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Case Report

Submandibular space infection – A threatening plethora

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ABSTRACT

Facial space infection is the most common infection, which is considered as the life-threatening problem. It occurs due to the poor oral hygiene and other etiological factors such as tooth infection, decreased immunity. The main path of the spread of the infections is the odontogenic path. The patients having the habit of smoking, tobacco use, chewing areca nuts etc. are at the high risk of having odontogenic infection. So the odontogenic infections are considered as the origin of space infections. Out of which the submandibular space infections is the most common. Mostly it occurs due to the periapical infection and pericoronitis around the mandibular third molar.

In this report we have described 38 years old female with the submandibular space infection which appeared 10 days after visiting a local dentist. The clinical characteristics were seen and the management of submandibular space infection was done.

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1. Introduction

The deep neck spaces are region of loose connective tissue filling the areas between the three layers of deep cervical fascia (superficial, middle, and deep layer). However, the spaces of the neck interfere with one another forming the path by which infections may spread over large areas.¹

Shapiro defined that facial spaces are the potential spaces between the layers of fascia. These spaces are usually filled with loose connective tissues and various anatomical structures like veins, arteries, glands etc. The potential spaces are compartments which contain structures such as submandibular salivary glands, the buccal pad of fat or groups of lymph nodes. Normally, these various anatomical structures are surrounded by loose connective tissue, which can easily be stripped by finger pressure to produce a cavity.

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The pus/ abscess destroys the loose connective tissue and separates the anatomical boundaries of the compartment which leads to increases in volume, thus an abscess cavity bounded by muscle, tissues and bone is created.²

The submandibular space boundaries includes, above by the oral mucosa of the floor of the mouth and below by the superficial layer of the deep cervical fascia as it extends from the mandible to the hyoid bone. Mylohyoid muscle divides the submandibular space into the sublingual space, containing the sublingual glands, the deep smaller portion of the submandibular gland and Wharton's duct, and the submaxillary space, containing the larger superficial portion of the submandibular space and its lymph node odontogenic infection can provide a path to deep neck space infections. The most common cause of these infections are poor oral hygiene, low immunity, systemic ailments etc.

Odontogenic infections initiate in dental and periodontal tissues which can spread to deep anatomical structures of neck. When bacteria/ micro orgsnisms reaches the dental pulp, it causes necrosis and induces the formation of an abscess/ pus. Once the infection is formed in the periapical tissue, it crosses periosteum and goes through the path which is less resistance.

The dissemination of Odontogenic infection occurs by the following three routes:

1. Through anatomical spaces
- 2 through circulatory system
- 3 through lymphatic system.

Studies found that more severe odontogenic infections were present in the patuents who were smokers or drug abusers.³⁻⁵

The aim of this study is to review the clinical characteristics and management of submandibular space infections.

2. Case Report

A 38 years old female reported to the department of oral and maxillofacial surgery with the chief complaint of swelling and pain on the left side of the face.(Figure 2) The patient had visited a local dentist in her area 10 days ago and was prescribed with the antibiotics(amoxycillin and potassium clavulanate 375mg), NSAIDS (diclofence potassium 50mg Paracetamol 325 mg and chlorzoxazone 250mg in combination), steriods (methylprednisolone 4 mg), taxim (cefotaxime sodium) 500 mg and gentamycin 1mg injection. There was no improvement in the condition of the patient and swelling remained the same. Patient gave no history of hot compression.

On clinical examination, the asymmetry of the face with the swelling present on the left side of the mandibular region was found. The swelling was fluctuant and hard in nature and was extending from 33 tooth region inferiorly and superiorly below the ala tragus line and posterior auricular region posteriorly. The patient had reduced mouth opening with elevated temperature. On radiographic examination, it was found that the permanent molars 37, 38 were involved with the periapical abscess.(Figure 1) The periapical abscess was suggested to be the aetiology of the swelling. Since the patient was on medication but there was no sign of relief then it was decided to incise and drain the abscess from the submandibular region with Hilton's method.(Figure 3) The procedure was explained and informed consent was taken from the patient and the witness accompanying patient.

Under the aseptic conditions, the pus was drawn using the 18-gauge needle; about 7 ml of the pus was drained out. The pus was sent for the culture in the lab and the result came out to be sterile. Under the local anaesthesia, 2 cm long incision was given on the most prominent point of the fluctuant swelling. The loculi were broken using the artery forcep. The pus was drained by the Hilton's method.



Fig. 1: Radiographic examination



Fig. 2: Pre-operative photograph

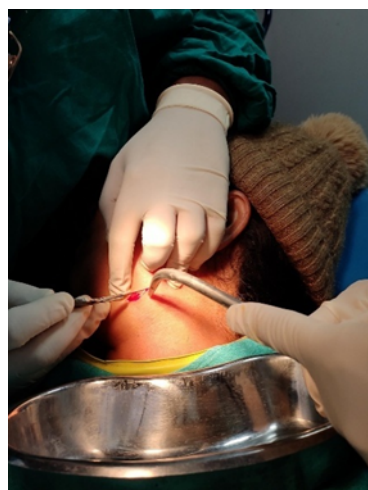


Fig. 3: Incision and Drainage

Due to reduced mouth opening, Heister's mouth gag was used to open the mouth for the extraction of the involved permanent molars. (Figure 4) Then after the removal of the aetiology, the extraoral drain (Figure 5) was placed deep into the submandibular space with the help of sutures, extra oral dressing was given and patient was recalled after 2 days. Postoperative medication for swelling {Tab. Augumentum (amoxicillin 500 mg + clavulanic acid 125 mg) 625 mg - BD, Tab. Metrogyl (metronidazole) 400mg - TDS, Tab. Zerodol sp (aceclofenac 100 mg + serratiopeptidase 15 mg + paracetamol 325 mg) - TDS, Tab. Celin (vitamin c 500 mg) - OD} was prescribed for 2 days and recalled after 2 days.



