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Severe Ludwig's Angina with Mediastinal Spread: A Case Report

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Abstract **Case Report**

Ludwig's angina is a rapidly progressive cellulitis of the submandibular, sublingual, and submental spaces, most commonly originating from odontogenic infections. Although modern antibiotic therapy and airway management have reduced mortality, life-threatening complications such as descending necrotizing mediastinitis remain rare but serious. ***Case Presentation:*** We report the case of a 53-year-old female with a history of hypertension and type 2 diabetes mellitus, who presented with progressive dyspnea following a dental extraction in a non-medicalized setting. Physical examination revealed a swollen neck, hoarse voice, and inspiratory dyspnea. Laboratory studies showed leukocytosis [19,000/mm³] and CRP 397 mg/L. Cervicothoracic CT scan demonstrated multiple fluid collections in the submandibular, sublingual, and parapharyngeal spaces, causing pharyngeal lumen narrowing and extending along the right lateral cervical region into the anterior mediastinum, consistent with descending necrotizing mediastinitis. The patient was started on broad-spectrum intravenous antibiotics [ceftriaxone, metronidazole, vancomycin] with intravenous corticosteroids and nebulized adrenaline. Due to persistent dyspnea and high risk of airway obstruction, she underwent an urgent tracheotomy, followed by surgical drainage of the right submandibular collection with Delbet drainage strips. The patient was admitted to the intensive care unit for close monitoring. She gradually improved clinically and biologically over the following days. ***Conclusion:*** This case highlights the potential severity of Ludwig's angina, particularly when complicated by mediastinal extension. Early recognition, prompt airway management, broad-spectrum antibiotics, and timely surgical intervention are essential to prevent life-threatening outcomes.

Keywords: Ludwig's angina, descending necrotizing mediastinitis, deep neck infection, odontogenic infection, submandibular space cellulitis, airway obstruction, surgical drainage, cervical fascial spaces, sepsis, life-threatening infection, early diagnosis, antibiotic therapy.

INTRODUCTION

Ludwig's angina is a rapidly progressive, potentially life-threatening cellulitis of the floor of the mouth and neck**,** involving the sublingual, submental, and submandibular spaces bilaterally [1]. It is characterized by its rapid spread along fascial planes, which can lead to airway compromise, deep neck infections, and rare but severe complications such as descending necrotizing mediastinitis [2,8].

The primary etiology of Ludwig's angina is odontogenic infection, particularly involving the second or third mandibular molars, often following dental extractions, dental abscesses, or untreated dental caries [1,3]. Less commonly, it may arise from trauma, oral lacerations, piercings, mandibular fractures, or infections of the oral cavity, pharynx, or salivary glands [4].

Predisposing factors include diabetes mellitus, immunodeficiency, alcoholism, and oral malignancy, as well as poor oral hygiene and dental procedures, which increase the risk of rapid disease progression [2,3]. Ludwig's angina is typically polymicrobial, involving both aerobic and anaerobic oral flora, including *Bacteroides spp.*, *Fusobacterium spp.*, *Peptostreptococcus*, Group A β-hemolytic Streptococcus, and *Staphylococcus aureus* [5,6].

Clinically, patients present with neck and facial swelling, elevation of the tongue, trismus, dysphagia, dysarthria, and malaise [1,3]. Stridor, inability to

swallow saliva, and respiratory distress are early warning signs of impending airway compromise [7]. Although modern management with airway control, broad-spectrum antibiotics, and surgical drainage has significantly reduced mortality [from over 50% in the pre-antibiotic era to approximately 8%] [2,3], mediastinal extension remains a rare but highly fatal complication [8-10].

Here, we report a case of Ludwig's angina complicated by descending necrotizing mediastinitis following a dental extraction in a non-medicalized setting, highlighting the importance of early recognition, airway management, imaging, and multidisciplinary intervention.

Case Presentation

A 53-year-old female patient with a history of hypertension and type 2 diabetes mellitus [managed with diet] presented to the emergency department with progressive dyspnea. Two days prior, she had undergone a dental extraction in a non-medicalized setting, which was complicated by cervical cellulitis and inspiratory dyspnea.

Figure 1: Clinical presentation of the patient showing marked submandibular and sublingual swelling with elevation of the tongue, consistent with Ludwig's angina

On examination, the patient was alert but in mild respiratory distress, with a hoarse voice and a tender, swollen neck. Vital signs were: respiratory rate 18/min, oxygen saturation 90% on room air, and blood pressure 140/80 mmHg.

Laboratory investigations revealed leukocytosis [19,000/mm³] and a markedly elevated C-reactive protein [CRP 397 mg/L], consistent with a severe infection.

Cervicothoracic CT scan demonstrated multiple fluid collections filling the submandibular and sublingual spaces, extending into the parapharyngeal spaces, causing narrowing of the pharyngeal lumen, and spreading along the right lateral cervical region into the anterior mediastinum, consistent with descending necrotizing mediastinitis.

