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Ludwig's Angina Following Dental Extraction in a Patient with Uncontrolled Diabetes: A Case Report Emphasizing Multidisciplinary Management

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1. Abstract

Ludwig's angina is an aggressive infection involving the fascial spaces of the floor of the mouth and neck, with the potential to rapidly compromise the airway. Odontogenic infections remain the leading cause, particularly following dental procedures. We describe a 48-year-old man with poorly controlled diabetes mellitus who developed Ludwig's angina after extraction of a mandibular molar tooth. Initial management with incision and drainage at a peripheral center failed to control the infection, resulting in progressive neck swelling, respiratory distress, and stridor. Computed tomography of the neck demonstrated extensive multiloculated collections involving the sublingual region with spread into the parapharyngeal and pre-epiglottic spaces. Emergency airway protection through tracheostomy and surgical drainage were performed. Microbiological analysis guided targeted antibiotic therapy, leading to gradual clinical improvement. The patient additionally developed an adjustment disorder with depressive features related to financial concerns, necessitating psychiatric intervention. Successful recovery was achieved through coordinated management involving surgical, medical, endocrine, and psychiatric teams. This report highlights the importance of prompt diagnosis, early airway protection, appropriate imaging, and comprehensive multidisciplinary care in reducing morbidity associated with Ludwig's angina.

2. Keywords

Ludwig's angina, deep neck space infection, dental extraction, tracheostomy, diabetes mellitus, airway obstruction

3. Introduction

Ludwig's angina is an uncommon but potentially fatal deep neck space infection that was first described by Wilhelm Friedrich von Ludwig in the nineteenth century. The disease is characterized by rapidly progressive cellulitis involving the submandibular, sublingual, and submental spaces. Extensive inflammation within these compartments results in swelling of the floor of the mouth and posterior displacement of the tongue, creating a significant risk of upper airway obstruction.

Patients commonly present with neck swelling, fever, dysphagia, odynophagia, trismus, drooling, muffled speech, and varying degrees of respiratory compromise. Odontogenic infections account for the majority of cases, particularly infections arising from the second and third mandibular molars. Other reported etiologies include trauma to the oral cavity, mandibular fractures, salivary gland infections, and peritonsillar or parapharyngeal infections.

Several systemic conditions predispose individuals to severe disease, including diabetes mellitus, malnutrition, chronic alcoholism, and immunosuppression. The infection is usually polymicrobial, involving a mixture of aerobic and anaerobic organisms from the oral flora.

Although the diagnosis is often based on clinical findings, radiological imaging plays an important role in determining the extent of infection and identifying deep-space involvement. Effective treatment requires rapid airway assessment, broad-spectrum antimicrobial therapy, surgical drainage when necessary, and management of associated comorbidities. Advances in antibiotics, imaging techniques, and critical care have significantly reduced mortality; however, Ludwig's angina continues to represent a medical and surgical emergency. We report a challenging case in a diabetic patient following tooth extraction and discuss key aspects of diagnosis and management.

4. Case Presentation

A 48-year-old male presented with progressive swelling and pain over the right mandibular region one week after extraction of a right lower molar tooth. Following the onset of symptoms, he underwent incision and drainage at a local healthcare facility. Despite the procedure, his clinical condition worsened, and he developed increasing respiratory difficulty associated with

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declining oxygen saturation levels. Consequently, he was referred to our tertiary care center for further evaluation and management.

His medical history was significant for diabetes mellitus with poor treatment adherence. Laboratory evaluation revealed a glycated hemoglobin (HbA1c) level of 7.9%, indicating suboptimal glycemic control.

On admission, his blood pressure was 120/80 mmHg and oxygen saturation was 96% on room air. Examination of the oral cavity and neck demonstrated extensive edema of the floor of the mouth, restricted mouth opening of approximately two finger breadths, tongue enlargement with protrusion, and audible inspiratory stridor. These findings raised immediate concern regarding impending airway compromise.

5. Radiological Findings

Contrast-enhanced computed tomography of the neck revealed a multiloculated trans-spatial fluid collection predominantly involving the floor of the mouth beneath the mylohyoid muscle. Bilateral obliteration of the sublingual spaces was evident. The largest collection measured approximately $2.9 \times 4.7 \times 1.6$ cm. Extension into the right parapharyngeal space and posterior spread toward the root of the tongue and pre-epiglottic region were observed. Extensive surrounding soft-tissue inflammation and multiple intralesional air pockets were present, suggesting an advanced deep neck infection. Enlarged reactive cervical lymph nodes were noted at levels II and III.

