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Ludwig's Angina presenting with acute airway compromise: A case report

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Abstract
Background: Ludwig's angina is a rare but potentially life-threatening deep neck space infection characterised by rapidly progressive cellulitis involving the submandibular, sublingual, and submental spaces. Early recognition is essential due to the risk of acute airway compromise and systemic complications.
Case Presentation: A 45-year-old male presented with progressive submandibular swelling, dysphagia, voice changes, and respiratory distress. Clinical examination and ultrasonography revealed diffuse oedema of the left submandibular and submental spaces without evidence of abscess formation, consistent with Ludwig's angina. The patient was managed conservatively with close airway monitoring, broad-spectrum intravenous antibiotics, corticosteroids, and supportive care. No surgical intervention was required, and the patient showed significant clinical improvement.
Conclusion: This case highlights the importance of early diagnosis, appropriate imaging, and timely initiation of conservative management in selected patients with Ludwig's angina. Prompt multidisciplinary care and vigilant airway monitoring can lead to favourable outcomes and may prevent the need for invasive airway procedures or surgical drainage.

Keywords: Ludwig's Angina, deep neck space infection, submandibular swelling, dysphagia, voice changes, respiratory distress

Introduction

Ludwig's angina is a rare but potentially life-threatening deep neck space infection characterised by rapidly progressive cellulitis involving the submandibular, sublingual, and submental spaces. Early recognition in emergency settings is critical due to the high risk of acute airway obstruction and systemic complications [1, 2].

The condition most commonly originates from odontogenic infections, particularly involving the second and third mandibular molars, and spreads along the fascial planes of the floor of the mouth [3]. The anatomical continuity between these spaces allows rapid bilateral involvement, resulting in elevation and posterior displacement of the tongue, which contributes significantly to airway compromise. Predisposing factors include poor oral hygiene, dental caries, recent dental procedures, diabetes mellitus, alcohol use disorder, malnutrition, and immunosuppression [2, 3].

Infection may extend posteriorly within the sublingual space between the hypoglossus and genioglossus muscles, leading to involvement of the epiglottis and resulting in glottic oedema and airway compromise [4]. In severe cases, spread to deeper cervical fascial planes may result in mediastinitis and systemic sepsis. Common clinical manifestations include fever, dysphagia, trismus, voice changes, drooling, and respiratory distress [5].

Serious complications include airway obstruction, aspiration pneumonia, carotid sheath involvement, septic shock, and multi-organ dysfunction, all of which require prompt multidisciplinary management [6]. Early diagnosis and timely intervention significantly reduce morbidity and mortality associated with Ludwig's angina [7].

Case Presentation

A 45-year-old male was admitted to the emergency department of a tertiary care hospital, reporting jaw pain, inability to speak, and difficulty breathing, along with fever and chills, cough with sputum, and a headache. The patient also noted swelling on the left side of the submandibular and sublingual areas, as well as beneath the chin; this swelling was progressive and caused significant discomfort. These symptoms had been developing gradually over the course of a week.

The submental swelling was first noticed four days prior to admission and progressively worsened, leading to dysphagia, voice changes, and restricted mouth opening. There was no history of trauma; however, the patient reported a similar episode in the past.

On physical examination, a diffuse, tender swelling was observed in the left submandibular and submental regions, measuring approximately 10 × 4 cm (Figure 1). The overlying skin was warm without erythema. Intraoral examination revealed poor oral hygiene and multiple discoloured teeth. The affected region appeared edematous and indurated on palpation. The patient was conscious, oriented, and in moderate respiratory distress.

Ultrasonography of the neck demonstrated an enlarged and heterogeneous left submandibular gland with diffuse interfacial, intramuscular, and subcutaneous oedema involving the left submandibular and submental spaces, along with mild reactive lymphadenopathy.

No localised abscess collection was identified (Figure 2). These findings were suggestive of Ludwig's angina predominantly affecting the left submandibular region.

Fig 1: A) Frontal view showing poor oral hygiene; B & C) Neck and Chin region showing diffuse swelling in the submandibular region below the chin, predominantly involving the left side

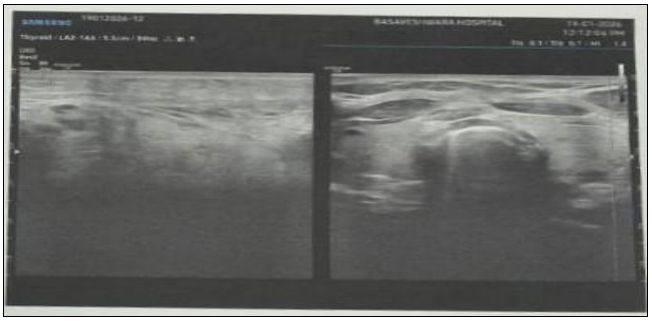

Fig 2: USG of neck showing diffuse interfacial and intramuscular oedema along the left side of the mandible, predominantly involving the left submandibular region

On admission, vital parameters revealed an oxygen saturation of 98% on 4 L/min supplemental oxygen via nasal cannula, heart rate of 80 beats per minute, and blood pressure of 120/80 mmHg.

The patient was managed conservatively with close airway monitoring and supportive care. Empirical broad-spectrum intravenous antibiotic therapy was initiated, including ceftriaxone and metronidazole for gram-positive, gram-negative, and anaerobic coverage, along with amikacin for enhanced gram-negative coverage. Anti-inflammatory and analgesic therapy included intravenous paracetamol and diclofenac. Intravenous dexamethasone was administered to reduce inflammatory oedema and potential airway compromise.

