



**CASE REPORT**

**FROM FRACTURE TO AIRWAY THREAT: A CASE OF LUDWIG'S ANGINA FOLLOWING MANDIBULAR FRACTURE**

**Rohit Singh<sup>1</sup>**

<sup>1</sup>-Consultant Oral and Maxillofacial Surgeon, Department of Surgical Oncology (Head and Neck Division), Zulekha Yenepoya Institute of Oncology, Yenepoya Medical College Mangalore- 575018, India

**Corresponding Author:** Rohit Singh, Consultant Oral and Maxillofacial Surgeon, Department of Surgical Oncology (Head and Neck Division), Zulekha Yenepoya Institute of Oncology, Yenepoya Medical College, Mangalore- 575018, India. Email: maxfacrohitsingh@gmail.com

**Received:** May 4, 2025; **Accepted:** May. 24, 2025; **Published:** May. 30,2025

**ABSTRACT**

**Background:** Ludwig's angina is a rapidly progressive, potentially fatal cellulitis of the floor of the mouth and neck, often arising from odontogenic or mandibular infections. Prompt surgical intervention and appropriate antimicrobial therapy are critical for successful outcomes.

**Case Presentation:** A 53-year-old male presented to the emergency department with severe facial swelling, trismus, dysphagia, and signs of airway compromise. Clinical and radiographic evaluation revealed an untreated, intraorally open mandibular fracture complicated with Ludwig's angina, necessitating urgent surgical intervention.

**Management and Outcome:** Under general anesthesia, bilateral submandibular stab incisions were made for Surgical Decompression, debridement, and irrigation with gentamicin and metronidazole, followed by placement of corrugated drains, and then ORIF of mandibular and maxillary fractures was performed. Postoperatively, the patient received intravenous antibiotics, corticosteroids, NSAIDs, and fluid support. Microbiology report revealed diphtheroids on POD-4, and Gentamicin was added to drug regimen. Drains were removed on POD-5, surgical closure of the stab incisions was done on POD-12 following the resolution of infection, and the patient was discharged.

**Conclusion:** This case underscores the importance of early surgical intervention, multidisciplinary care, and adaptive antimicrobial strategies for managing complex facial trauma complicated by deep space infections, such as Ludwig's angina.

**Keywords:** Ododontogenic infections, Ludwig's angina, Mandibular fracture, Surgical intervention

**1.INTRODUCTION**

Maxillofacial trauma represents a significant portion of emergency presentations globally, with mandibular fractures being among the most commonly encountered injuries. These fractures

often result from road traffic accidents, assaults, or falls and may be associated with open wounds that create a conduit for microbial invasion<sup>1</sup>. If left untreated, open mandibular fractures can lead to serious infections, including deep neck space

infections, such as Ludwig's angina.<sup>2</sup>

Ludwig's angina is a rapidly progressing, bilateral cellulitis involving the submandibular, sublingual, and submental spaces. It can result in airway obstruction, sepsis, and death if not promptly addressed. This condition is frequently odontogenic in origin but may also arise secondary to facial trauma, particularly when compounded by delayed or inadequate medical intervention.<sup>3,4</sup>

This case report describes a rare presentation of Ludwig's angina resulting from an intraorally open mandibular fracture that remained untreated for several days. It highlights the importance of early diagnosis, aggressive surgical management, and culture-directed antibiotic therapy to prevent life-threatening complications. The surgical and medical strategies adopted in this case provide valuable insights into managing similar complex presentations in clinical practice.

### Case Presentation

**Chief Complaints:** A 53-year-old patient was reported to the Emergency Department, Yenepoya Medical College and Hospital, Mangalore, Karnataka, India with chief complaints of pain in the left upper and lower jaws following a road traffic accident on 23/03/2025. Patient reported a history of 2 episodes of Vomiting and Nasal bleeding. No history of LOC and seizures was noted. Suturing of the laceration over the upper and lower lip was done. MDCT scan was done.

**Examination:** Upon presentation on 23/03/2025, the patient exhibited signs of systemic compromise, including tachycardia (heart rate: 105 beats per minute), low-grade fever (100° F), and dehydration, although no respiratory issues were noted.

