this study did not have complete knowledge regarding the new generations of cephalosporins rather; they were aware of the 3rd and 4th generation cephalosporins. More education and understanding will improve the effectiveness of use and solve the difficulties faced in dentistry.



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INTRODUCTION

An odontogenic infection is an alveolar, jaw, or facial infection that is caused by a tooth or its supporting structures and is one of the most common infections.

Dental caries, heavy restorations or unsuccessful endodontic treatment, pericoronitis and periodontal infection are by far the most likely reasons for odontogenic infections. Infections are typically clustered around teeth and may stay concentrated to the region where it began, and may propagate to neighbouring or distant locations. The duration of the infection varies depending on the virulence of the pathogens, host susceptibility variables and the regional anatomy.

The clinical manifestation of odontogenic varies widely depending on whether it is anterior or posterior, maxilla or mandible, and whether the infection is concentrated or spread. Like other infections, pain, tenderness, redness, and swelling are clinical signs and symptoms. Patients with reductive dental infections with regionalized discomfort, cellulitis and receptivity to percussion and tem-

perature (Holmes and Pellecchia, 2016). Nevertheless, patients with deep infections or abscesses which extend throughout the fascial zone may have swelling; fever; and occasionally trouble in swallowing, opening the mouth, or respiration (Holmes and Pellecchia, 2016; Pellecchia et al., 2016).

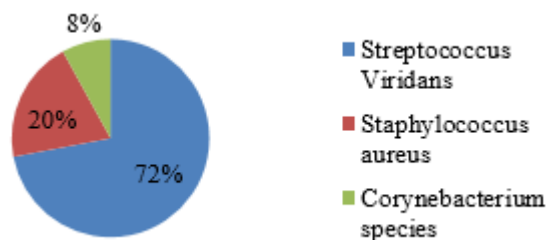


Figure 1: Most common micro organisms in odontogenic infection.

There are a variety of problems in the dental clinic that can be known to be unanticipated dental emergencies, such as toothache, broken or avulsed tooth, and odontogenic infections. Dentist treatment of odontogenic diseases may be the most applicable to these incidents due to its complex microbiology and the propensity for life-threatening medical emergency situations. Odontogenic infections cover a range of conditions varying from minor abscesses to deep head and neck infections (Lypka and Ham-moudeh, 2011). Deep space infection can cause a high likelihood of morbidity and mortality.

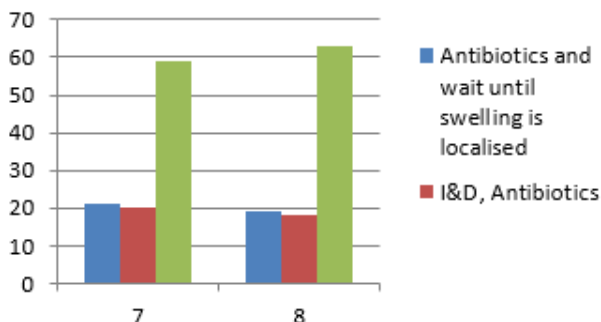


Figure 2: Management of canine and submandibular space infections.

(Sato et al., 2009) It is important for dental practitioners to consider the diagnosis and management of these infections. Patient management with odontogenic infection is a holistic approach encompassing the examination and evaluation of the patient, the identification of the origin of the infection, anatomical factors, surgery and suitable antimicrobial therapy. This study was conducted to assess the knowledge and practice towards the Management of space infections among dental students. The purpose of this study was to evaluate the awareness

and practice for the Management of space infections among dental practitioners.

MATERIALS AND METHODS

A questionnaire comprising of ten queries were formulated and circulated to 100 dental practitioners to evaluate their expertise, understanding and practice for the Management of space infections amongst dental practitioners. The questionnaire was configured online using the survey planet, and the link was circulated to dental practitioners to complete the survey. The questionnaire included questions regarding essential knowledge and understanding of the Management of odontogenic space infections. Responses were obtained, and the data were analyzed.

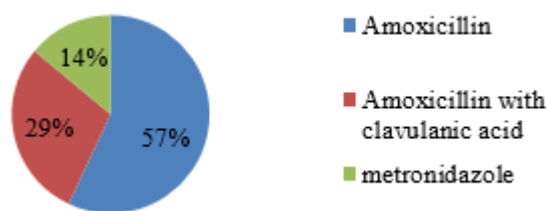


Figure 3: Choice of antibiotics in odontogenic infections.

The above Table 1 shows the questions and their options from the questionnaire, which was distributed among the dental students. The results were collected, and the data were analyzed using Microsoft Excel.

