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Case Report

Management of life threatening facial cellulitis (Potential Ludwig's Angina) due to dental infection in a high altitude setup- A case report

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ABSTRACT

Ludwig's angina is a poly-bacterial space infection (progressive cellulitis or necrotizing fasciitis) involving bilateral sub-mandibular, sub-lingual and sub-metal spaces with most common etiology being 2nd or 3rd mandibular molars infections. Condition can become life threatening due to its risk to impede airway. Treatment is generally aggressive which includes IV antibiotics along with surgical intervention. Current case report describes management of right side facial cellulitis which was managed on time, averting potential life threatening complication along with management of infected tooth endodontically in a remote high altitude setup. Early recognition of the condition in such cases is vital to prevent potential complications.

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1. Introduction

Almost two centuries ago in 1836, a swiftly progressive fatal gangrenous cellulitis and necrotizing fasciitis of the soft tissues of the face, neck and floor of the mouth was 1st described as Ludwig's angina by a German physicist Wilhelm Friedrich von Ludwig.¹

A polybacterial disease involving Streptococcus, Bacteroides, Staphylococcus, and anaerobic bacteria invade the submandibular, sublingual, and submental regions, and this severe bacterial disease first manifests itself. Oedema, trismus, and odynophagia are typical clinical symptoms.

The two most serious complications of Ludwig's angina are airway obstruction and septic shock, the two of which necessitate particular airway treatment during resuscitation.

Ludwig's angina's overall mortality has been reported to be greater than 50%,² but it can be reduced to about 8% with

the right management that combines surgery, antimicrobial therapy, and resuscitation techniques.³

Depending on the patient's clinical appearance, Ludwig's angina can be treated with anything from intravenous antibiotics and supportive treatments to airway intervention in cases of more advanced disease with compromised airways.

Surgery, which aims to achieve debridement of the infected areas, removal of the necrotic tissue, and pus drainage, is typically regarded as the most significant component of the treatment. After debridement and drainage, further surgery or the removal of an underlying odontogenic or non-odontogenic etiology may be warranted.

1.1. High altitude impact on stomatognathic system

Chronic exposure to high altitude and hypoxia leads to an increase in inflammatory markers, as there is a greater

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amount of oxidative stress as well as lower systemic and local anti-oxidant capacity, which are known to have a deleterious effect on stomatognathic system and oral health. These mechanisms eventually lead to increased alveolar bone loss, altered periodontal ligament height and decreased salivary flow and may significantly increase the incidence of abscess and cellulitis.⁴ Hypoxia, especially in chronic cases, has been known to lead to stress erythrocytosis, resulting in increased load on organs such as liver, spleen and kidney to help in regulation of optimal level of RBCs and myeloid cells in order to combat hypoxia and inflammatory markers. In the initial stages, this causes the hemoglobin levels to rise up to or more than 19 gm/dl in females and 21 gm/dl in males. Ultimately, it leads to more inflammation and stress anemia in certain chronically hypoxia exposed individuals,⁵ these are the major factors to be taken into consideration while performing oral surgical procedures in extreme high altitudes.

Considering above mentioned factors in consideration, management of patient with cellulitis of right side of face due to underlying odontogenic infection and salvaging of involved tooth endodontically is described in the current case report at a high altitude field hospital setup.

2. Case Report

A previously healthy 20-year-old man visited the dentistry department of a field hospital in a high-altitude region (11000 feet) with a serious complaint of odynophagia, swelling on the right side of the face (Figure 1), which he had been managed for three days by a medical officer with NSAIDs and antibiotics. A plain CT of the face was performed, and the findings indicated a right submandibular, sublingual, and submental abscess/exudate (Figure 2) which was causing the tongue to rise from the floor of the mouth and deviating to the left, causing trismus along with troubled chewing and swallowing. TLC before the procedure was 18900/microliters. The first surgical step was carried out after achieving inferior alveolar nerve block and local infiltrations in the affected area with local anesthesia (2% Lignocain with 1:80000 adrenaline) under injectable antibiotic cover to decompress the involved facial compartments by performing blunt dissection after giving two Hiltons incision in the submental and submandibular regions, following that 2 corrugated drains were positioned (Figure 3). Amoxicillin-clavulanate and Metronidazol combination antibiotic medication was started prior to the operation.