A clinical examination revealed significant swelling in the neck, with bilateral involvement of the submental, sublingual, and submandibular regions. The overlying skin appears stretched, shiny, and congested, with cyanosis noted in the left submandibular and submental regions (Figure 1).

Intraoral examination revealed restricted mouth opening with an interincisal distance of 15 mm. Ecchymosis was noted over the floor of the mouth (Coleman's sign) (Figure 2). In the fracture focus, there was an intraoral open wound, whose instrumental exploration evidenced bone stumps in the fracture area. Occlusion was deranged and avulsion was noted with respect to 11,12, 21, 31, 32, 41 and 42 teeth. Sutured laceration was noted.

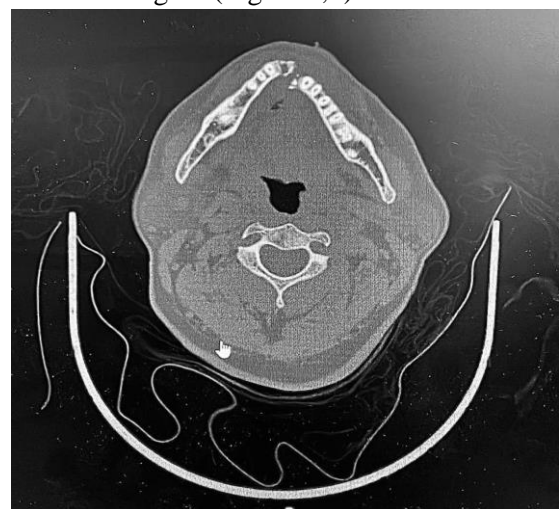


**Figure 1.** Shiny, stretched skin noted over the left submandibular and submental regions.



**Figure 2.** Coleman's sign

**Radiographic Investigation:** An MDCT was performed, which showed a displaced mandibular symphysis fracture and left maxillary buttress and sinus wall fracture. It also revealed a small collection within the floor of the mouth, and significant soft tissue swelling in the submental and submandibular region (Figure 3,4).



**Figure 3.** Axial CT cut showing symphysis fracture.





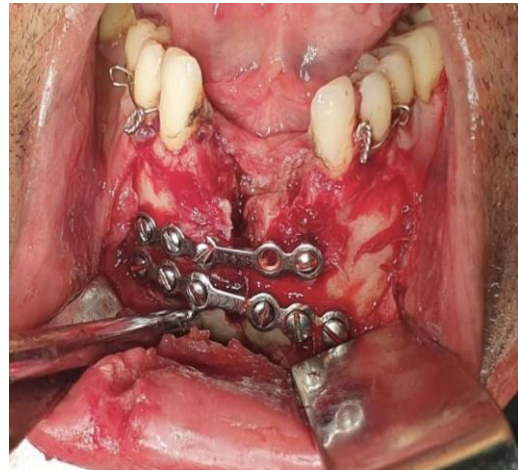
**Figure 4.** 3D CT showing symphysis fracture and left maxillary buttress and maxillary sinus fracture.

**Treatment:** The patient was admitted as an emergency case, and surgery was carried out under general anesthesia with nasotracheal intubation. Patient was painted and draped under all aseptic precautions. Stab incision was placed 1 cm below the lower border of the mandible on both sides in the submandibular region and a pus swab was taken and sent for culture and sensitivity. The blunt dissection of the underlying tissues was performed and the submental and sublingual regions were approached contralaterally. Secretions were collected from the septic focus and were sent for microbiological examination. After draining the pus, a wash was performed with Gentamicin and Metronidazole. Then, a corrugated rubber drain was placed and secured with suture (Figure 5). After the management of Ludwig's angina, fracture management was performed.



**Figure 5.** Corrugated rubber drain placed and secured with suture.

Ivy eyelets were placed. Crevicular incision was placed extending from 33 to 43. Mucoperiosteal flap was raised. Subperiosteal dissection was done and fracture segment was exposed, debridement was done. Reduction of the fracture segment was reduced, and IMF was achieved. Plating was done using miniplates fixed as per Champy's line of osteosynthesis (Figure 6).