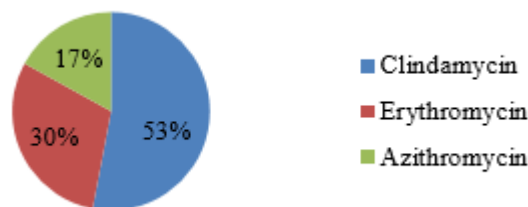


Figure 4: Choice of antibiotics in case of Penicillin allergy.

RESULTS AND DISCUSSION

72% of the respondents have said streptococcus viridans is the most common microorganisms in odontogenic infection (Figure 1), 57% said they would give antibiotics, incision and drainage for canine space infection, 63% said they would give antibiotics, incision and drainage for submandibular infection space infection (Figure 2), 57% said their

Table 1: Questionnaire for assessment of knowledge on space infections

| Assessment of knowledge on space infections | | |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 1 | What are the most common micro organisms in odontogenic infection? | a) Streptococcus viridians b) Staphylococcus aureus c) Corneibacterium species |
| 2 | Are you aware of Management of space infections? | a) Yes b) No |
| 3 | The most common cause of space infection is Dental Caries /Periodontal Infections? | a) Yes b) No |
| 4 | Signs of severe odontogenic infection include facial or neck swelling and tenderness, dysphagea, dyspnea, trismus | a) Yes b) No |
| 5 | Would you prescribe antibiotics after a routine surgical extraction? | a) Yes b) No |
| 6 | Do you think the routine prescription of antibiotics when not needed increases the resistance of bacteria? | a) Yes b) No |
| 7 | What is your immediate Management of the patient with a canine space infection, which is hard, causing swelling of the cheek and extending to the eye? | a) Antibiotics and wait until swelling is localized b) I&D, Antibiotics c) I&D, Antibiotics, Extraction |
| 8 | Management of submandibular space infection associated with fever and dehydration? | a) Antibiotics and wait until swelling is localized b) I&D, Antibiotics c) I&D, Antibiotics, Extraction |
| 9 | The first choice of antibiotic for Odontogenic infections? | a) Amoxicillin b) Amoxicillin with clavulanic acid c) Metronidazole |
| 10 | The first choice of antibiotic for Odontogenic infections in penicillin-allergic patients? | a) Clindamycin b) Erythromycin c) Azithromycin |

first choice of antibiotic in managing space infection is Amoxycillin (Figure 3), and 53% said clindamycin is the choice of antibiotics in patients allergic to Amoxycillin (Figure 4).

Pyogenic oro-fascial infections are quite typically odontogenic in nature, such as periapical abscesses to superficial and deep infections of the neck. If left unchecked, they typically propagate to neighbouring fascial spaces such as massastic, sublingual, submandibular, temporal, buccal, canine and parapharyngeal, which may contribute to additional problems. Early identification of infection and effective treatment is essential (Bahl *et al.*, 2014). Most oral abscesses are caused by an oral microbiota host that affects normal healthy soft tissue. The main serotypes are streptococci and anaerobic bacteria, which are known to be natural oral flora in gingival crevices (Haenel, 1975). In this study, 72% of students accepted that Streptococcus viridians is a significant causative agent for odontogenic infections.

Dental practitioners were very well aware (84 per

cent) of the triggers of odontogenic space caused by bacterial infections induced by pre-existing dental caries, such as pulpitis and periodontitis, pericoronitis or peri-implant diseases. Certain known causes include tonsillitis, bullet wounds, peritonsillar or parapharyngeal abscesses, mandibular fractures, oral lacerations, or submandibular sialodentitis. Predisposing variables include last few dental services, infectious diseases such as diabetes mellitus, obesity, alcoholism, weakened immune responses such as acquired immune deficiency syndrome (AIDS) and organ transplantation (Kurien *et al.*, 1997; Ryan *et al.*, 2011). Clinical appearance of this infection could be attributed to a toothache for restricting the opening of the mouth, cough, malaise, dysphagia. Space infections in their most serious form can lead to death, typically due to acute airway obstruction or multi-organ failure.

Signs and symptoms presented in patients with serious infection due to odontogenic origin are key factors. A retrospective review showed that cases of

odontogenic infection need immediate clinical or surgical attention. The most common signs and symptoms reported are trismus, fever, dysphagia, pain and swelling (Flynn *et al.*, 2006). The patient's clinical history and current drugs help determine the ability of the patient to combat infection and provide insight into possible drug interactions. This study indicates that dental practitioners (81 per cent) were very well aware of the signs and symptoms of space infections. While we discuss the signs and symptoms, it is important for us to look into "Ludwig's Angina" as they are the most dangerous type of space infection as it is a life-threatening infection. It has 'brawny boardlike swelling' of the submandibular, sublingual and the submental region with edema and elevation of tongue leading to drooling which also causes airway obstruction (Saifelddeen and Evans, 2004); (Patterson *et al.*, 1982). The most common cause of death in the case of Ludwig's angina is due to airway obstruction as it is a most life-threatening complication.

