

# Ludwig's Angina: A Nightmare Worsened by Adverse Drug Reaction to Antibiotics

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## Abstract

A 52-year-old obese gentleman presented to the hospital with complaints of fever and shortness of breath for 10 days. He was admitted in the ward and treated for acute exacerbation of asthma. He was shifted to the Intensive Care Unit (ICU) for persistent fever, neck swelling, airway obstruction and desaturation. Ludwig's angina was suspected and computed tomography of neck confirmed it. A difficult airway was anticipated and preceded with surgical tracheostomy. The patient had hypersensitivity reactions to piperacillin/tazobactam; hence, he was treated with clindamycin and metronidazole. The patient improved and was discharged after five days of ICU stay and 12 days of hospitalization. This case summarizes the rare incidence of Ludwig's angina with antibiotic adverse reactions. If angioneurotic edema is coincidental with features of Ludwig's angina, it becomes more challenging. Early identification, securing the airway, and antibiotic administration are the keystone to better survival.

**Keywords:** Angioneurotic edema, hypersensitivity, submandibular infection

## INTRODUCTION

Ludwig's angina is a potentially life-threatening infection of the sublingual and submandibular space which involves the neck and floor of the mouth.<sup>[1]</sup> It is one of the rare medical emergencies in a critical care setting, which could turn out to be devastating if unidentified at the earliest. If angioneurotic edema is coincidental with features of Ludwig's angina, it becomes more challenging. This case report adds more information in managing Ludwig's angina along with antibiotic adverse reactions.

## CASE REPORT

A 52-year-old obese gentleman initially presented to a local hospital with complaints of fever, shortness of breath for 10 days, and wheezing for the last 3 days. He was a teetotaler with a past history of obstructive sleep apnea and asthma. His body mass index was 32.9. He was treated for acute exacerbation of asthma and referred to our hospital. In the ward, he was treated for asthma exacerbation with oxygen by facemask, nebulization (budesonide, ipratropium, and levosalbutamol), and intravenous hydrocortisone (100 mg for every 8 h). Pulmonary function test showed reversible

obstructive airway disease. The patient's condition improved and he was planned to be discharged on the third day from hospital admission. On the day of discharge, he developed fever, trismus, dysphagia, submandibular pain, and swelling in the neck causing airway obstruction.

The patient had enlargement of lymph nodes in the neck and had normal dentition. Examination with fiber-optic laryngoscope revealed congestion of the epiglottis and tongue. Ultrasonography (USG) neck was done which reported enlarged parotid and submandibular glands with cervical lymphadenopathy. The patient became drowsy and was immediately shifted to the Intensive Care Unit (ICU). Suspecting Ludwig's angina, piperacillin/tazobactam (4.5 g for every every six hours) was prescribed.

On ICU admission, the patient was normotensive, tachycardic (120 beats/min), tachypneic (26 breaths/min), and had a high-grade temperature (101.3°F). His arterial blood gas

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revealed respiratory acidosis (pH – 7.19, pCO<sub>2</sub> – 83.2 mmHg, and HCO<sub>3</sub> – 32.1 mEq/L). He had leukocytosis with white blood cell count of 20,300 cells/mm<sup>3</sup> (normal range – 4500–12,500 cells/mm<sup>3</sup>). He was supported with bilevel positive airway pressure. A follow-up fiber-optic laryngoscopy examination confirmed edema of the nasopharynx and oropharynx causing obstruction to the airway with normal glottis. In view of increasing neck swelling and persistent airway obstruction, a difficult intubation was anticipated and preceded with surgical tracheostomy. On the third dose of piperacillin/tazobactam, the patient developed facial edema, redness, and erythematous papules all over the body, and the antibiotic was stopped. The patient was treated with clindamycin (600 mg for every six hours) and metronidazole (500 mg for every eight hours).

Computed tomography (CT) neck was done once the patient was stabilized which revealed extensive subcutaneous and mediastinal emphysema, edematous changes in the subcutaneous and intermuscular planes of neck, mucosa of pharynx, and had cervical lymphadenopathy [Figures 1 and 2].

The erythematous rashes and facial edema subsided gradually. The patient became afebrile and symptomatically better in the ICU. He was weaned off the ventilator and transferred to the ward after five days of ICU stay. The swelling completely subsided; tracheal tube was decannulated and he was subsequently discharged after 12 days of hospitalization. He was advised to take inhalers (tiotropium, levosalbutamol, and budesonide) and continue clindamycin (600 mg for every six hours) and metronidazole (500 mg for every eight hours) to complete a course of 10 days. The patient was explained about the adverse drug reactions he had during hospitalization. He was also advised to be cautious when he takes any medicines and to reveal the history of drug allergies whenever he visited a doctor. The patient had proper follow-up with the pulmonology outpatient department and remained stable with no further