**Figure 6.** Reduction of mandibular fracture segment and miniplate fixation.

After plating IMF was released, and occlusion was checked.

Upper vestibular incision was placed extending from 13 to 26 region. Mucoperiosteal flap was raised. Subperiosteal dissection was done and the infraorbital and zygomatic buttress regions were exposed. Fracture fragment was reduced. 2-mm 2 hole with a gap plate was fixed with 2x8 mm screws lateral to the pyriform aperture, and a 2-mm 4-hole L-shaped plate with a gap was fixed over the zygomatic buttress region with 2x8mm screws (Figure 7).



**Figure 6.** Reduction of maxillary fracture segment and miniplate fixation.

Hemostasis was achieved. Closure of maxillary vestibular incision and mandibular crevicular incision were closed using 3-0 vicryl. Patient extubated and shifted to the postoperative room.

Surgery was paralleled by drug treatment with Inj. Taxim 1 Gm i.v TID and Inj. METROGYL 500 Ml i.v TID. Nonsteroidal anti-inflammatory treatment was administered with Inj. DICLO 75 mg i.m twice daily, and his electrolyte balance was restored by the administration of Ringer's solution and physiological serum. Inj. Dexamethasone 8 mg i.v TID was also added, and it was tapered and stopped on POD4. Every day, Metrogyl washes were done through the drain tubes 2 times a day.

Microbiological examination demonstrated the presence of diphtheroids on POD-4, following which Inj. Gentamycin 80 mg was added to the patient's treatment regimen, and Inj. Metrogyl was stopped.

Drain was removed on POD-5, following which regular dressing was done with betadine and ribbon gauze until the pus discharge subsided. On POD-12, with the diminution of fetid secretions in the septic focus, closure of the stab incisions was done with 3-0 silk suture. Following this patient was discharged with a favourable recovery, with a normal appearance of the postoperative wound and a general good state.

### DISCUSSION

Ludwig's angina was first described by the German surgeon Wilhelm Friedrich von Ludwig in 1836 as a severe diffuse cellulitis that presents an acute onset and spreads rapidly, affecting the submandibular, sublingual, and submental spaces bilaterally resulting in a state of emergency because of impending airway obstruction.<sup>5,6</sup>

The most common cause of Ludwig's angina is an odontogenic infection, although can also be due to penetrating injury of the floor of the mouth, osteomyelitis or fracture of the jaw, tongue piercing, sialadenitis or sialolithiasis of the submandibular glands<sup>7</sup>. Infection can rapidly progress and can cause a number of potentially life-threatening complications, including airway obstruction, carotid arterial rupture, carotid sheath abscess or aspiration pneumonia.<sup>8</sup>

The presence of immunosuppressive co-morbidities, most commonly DM, hepatic or hematological disorders have been found to be implicated in the development of severe space infections<sup>8</sup>, and these

must therefore be taken into consideration. In particular, DM has been implicated in poor wound healing and prolonged length of inpatient stay due to increased severity of infection, which is in accordance with a study by Miller EJ and Dodson TB<sup>9</sup>. Lack of acknowledgement around these issues can cause pitfalls in patient care, and emphasis must be placed on close monitoring, tight glycaemic control, and aggressive management of infection.

In Ludwig's angina, patients demonstrate swelling in the floor of the mouth and neck, pain, malaise, fever, and dysphagia. In these patients, inability to swallow saliva and stridor indicate imminent airway compromise. The most feared complication is airway obstruction due to elevation and posterior displacement of the tongue and edema of the glottis. Management of Ludwig's angina in this context necessitates a multidisciplinary approach.