The decision on how to treat an odontogenic infection is dependent on the origin of the infection, the extent of the infection and the status of the host patient's innate immunity. The first and most significant factor in the treatment of dental infections is the removal of the primary source of infection. In the treatment of serious abscess, incisions and drains are required to discard accumulated pus containing bacteria. The incision and drainage operation must sever all the loculi inside the abscess cavity and remove as much purulent material as necessary. After the purulent exudate has been drained, the use of irrigation further dilutes the bacterial population. When addressing the Management of these odontogenic infections, this study indicates that 72% of dental students are aware of the Management of space infections.

For eradicating the infection, experts routinely prescribe NSAIDs and antibiotics to patients after surgery, which is followed by 97% of dental practitioners. This can be implemented in cases which do not include deep spaces or abscesses; however, when it comes to space infections, the doctor should be well aware of the treatment strategy of such infections. Penicillin is the medication of choice in the treatment of space infections as it is effective against gram-positive aerobic and intraoral anaerobic, typically present in alveolar abscesses. All aerobic and anaerobic microorganisms are susceptible to penicillin (Sabiston and Gold, 1974). The first medication of choice in the treatment of odontogenic infection is Amoxicillin, a semisynthetic antibiotic in the penicillin category of drugs. It has a broad spectrum of bacterial activity against gram-positive

and gram-negative organisms. Research by Raquel González-Martínez *et al.* indicates that Amoxicillin is the primary option of medications administered by dentists (Gonzalez-Martinez *et al.*, 2012) this is consistent with our survey, which indicates that 57% of dentists still administer the same medications. Whilst the drug of choice for penicillin-allergic patients, 53 per cent of dental students, remained aware that clindamycin was the first drug choice. In a research performed by Martínez *et al.* (2004) and Isla *et al.* (2005), a pharmacokinetic and pharmacodynamic review was conducted and concluded that Amoxicillin in combination with clavulanic acid and clindamycin was successful against microbial sources from odontogenic infections, whereas spiramycin and metronidazole may not cover bacterial infections.

While the majority of respondents (73 per cent) claimed that prescribing antibiotics would needlessly raise resistance in the population, a small number of students still recommend antibiotics in circumstances where it is not inherently suggested. It may be due to the student's attempts to prevent infection. Nevertheless, the removal of the possible source of infection is often necessary, as seen in prior studies (Bodner *et al.*, 2012; Hupp and Ferneini, 2015). This is a more global problem recorded in the United States, Nigeria, the Czech Republic, and Japan. Practitioners should be extremely cautious when administering amoxicillin/clavulanate because there have indeed been some reports of resistant strains of *Escherichia coli* and *Salmonella* spp—reported in a variety of reports. In Poeschl *et al.* (2010) report, resistance levels for serious deep-space head and neck infections were found to be 14 per cent vs clindamycin, 14 per cent vs macrolides, and 7 per cent vs penicillin G.

Conventional surgical incision and drainage are known to be the line of therapy for submandibular space infections and Ludwig's angina. It is best to treat all patients with high doses of wide-spectrum intravenous antibiotics (e.g. amoxicillin/clavulanate potassium) until culture results recognize the pathogenic organism. In the case of large abscesses or multiple space engagement, open surgical incisions and drainage are performed quickly. A watch and wait protocol is enforced for 48 hours in patients with minor abscesses; if there is a lack of reaction to medical care clinically and by CBCT, the patient should be managed through surgical drainage. Among respondents, more than half of them (59% and 63%) suggested of eliminating the source of infection that is the extraction of the tooth, then I&D and prescribe antibiotics in case of immediate Management of patient which was in

contradiction to the study done by Al-Sebaei and Jan (2016) in which their respondents had a general tendency to delay the surgical approach by prescribing antibiotics and wait for the swelling to localize.

CONCLUSION

Most of the dental practitioners in this study did not have complete knowledge regarding the new generations of cephalosporins rather; they were aware of the 3rd and 4th generation cephalosporins. More information on the chemotherapeutic aspects of current generation cephalosporins is required to allow dentists to apply in their practice. Further education and understanding will improve the effectiveness of antibiotic usage and solve the challenges faced in dental care to suffering patients.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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