The imaging findings were consistent with extensive Ludwig's angina complicated by deep neck space extension.

6. Management and Clinical Course

Given the presence of airway compromise manifested by stridor, tongue swelling, and restricted mouth opening, urgent airway protection was prioritized. The patient underwent emergency tracheostomy followed by surgical drainage of the infected collections.

During the postoperative period, blood-stained emesis and hemorrhagic tracheal secretions were observed, necessitating close monitoring. Microbiological cultures were obtained, and antimicrobial therapy was subsequently tailored according to sensitivity results. Following targeted antibiotic treatment, wound healing progressed satisfactorily with no evidence of persistent purulent discharge. The tracheostomy site remained healthy, and dressing inspections showed no significant soakage.

During hospitalization, the patient appeared emotionally distressed. Psychiatric evaluation identified an adjustment disorder with depressive features, largely attributed to financial difficulties and anxiety related to his illness.

Appropriate counseling and psychiatric support were initiated.

Over the following days, the patient demonstrated progressive clinical improvement. Fever subsided, inflammatory markers declined, and respiratory symptoms resolved. He was eventually decannulated and transitioned to oral antibiotic therapy. After achieving stable clinical status, he was discharged with advice regarding completion of antibiotic treatment, diabetic control, and follow-up care.

7. Discussion

Ludwig's angina remains one of the most serious infections of the head and neck because of its potential to cause rapid airway obstruction. Dental infections continue to be the predominant source, particularly infections involving mandibular molars whose roots lie in close proximity to the fascial spaces of the floor of the mouth.

The disease process begins as cellulitis and spreads through fascial planes rather than through lymphatic channels. As inflammation progresses, edema develops within the submandibular and sublingual compartments, causing superior and posterior displacement of the tongue. This mechanism explains many of the characteristic manifestations, including dysphagia, trismus, muffled voice, respiratory distress, and stridor.

The present patient developed symptoms shortly after molar extraction, a recognized precipitating event. Failure of the initial drainage procedure and subsequent deterioration suggested ongoing infection with extension into deeper cervical spaces. Cross-sectional imaging confirmed widespread involvement of the floor of the mouth and adjacent deep neck compartments.

Contrast-enhanced CT remains the imaging modality of choice for evaluating deep neck infections. It accurately delineates the extent of disease, identifies abscess formation, and assists in surgical planning. The presence of multiple loculations and intralesional air pockets in our patient indicated advanced infection requiring prompt operative intervention.

Airway protection remains the most critical component of treatment. Delayed airway management may lead to catastrophic outcomes. In this case, tracheostomy was performed because of significant airway compromise and anticipated difficulty with endotracheal intubation.

Broad-spectrum antimicrobial therapy should be initiated immediately and subsequently modified according to culture results. Surgical drainage is indicated when abscess formation, extensive tissue involvement, or clinical deterioration is present. Our patient responded favorably following drainage and targeted antibiotic therapy.

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Poorly controlled diabetes mellitus likely contributed to disease severity. Hyperglycemia impairs neutrophil function and host immunity, predisposing patients to more aggressive infections and delayed recovery. Therefore, strict glycemic management constituted an important component of treatment.

An additional noteworthy aspect of this case was the presence of psychological distress. Serious illness, prolonged hospitalization, and financial burden can significantly affect mental health and recovery. Early psychiatric involvement facilitated emotional support and improved overall patient care.

The favorable outcome achieved in this case reflects the importance of coordinated multidisciplinary management involving otolaryngologists, surgeons, intensivists, infectious disease specialists, endocrinologists, and mental health professionals.

8. Conclusion

Ludwig's angina continues to be a potentially life-threatening emergency despite advances in modern medical care. Early recognition of warning signs, timely imaging, prompt airway protection, appropriate antimicrobial therapy, and surgical drainage are essential for preventing serious complications. Patients with diabetes and other immunocompromising conditions require particularly close monitoring because of their increased risk of severe disease.

This case demonstrates that successful outcomes can be achieved through a multidisciplinary approach that addresses not only infection control and airway management but also metabolic optimization and psychological well-being. Greater awareness among clinicians and patients regarding dental hygiene and chronic disease management may help reduce the occurrence of such severe infections.

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