Airway security remains a priority, and it often requires awake fiberoptic intubation or tracheostomy. Empirical broad-spectrum antibiotic therapy should be initiated early, targeting anaerobic and aerobic flora, and adjusted based on culture results. Surgical drainage, when indicated, must be performed promptly, and any focus of ongoing infection such as infected hematoma or necrotic bone must be addressed. The role of early fixation or debridement of the fracture in such cases remains a subject of debate, with some advocating for stabilization only after the resolution of infection, while others suggest early intervention to remove the nidus.<sup>10</sup>

In the Case reported by Mihai Juncar et al, he did extensive drainage of the affected tissues with the complete removal of necrotic areas, and fracture fixation was performed once the infection resolved after a week.<sup>7</sup>

In the present case, surgery proved to be a determining factor in stopping the septic process and obtaining a favourable outcome for the patient. Thus, surgical decompression and the fixation of the fracture was done at the same time. No complications were noticed in the follow-up period. Regular antibiotic washes were given twice a day. Healing of the fracture was not compromised, and two separate GA procedures were also avoided by simultaneous decompression and fracture fixation at the same time.

Our findings underscore the importance of high clinical suspicion in cases of mandibular fracture, particularly those with delayed presentation, poor dental status, or signs of systemic infection. Routine screening for signs

of fascial space involvement in such patients can facilitate early diagnosis and timely intervention. Moreover, prophylactic antibiotic coverage and meticulous oral hygiene in fracture cases, especially when surgery is delayed, may reduce the risk of progression to deep neck infections like Ludwig's angina.

## CONCLUSION

Timely identification of mandibular fractures, vigilant clinical observation, proactive management of comorbidities, and appropriate antimicrobial intervention are critical for preventing severe complications such as Ludwig's angina. Delayed presentation, as observed in this patient, compounded by a new diagnosis of diabetes mellitus and resulting immunosuppression, can significantly prolong recovery and complicate treatment. We recommend early fracture recognition, judicious use of antibiotic therapy, and a high index of suspicion in patients with systemic conditions to mitigate adverse clinical outcomes and support optimal recovery.

## DECLARATIONS

### Ethical approval and consent to participate

Not Applicable

### Competing interest

The authors declare that there are no competing interests.

### Funding

None

### Acknowledgments

None

## REFERENCES

Craniofacial Surgery 2019.30(2):571-577, DOI:10.1097/SCS.00000000000005195

3. Murphy SC: The person behind the eponym: Wilhelm Frederick von Ludwig (1790-1865). *J Oral Pathol Med.* 1996;25:513-5.10.1111/j.1600-0714.1996.tb00307.x
4. Gaspari RJ: Bedside ultrasound of the soft tissue of the face: a case of early Ludwig's angina. *J Emerg Med.* 2006, 31:287-91. 10.1016/j.jemermed.2005.11.044
5. Gbolahan OO, Olowookere S, Aboderin A, Omopariola O. Ludwig's angina following self application of an acidic chemical Ann Ibadan Postgrad Med. 2012;10:34-7
6. Kassam K, Messiha A, Heliotis M. Ludwig's angina: the original angina. Case reports in surgery. 2013;2013(1):974269.
7. Juncar M, Juncar RI, Onisor-Gligor F: Ludwig's angina, a rare complication of mandibular fractures . *J Int Med Res.* 2019, 47:2280-2287. 10.1177/0300060519840128
8. Botha A, Jacobs F, Postma C: Retrospective analysis of etiology and comorbid diseases associated with Ludwig's Angina. *Ann Maxillofac Surg.* 2015, 5:168-173. 10.4103/2231-0746.175758
9. Miller Jr EJ, Dodson TB: The risk of serious odontogenic infections in HIV-positive patients: a pilot study . *Oral Surg Oral Med Oral Pathol Oral Radiol .* 1998, 86:406-409. 10.1016/s1079-2104(98)90364-x
10. Chen MK, Wen YS, Chang CC, Lee HS, Huang MT, Hsiao HC: Deep neck infections in diabetic patients . *Am J Otolaryngol.* 2000, 21:169-173. 10.1016/S0196-0709(00)85019-X

1. Wui LW, Shaun GE, Ramalingam G, et al. Epidemiology of trauma in an acute care hospital in Singapore. *J Emerg Trauma Shock* 2014; 7: 174-179.
2. Daar, David A. MD, MBA; Kantar, Rami S. MD; Cammarata, Michael J. BS; Rifkin, William J. BA; Alfonso, Allyson R. BS, BA; Wilson, Stelios C. MD; Rodriguez, Eduardo D. MD, DDS. Predictors of Adverse Outcomes in the Management of Mandibular Fractures. *Journal of*