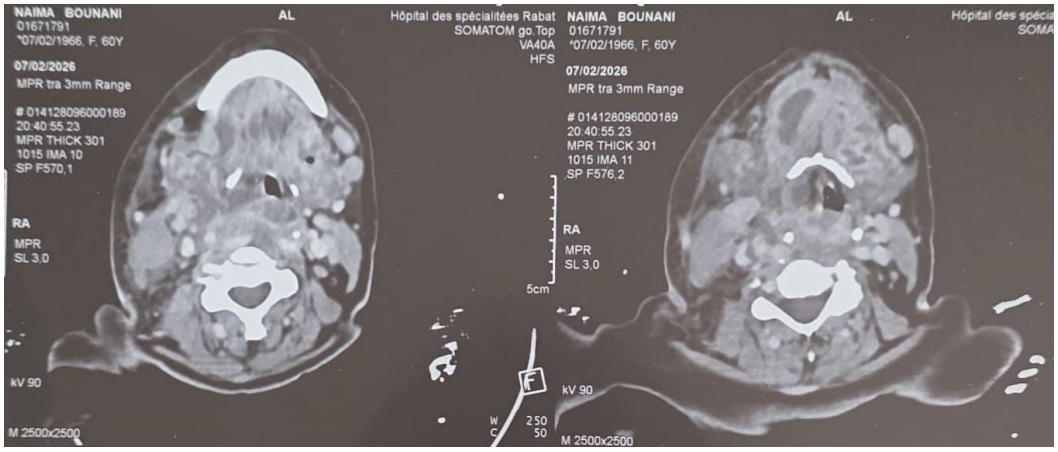

Figure 2. Contrast-enhanced cervicothoracic CT scan demonstrating multiple collections in the submandibular, sublingual, and parapharyngeal spaces, with extension to the anterior mediastinum, causing pharyngeal narrowing

The patient was immediately started on broad-spectrum intravenous antibiotics:

- Ceftriaxone 2 g/day
- Metronidazole 500 mg/day
- Vancomycin 500 mg/day

Adjunctive therapy included intravenous corticosteroids [Solumedrol 120 mg/day] and nebulized adrenaline to manage airway edema.

Despite initial medical management, the patient showed no clinical improvement, with persistent dyspnea and neck swelling. Due to the high risk of airway obstruction, an urgent tracheotomy was performed.

Following airway stabilization, the patient underwent surgical drainage of the right submandibular collection identified on CT scan, with placement of Delbet drainage strips to ensure continuous drainage and prevent reaccumulation of purulent material.

Given the extension of the infection into the anterior mediastinum, the patient was admitted to the intensive care unit for close monitoring and management of descending necrotizing mediastinitis. Supportive care included respiratory monitoring, continued intravenous antibiotics, and fluid management. Over the following days, the patient gradually showed clinical and laboratory improvement, with a reduction of cervical swelling and normalization of inflammatory markers.

DISCUSSION

Ludwig's angina is a rapidly progressive, potentially life-threatening cellulitis of the floor of the mouth and neck, typically involving the sublingual, submental, and submandibular spaces bilaterally. It can rapidly extend to adjacent fascial planes, leading to serious complications, the most critical being airway obstruction [4].

The majority of Ludwig's angina cases originate from odontogenic infections, particularly of the second or third mandibular molars [5]. Patients often report recent dental extraction or dental pain [4]. Other less common causes include infections or trauma of the oral cavity, pharynx, salivary glands, mandibular fractures, or oral piercings [6]. In the present case, the patient underwent a dental extraction in a non-medicalized setting, which rapidly progressed to submandibular sialadenitis and cervical cellulitis, ultimately leading to descending necrotizing mediastinitis.

Predisposing factors for severe Ludwig's angina include diabetes mellitus, oral malignancy, alcoholism, and immunodeficiency, as well as poor dental hygiene [4,7]. In this patient, type 2 diabetes likely contributed to the rapid progression of the infection.

Ludwig's angina is generally polymicrobial, involving both aerobic and anaerobic oral flora, most commonly Bacteroides spp., Fusobacterium spp., Peptostreptococcus, Group A β-hemolytic Streptococcus, and Staphylococcus aureus [8]. This polymicrobial nature contributes to the rapid tissue destruction and potential spread into deeper fascial spaces, such as the mediastinum.

Patients typically present with neck swelling, hoarseness, dysphagia, dyspnea, trismus, and malaise, as observed in our patient [4]. Stridor and inability to swallow saliva are early signs of impending airway compromise, which are particularly concerning when infection spreads to deep neck spaces and mediastinum [9].

Mediastinitis is a rare but life-threatening complication of Ludwig's angina, occurring when infection spreads through the pretracheal, retropharyngeal, or "danger" spaces into the thoracic cavity. This complication is associated with high morbidity and mortality, even with modern medical care [3,4]. In our patient, CT imaging demonstrated multiple collections in the submandibular, sublingual, and parapharyngeal spaces extending into the anterior mediastinum, confirming descending necrotizing mediastinitis.

Management of Ludwig's angina with mediastinal extension requires a multidisciplinary approach. Airway management is the first priority; in our case, the patient underwent urgent tracheotomy due to persistent dyspnea and high risk of airway obstruction. Broad-spectrum intravenous antibiotics were initiated immediately [ceftriaxone, metronidazole, vancomycin], along with intravenous corticosteroids and nebulized adrenaline to reduce edema and improve antibiotic penetration [10].

Surgical drainage is indicated for patients with abscess formation or inadequate response to medical therapy. In this patient, drainage of the right submandibular collection with Delbet drainage strips was performed following airway stabilization. Postoperatively, the patient required intensive care admission to manage the mediastinal extension and monitor for sepsis or respiratory compromise.

CONCLUSION

This case highlights the rapid progression of odontogenic infections in patients with comorbidities such as diabetes, and the potential for mediastinal extension, a rare but life-threatening complication. Early recognition, prompt airway management, broad-spectrum antibiotics, imaging, and timely surgical intervention are critical to reducing morbidity and mortality. Multidisciplinary management in ICU settings is often required in severe cases.

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