Supportive measures included intravenous fluids (normal saline and Ringer's lactate), proton pump inhibitor therapy (pantoprazole), and antiemetic treatment (ondansetron). Nebulisation with budesonide was used to alleviate airway inflammation.

Multidisciplinary consultations with respiratory medicine and general surgery were obtained. Surgical drainage was not required as imaging did not demonstrate any abscess formation. The patient showed steady clinical improvement with resolution of pain, swelling, and respiratory symptoms, and remained haemodynamically stable throughout hospitalisation

Discussion

Ludwig's angina is a severe deep neck space infection involving the floor of the mouth and cervical tissues. Before the widespread use of antibiotics, mortality rates were reported to exceed 50%; however, improved airway management and early antimicrobial therapy have significantly reduced fatal outcomes in modern clinical practice [4, 9].

Odontogenic infections remain the most common cause, accounting for approximately 85–90% of cases, particularly those associated with infected second and third mandibular molars. This is largely attributed to the anatomical relationship between the molar roots and the mylohyoid muscle, which facilitates rapid spread of infection into the submandibular space, with subsequent extension to the sublingual and submental regions. Other reported causes include peritonsillar and parapharyngeal abscesses, mandibular fractures, oral trauma, salivary gland infections, tongue piercings, and penetrating injuries to the floor of the mouth. Conditions such as diabetes mellitus, malnutrition, alcohol use disorder, immunosuppression, recent dental extractions, and poor oral hygiene are recognised predisposing factors that increase disease severity [4, 9, 10].

Clinically, Ludwig's angina typically presents with rapidly progressive submandibular swelling, dysphagia, and odynophagia, trismus, drooling, muffled voice, and varying degrees of respiratory distress. Posterior and superior displacement of the tongue contributes to narrowing of the oropharyngeal airway, which may result in stridor and acute airway obstruction. In the present case, the patient exhibited classical features, including painful submandibular swelling, dysphagia, voice changes, and restricted mouth opening, consistent with established clinical descriptions [4, 7].

Imaging plays a crucial role in confirming the diagnosis and assessing the extent of disease. Ultrasonography is a valuable bedside modality for detecting soft tissue oedema and involvement of fascial planes, while contrast-enhanced computed tomography remains the gold standard for identifying deep neck space infections, airway compromise, and abscess formation. In the early stages, imaging often demonstrates diffuse interfacial and subcutaneous oedema without a focal collection, supporting conservative management in clinically stable patients [6, 7]. In our case, ultrasonography revealed similar findings, allowing successful non-surgical treatment.

Airway obstruction represents the most serious complication and remains the leading cause of mortality in Ludwig's angina. Rapid tissue swelling, tongue displacement, and spread into deeper cervical spaces can lead to critical airway compromise requiring urgent intervention. Early warning signs include voice changes, dysphagia, excessive salivation, tachypnoea, stridor, and oxygen desaturation, all of which necessitate immediate airway assessment [12]. Severe cases may require awake fibre-optic intubation or emergency tracheostomy to secure the airway [7]. In contrast, early-stage disease without significant respiratory compromise can often be managed conservatively with close monitoring and aggressive antimicrobial therapy, as demonstrated in this case.

From a microbiological perspective, Ludwig's angina is typically polymicrobial, involving both aerobic and anaerobic organisms from the oral cavity. Commonly isolated pathogens include Streptococcus species, Staphylococcus aureus, Bacteroides, Fusobacterium, and other anaerobes. Consequently, empirical antibiotic therapy should provide broad-spectrum coverage against gram-positive, gram-negative, and anaerobic bacteria. Recommended regimens include third-generation cephalosporins or beta-lactam–beta-lactamase inhibitor combinations, supplemented with metronidazole or clindamycin, while aminoglycosides may be added in severe infections for enhanced gram-negative coverage [7]. The role of corticosteroids remains controversial; however, selective use may help reduce inflammatory oedema and improve airway patency [7].

In the present case, early administration of intravenous ceftriaxone, metronidazole, and amikacin, along with corticosteroids and supportive care, resulted in marked clinical improvement without the need for surgical intervention, as no abscess formation was detected. Similar favourable outcomes with conservative management have been reported in early-diagnosed cases [8].

Delayed diagnosis or inadequate treatment can lead to life-threatening complications such as necrotising fasciitis, mediastinitis, pleural empyema, septic shock, pericardial effusion, and multi-organ failure, significantly increasing morbidity and mortality. Rare neurological complications,

including facial nerve palsy and recurrent laryngeal nerve involvement, have also been documented, highlighting the potential for extensive neurovascular involvement [13].

This case underscores the importance of early clinical suspicion, prompt diagnosis, vigilant airway monitoring, and timely initiation of broad-spectrum antimicrobial therapy. Multidisciplinary collaboration among emergency physicians, anesthesiologists, surgeons, and infectious disease specialists is essential for optimal management and favourable patient outcomes.

Conclusion

Ludwig's angina is a rare but potentially life-threatening deep neck space infection that requires early recognition and prompt management to prevent critical airway compromise. This case highlights the importance of maintaining a high index of clinical suspicion in patients presenting with rapidly progressive submandibular swelling, dysphagia, and respiratory symptoms. Early diagnosis, appropriate imaging, and timely initiation of broad-spectrum intravenous antibiotics, combined with careful airway monitoring, can result in favourable outcomes and may avoid the need for invasive surgical intervention. Multidisciplinary collaboration remains essential for effective management and improved patient prognosis.

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