Ludwig's Angina – An Emergency: A Case Report With Literature Review

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Abstract

Ludwig's angina is a rapidly spreading and potentially life-threatening infection having an odontogenic infection as the most common source. It involves the floor of the mouth and neck. Here we report a case of a 14-year-old male who suffered from Ludwig's angina. Presenting symptoms and findings of the examination helped in the clinical diagnosis. Immediate intubation, use of broad-spectrum antibiotics, and treatment of complications aided the patient's recovery. Late stages of the disease should be addressed immediately and given special importance towards the maintenance of airway followed by surgical decompression under antibiotic coverage. The appropriate use of parenteral antibiotics, airway protection techniques, and formal surgical drainage of the infection remains the standard protocol of treatment in advanced cases of Ludwig's angina. Management of its complications should always involve doctors from multiple disciplines.

Keywords: Airway obstruction, ENT emergency, Ludwig's angina, Oral hygiene

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I. Introduction

Ludwig's angina was coined after the German physician, Wilhelm Friedrich von Ludwig who first described this condition in 1836 as a rapidly and frequently fatal progressive gangrenous cellulitis and edema of the soft tissues of the neck and floor of the mouth¹. With progressive swelling of the soft tissues and elevation and posterior displacement of the tongue, the most life-threatening complication of Ludwig's angina is airway obstruction. Prior to the development of antibiotics, mortality for Ludwig's angina exceeded 50%². As a result of antibiotic therapy, along with improved imaging modalities and surgical techniques, mortality currently averages approximately 8% In Ludwig's angina, the submandibular space is the primary site of infection^{3,4}. This space is subdivided by the mylohyoid muscle into the sublingual space superiorly and the submaxillary space inferiorly. The majority of cases of Ludwig's angina are odontogenic in etiology, primarily resulting from infections of the submaxillary space. Once infection develops, it spreads contiguously to the sublingual space. Infection can also spread contiguously to involve the pharyngomaxillary and retropharyngeal spaces, thereby encircling the airway.

Other causes include peritonsillar or parapharyngeal abscesses, mandibular fractures, oral lacerations/piercing or submandibular sialadenitis, and oral malignancy⁵. Predisposing factors include dental caries, recent dental treatment, systemic illness such as diabetes mellitus, malnutrition, alcoholism, compromised immune system such as AIDS and organ transplantation⁶⁻⁹. Without a treatment, it is frequently fatal from the risk of asphyxia with a mortality rate of 50%. The aggressive surgical intervention, the antibiotic introduction, and the improvement of dental care have determined a significant reduction of the mortality rate to less than 10%¹⁰.

II. Case Report

A 14-year-old male presented to the emergency department with concerns of swelling over his submandibular region for 7 days, fever, dysphagia, dysphonia, and drooling for two days. Meticulous history taking revealed that the patient had experienced pain in his mandibular teeth recently, but he did not seek any medical attention for it. He had no known history of allergy, no history of trauma nor surgical or dental procedures. On the day of the presentation, physical examination showed a fever of 102 degrees Fahrenheit, pulse rate of 143 beats per minute, respiratory rate of 37 breaths per minute, and blood pressure of 133/90 mmHg. Remarkable findings on examination were halitosis, firm and tender swelling which extended from one angle of the mandible to the other with bilateral involvement of submandibular space and sublingual space, restriction of mouth opening with an inter-incisor gap of 1.5 cm, swollen tongue, which was lifted up, and dental carries over both his

mandibular first molars. However, examination for stridor, headache, cyanosis and regional lymph node involvement were negative (Figure 1).

The diagnosis of Ludwig's angina was made by judging the clinical picture: firm, tender, bilaterally symmetric swelling of sublingual space and submandibular space, presence of carious teeth, and history of poor oral hygiene. The patient was immediately admitted to the intensive care unit and management was started promptly due to the possible impending airway obstruction. A vertical midline incision just above the sternal notch was given to perform an emergency tracheostomy, but couldn't be performed successfully due to the purulent discharge coming out of the incision site. Then emergency endotracheal intubation was performed with the help of direct rigid laryngoscopy under general anesthesia. Multiple incisions along the angle of the mandibles were performed for drainage of the neck swelling using sinus forceps (Figure 2). The wound was irrigated with normal saline, and a separate tube drain was placed and secured to the skin with silk sutures. The patient was put on clindamycin (300 mg) and meropenem (1 gm) intravenously for 12 days and carious teeth (both mandibular first molars) were extracted. Elective tracheostomy was performed eight days later. Tracheostomy tube care was taken in the postoperative period.