The dressing was changed every day until the edema completely disappeared and there was no longer any sign of new exudates. On the sixth postoperative day, the swelling had completely disappeared, and the mouth opening had also improved. Drains were taken out, and 4-0 nylon sutures were used to close the wounds. To validate full resolution, a new CT scan and TLC counts (11500/microliter) were

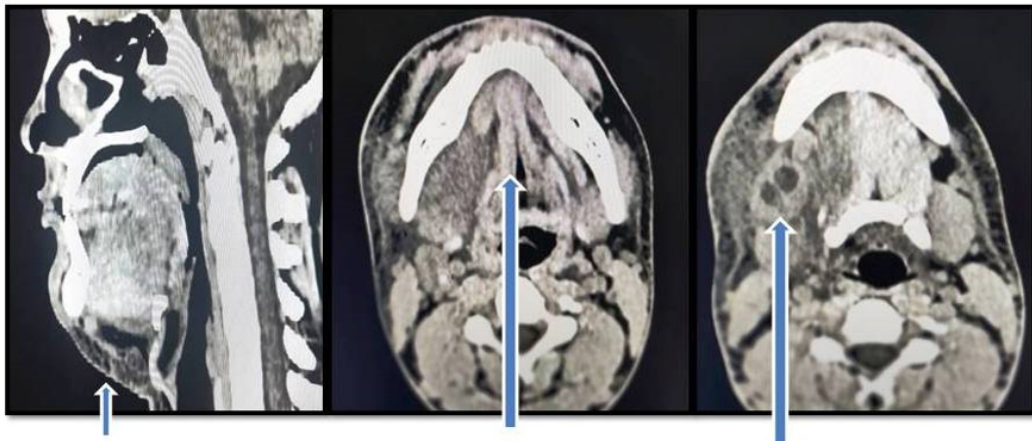


Fig. 1: Cellulitis of Right side of face

performed (Figure 4). For the next five days, the patient was given oral antibiotics to completely eradicate the remaining bacterial load. The recall was performed for suture removal after 5 days, and a second operation involving an endodontic procedure for tooth number 47 was started. The procedure was finished in the next 7 days. (Figure 5)

3. Discussion

Ludwig's angina, however uncommon, is an alarming complication of a lower molar infection that can swiftly progress to a fatal obstruction of the upper airway. The majority of cases are caused by odontogenic infections, however there are a few uncommon cases brought on by tongue piercings, mandibular fractures, otitis media, and sialolithiasis of the submandibular glands.⁶ Ludwig's angina in our patient was caused by acute exacerbation of asymptomatic chronic infection in tooth number 47, but physical examination revealed a fair dentition. Lateral skull views revealed carious involvement of the pulp chamber. In addition to the abrupt onset of dysphagia and odynophagia that affected our patient, other symptoms of airway narrowing include swelling of the face and upper neck, breathing problems, sore throats, and voice changes. Physical examination findings of pain and erythema across the submental and/or submandibular regions frequently indicate right side face cellulitis. The majority of cases are polymicrobial in origin and comprise a mix of anaerobic, Gram-positive, and Gram-negative microorganisms.⁷ The most often isolated organisms are *Streptococcus viridans* and *Staphylococcus aureus* since these are frequently connected to skin and mouth flora. Although anaerobic cultures are uncommon, it is crucial to perform them nonetheless because anaerobic microorganisms are probably found in the oral cavity. Because these bacteria are more contagious in low oxygen



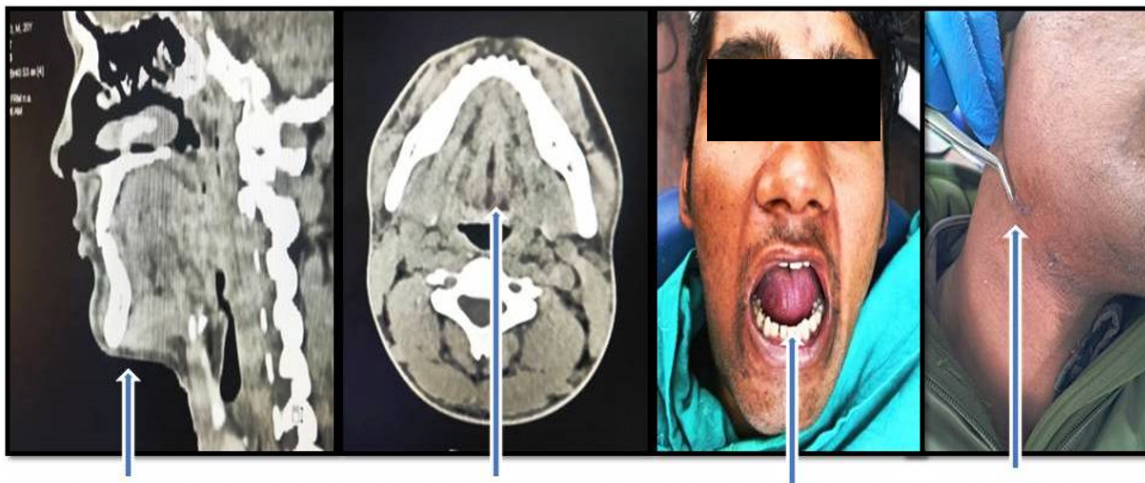
CT images -Sub mental space swelling, Deviation of tongue and Air pockets in involved facial spaces