Fig. 4: Intra-operative image



Fig. 5: Placement of extra-oral drainage

After 2 days improvement in mouth opening was seen upto 27mm width. (Figure 6) Some amount of pus was drained from the submandibular region and then the drain

was removed after 72 hours. The dressing was given and medication was continued for 3 more days. After 5 days swelling regressed and the symmetry of the face was seen. At follow up, the patient's clinical outcomes were satisfactory.



Fig. 6: Post-operative photograph

3. Discussion

Odontogenic infections, such as abscess of the 3rd molar tooth, are classified according to the morphological location as peritonsillar, pharyngeal or submandibular infections. The management of deep neck infections remains particularly troublesome due to the complex anatomy of the neck and leads to life-threatening complications that may arise.^{6,7} such as Necrotizing mediastinitis, Ludwig's angina, infratemporal and temporoparietal fossa abscesses, meningitis, osteomyelitis, intracranial abscesses, cavernous sinus thrombosis, necrotizing fasciitis, airway obstruction and death.

Ludwig's angina is the most common complication of odontogenic infection. It occupies the submental, submandibular and sublingual space bilaterally and is considered as an emergency because of its rapid onset. Ludwig's angina usually originates from second and/or third lower molar due to the proximity of the tooth apices with the submandibular and sublingual spaces which communicate with the submental space and can spread to pharyngeal spaces until reaching the mediastinum.

Moreover most commonly Deep neck space infections arise from a septic focus of the mandibular teeth, tonsils, parotid gland, middle ear or sinuses, and with its rapid onset and frequently with progression to life-threatening complications, particularly the airway obstruction.⁸

Infection can spread upwards through various foramina like, foramen ovale, jugular foramen and foramen lacerum, present at the base of the skull, producing brain abscess, meningitis or sinus thrombosis.

It can also spread downwards into the carotid sheath towards the mediastinum; a pathway which Mosher called the “Lincoln’s highway” of the neck.²

The mean age was 32.7 years a higher incidence of odontogenic infections was found to be in the fourth decade of life.^{9,10} patients with the age of 31-50 years old are more likely to neglect oral hygienic.¹¹ There was a predominance of males in a proportion of 1.4:1.

But the intake of antibiotics, NSAIDS and steroids can overcome the infection but the improper use of antibiotics, steroids, and non steroidal anti-inflammatory drugs may mask signs of infection and change the clinical presentation, making it more elusive and also lead to delayed recovery and the development of complications.¹²

The causative bacteria are usually a mixture of aerobes and anaerobes including oral microorganisms such as streptococci, staphylococci,¹³ Neisseria, E. Faecalis, peptococci, veilonella.

The culture of sample was seen with a predominance of gram positive cocci and gram negative bacilli but after the 48 hours of aerobic incubation there was decline in growth which is indicative of effectiveness of previously taken antibiotics.

In agreement with others reports,^{6,14,15} dental infections were the most common cause of submandibular space infections found. Since submandibular space infections usually have a dental origin, acquisition of high-resolution axial scans of the jaw together with curved and orthoradial multiplanar reconstructions (DentalScan) were advisable in order to identify periapical infections.¹⁶

There are variety of options such as panoramic Radiography, computed tomography (CT), magnetic Resonance imaging (MRI) and ultrasound.^{17,18}

Panoramic radiography is the first Choice of imaging study for the odontogenic infection management because it shows signs of bone and dental destruction that monitors the clinician to the origin of the infection.¹⁹

The overuse of CT as diagnostic imaging in cases of odontogenic infection has been discussed on several occasions. Weyh, et al. Published a guideline for CT request that considers signs and symptoms as “red flags” that impart an increased risk Of dissemination of the infection to deep anatomic spaces thus increasing the risk of complications²⁰ but on other hand Computed Tomography (CT) and laboratory tests such as white blood count and

C-Reactive Protein (CRP) are of great importance to the professional because they can help to identify severity and guide treatment.^{4,21}

Because of its good sensitivity to characterize soft tissues (varying between 60%–100%), contrast-enhanced cervical CT is often used as the standard method to assess the extent of deep neck space infections.²² Assess to Ultrasonography is easily and free of ionizing radiation, but it is less sensitive for deeper cervical tissues.²³

Other studies found that the most cases involved lower posterior teeth, especially the third molars.^{3,5,24,25}

Concerning nutritional status, assessed by the nutrition team of the hospital. They classified patients as eutrophic, mild malnourished, moderate malnourished, severe malnourished, overweight, and obese,²⁶ more than half of the patients were eutrophic, with no significant difference between the number of facial spaces and nutritional status. Pre-albumin is one of the sensitive marker for nutritional status which is a useful marker for looking towards the severity of odontogenic infections.²⁷

In the current case, aetiology was removed (extraction of involved permanent 2nd and 3rd molars) which were responsible for the infections and the surgical drainage was done.

Surgical drainage helped in removal of toxic purulent material, decompression of the oedematous tissues, allowed better perfusion of blood containing antibiotics and defensive elements and increased oxygenation in the infected area leading to postoperative uneventful healing.^{28,29}

4. Conclusion

Odontogenic infections are polymicrobial, being gram negative rods and gram positive cocci the most frequently found; complications derived from odontogenic infections can be lethal if not well treated. Regular dental visits can strengthen the early diagnosis and treatment of dental diseases and preventing the spread of facial infections.

5. Source of Funding

None.

6. Conflict of Interest

None.

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