As the patient was being monitored regularly for possible complications of Ludwig's angina, empyema thoracic and loculated effusions were noticed on the fourth day of admission. Chest-tube insertion was carried out for its management. Our patient was also prescribed vancomycin for 14 days as urine culture tested positive for Enterococcus species on the twelfth day of ICU admission (Figures 3). After successfully managing a series of complications and close monitoring, then patient was transferred to the pediatric ward from the ICU. The patient recovered well and faced no new issues. The tracheostomy was closed, and discharge was planned for the patient. Our patient and his parents were counseled about his clinical condition and the interventions carried out. Our patient was prescribed mupirocin (2%) ointment for application over the closed incision sites and prednisone tablets (5 mg, once a day, for five days) along with pantoprazole tablets (40 mg, once a day, for one month). He was called for a follow-up two weeks after discharge.



Figure 1: On presentation, submandibular and sublingual swelling



Figure 2: Multiple incisions performed along the two angles of the mandible for drainage.



Figure 3: Chest X-ray showing improved status of loculated effusion before and after the treatment.

III. Discussion

We report a case of Ludwig's angina that originated from an odontogenic infection. Prabhu et al. concluded that odontogenic infections with poor oral hygiene are consistent in the majority of cases¹¹. Ludwig's angina and deep neck infections are dangerous because of their normal tendency to cause edema, distortion, and obstruction of airway and may arise as a consequence of airway management mishaps. Infection originates in the subgingival pocket then spreads to the musculature of the floor of the mouth. This infection now progresses below the mylohyoid line gaining access to sublingual space and then submandibular space. Okoje et al. pointed out in their study that the first mandibular molar can be involved in the development of Ludwig's angina¹². In our patient, there was the presence of unattended carious mandibular molars which acted as the source of infection. In the early stages of the disease, patients may be managed with observation and intravenous antibiotics. Advanced infections require the airway to be secured with surgical drainage. This is complicated by pain, trismus, airway edema, and tongue displacement creating a compromised airway. As soon as we diagnosed the patient, he was intubated and admitted to the ICU due to the possible impending airway obstruction. This is the most feared complication of Ludwig's angina and this was to be considered with the utmost emergency. After securing the airway, early treatment of the underlying cause was important to avoid a lethal outcome. We removed the patient's carious teeth, and he was put under broad-spectrum antibiotics. Since causative agents are usually a mix of both aerobic and anaerobic bacteria, the aim while using antimicrobials should be to cover all possibilities.4,5 Besides airway complications, our patient also showed empyema and pleural effusion on radiological examination. Empyema and pleural effusion are some of the noted complications of LA. β -hemolytic streptococcus associated with anaerobic germs such as peptostreptococcus and pigmented bacteroides have been described as causative agents. Streptococcus viridans (40.9%), Staphylococcus aureus (27.3%), and Staphylococcus epidermis (22.7%) were isolated from deep neck infections. Intravenous penicillin G, clindamycin or metronidazole are the antibiotics recommended for use prior to obtaining culture and antibiogram results. Some authors also recommend the association of gentamycin^{13,14}. Recent case reports advocated the use of intravenous steroids which potentially avoided the need for airway management^{1,4}. If patients present with swelling, pain, elevation of the tongue, malaise, fever, neck swelling, and dysphagia, the submandibular area can be indurated, sometimes with palpable crepitus. Inability to swallow saliva and stridor raise concern because of imminent airway compromise. The most feared complication is airway obstruction due to elevation and posterior displacement of the tongue. To reduce the risk of spread of infection, needle drainage can be performed.

Airway compromise is always synonymous with the term Ludwig's angina, and it is the leading cause of death. Therefore, airway management is the primary therapeutic concern. The stage of the disease and comorbid conditions at the time of presentation, physician experience, available resources, and personnel are all crucial factors in the decision making. Immediate involvement of an anesthetist and an otolaryngology team is crucial^{15,16}. Blind nasotracheal intubation should not be attempted in patients with Ludwig's angina given the potential for bleeding and abscess rupture¹⁷. Flexible nasotracheal intubation requires skill and experience, if not feasible, cricothyrotomy and tracheostomy under local anesthesia are occasionally performed in the emergency department in those with advanced stages of the disease¹⁸. Elective awake tracheostomy is a safer and more logical method of airway management in patients with a fully developed Ludwig's angina¹⁹.

Tracheostomy using local anesthesia has been considered the "gold standard" of airway management in patients with deep neck infections, but it may be difficult or impossible in advanced cases of infection because of the position needed for tracheostomy or because of anatomical distortion of the anterior neck²⁰⁻²².

Consent: Written informed consent for publication of their clinical details and clinical images was obtained from the patient's family.

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IV. Conclusion

Although Ludwig's angina is a rare entity, it should be considered for differential diagnosis in cases of neck swelling especially in those having a history of poor oral hygiene and recent dental procedures. This condition spreads aggressively and demands aggressive management with the priority of securing the airways first and the use of broad-spectrum antimicrobials. Complications of Ludwig's angina require special attention from multiple disciplines. The practice of good oral hygiene is not just about the oral cavity but is also about life-threatening conditions like Ludwig's angina.

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