Fig. 2: CT images of space infection



Stab incisions with abscess and serosanguineous fluid drainage

Fig. 3: Stab incision



CT and clinical Pics showing completely healed all the spaces with healed suture sites

Fig. 4: CT images after healing of facial spaces

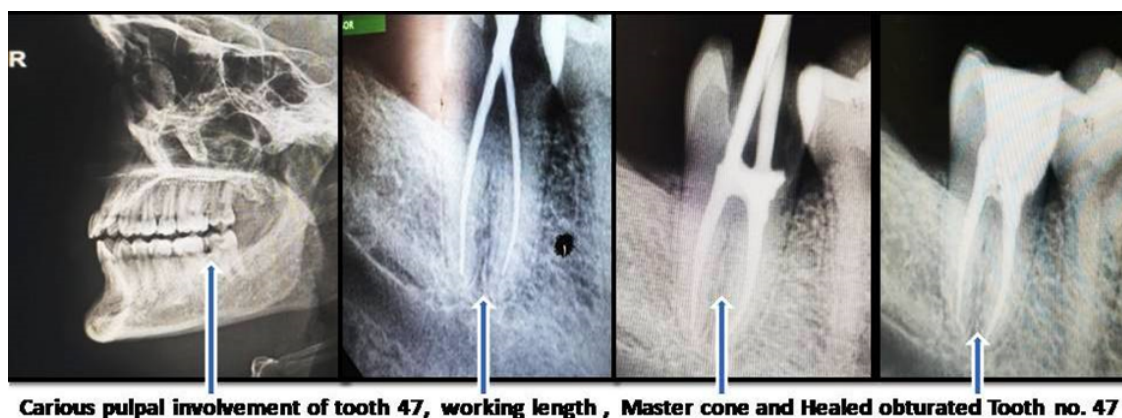


Fig. 5: Endodontic treatment of involved tooth

environments, such as those found in high altitude regions, patients are typically treated with antibiotics. Since there is a substantial risk that their health will quickly get worse, the majority of patients need acute care. In their retrospective study, Lin et al. found Ludwig's angina could have serious complications, particularly in those with descending necrotizing mediastinitis, who displayed longer ICU and hospital stays and a high mortality rate of 37.5%. Those with comorbidities have a more severe course of Ludwig's angina due to their immunocompromised state and hence, a higher mortality rate.⁸ However, our patient, who had comorbidities, did not have a complicated course or a prolonged hospital stay. This is largely because he did not require endotracheal intubation or a tracheostomy, which significantly reduced the length of stay. The optimum method for treating the early stages of Ludwig's angina is unknown; either intravenous antibiotics without any surgical care, or a mix of both. According to Ekaniyere et al.'s retrospective cohort research, patients treated with antibiotics alone as opposed to surgical debridement + antibiotics had a greater prevalence of airway impairment.⁹

The care of this patient involves many clinical and physiological difficulties given the high altitude location. A timely referral of the patient to a higher centre was impossible due to the challenging terrain and pressing service needs. The patient was at risk of complications and had already completed several courses of antibiotics and analgesics, so the surgery had to be done in a rush with minimal equipment. In addition to hypoxia, it has been noted that high altitude causes an increase in inflammatory markers, which delays healing. This presents a significant physiological obstacle when performing surgical procedures, in addition to elevated haemoglobin levels and momentary hypertension. Despite these difficulties, our patient underwent the treatment uneventfully and had remarkable recovery in the post procedure period.

4. Conclusion

High altitude, defined as an altitude above 2700m (9000 feet), alters the normal physiological response of the human body. This results in an increase in inflammatory markers, raised hemoglobin levels and transient hypertension which, when coupled with the associated hypoxic environment, has been observe to cause a delay in the normal healing process. This scenario poses a major challenge for the dental surgeon to perform surgical procedures at high altitude areas. In the present case, Ludwig's angina was managed based on the clinical state and severity of symptoms in the patient, and the affected tooth was also preserved through endodontic therapy. It is critical to detect the development of Ludwig's angina and the underlying cause in the early stages of the illness. Airway management, surgical drainage, and organism-specific antibiotic therapy are crucial in advanced cases to prevent complications, particularly in high-altitude terrain.

5. Source of Funding

None.

6. Conflict of Interest


None.


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