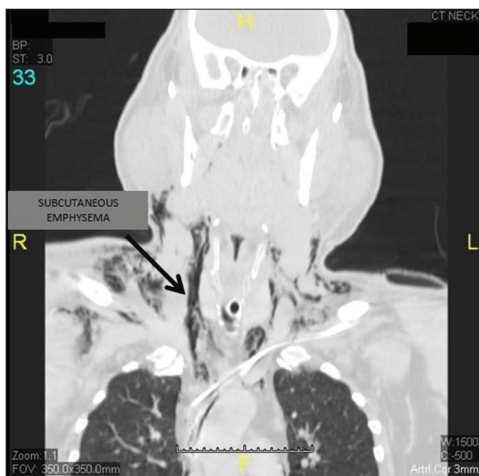
episodes of exacerbation. The patient was instructed to take inhalers regularly.

## DISCUSSION

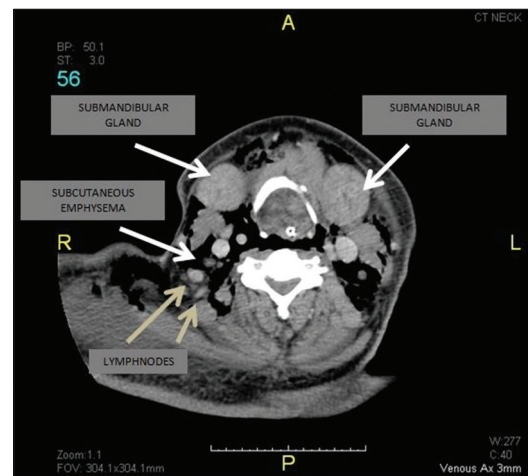
In 1836, Wilhelm Frederick von Ludwig defined this submandibular infection.<sup>[2]</sup> Ludwig's angina is an uncommon, aggressive, rapidly progressing, and fatal infection with high mortality rate if unidentified and not treated appropriately.<sup>[3,4]</sup> More than 70% of the cases have odontogenic etiology, while the other causes include foreign body, tonsillitis, epiglottitis, pharyngitis, oral laceration, mandible fracture, endotracheal intubation, traumatic bronchoscopy, malignancy, or surgery.<sup>[3,5]</sup> This patient did not have any typical dental history, hence strongly indicates the other causes of Ludwig's angina. The most common causative organisms involved are the oral flora: *Streptococcus* species, *Staphylococcus* species, and anaerobes.<sup>[6]</sup>

Clinical manifestations include fever, tachypnea, tachycardia, swelling and pain in the oral cavity and anterior of neck, dysphagia, stridor, hoarseness, and respiratory distress. It can present as a mild infection and evolves quickly to brawny bilateral neck swelling, tongue edema, fever, and dysphagia.<sup>[6]</sup> Differential diagnosis of Ludwig's angina includes angioneurotic edema, carcinoma, or abscess.<sup>[3]</sup>

Early recognition and diagnosis is the cornerstone to successful management of Ludwig's angina. Ensuring the airway is most important in the treatment of Ludwig's angina.<sup>[3]</sup> Considering that this case had continuous airway obstruction and difficult intubation, he was electively taken for surgical tracheostomy. The choice of antibiotics is equally important. Piperacillin/tazobactam or benzyl penicillin with metronidazole are the preferred first-choice antibiotics in perimandibular infections.<sup>[1,7]</sup> For patients allergic to penicillins, alternative treatment includes clindamycin or vancomycin. It becomes graver and challenging when the patient develops hypersensitivity reactions to most of the treatment options. There is high chance of cross-reactivity among the beta-lactam



**Figure 1:** Coronal computed tomography images showing laryngeal inlet edema with airway compromise and subcutaneous emphysema.



**Figure 2:** Axial computed tomography images showing laryngeal inlet edema with airway compromise and subcutaneous emphysema.

group of antibiotics including penicillins, cephalosporins, and carbapenems, unless reviewed separately for skin testing, graded challenge test, and desensitization.<sup>[8]</sup> Steroid therapy and epinephrine nebulization are all recommended treatment in airway compromise.<sup>[9,10]</sup>

Neck radiography and USG are useful to identify the soft-tissue involvement. After assuring the airway, CT and magnetic resonance imaging (MRI) are useful modalities to define the extent of soft-tissue infection.<sup>[3]</sup> In this case, CT imaging was done after securing airway; it defined the space infections with great clarity.

## CONCLUSION

Early identification, securing the airway, and antibiotic administration are the keystone to better survival. The establishment of airway is done by fiber-optic intubation, tracheostomy, or cricothyroidotomy. CT and MRI are useful modalities to define the extent of soft-tissue infection, considered only after assuring the airway. Always remember the alternative antibiotics in case the patient is allergic to penicillin.

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## Conflicts of interest

There are no conflicts of interest.

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