

A Fatal Outcome of Ludwig's Angina and Necrotizing Fasciitis Following Traditional Tooth Extraction

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Abstract: Ludwig's angina is a potentially fatal condition characterized by a rapid onset of cellulitis that bilaterally involves the submandibular, sublingual, and submental spaces. This report describes the case of a 29-year-old female who presented to us with Ludwig's angina following a tooth extraction performed by a traditional healer in Southwestern Uganda. The patient stayed home for over a week before she could seek formal treatment, and this delay led to severe infection and necrotizing fasciitis with extensive tissue necrosis. Despite multiple in-hospital interventions which included incision, drainage, and debridement, the patient succumbed to complications such as secondary lung infection, septicemia, and disseminated intravascular coagulation (DIC). This case report highlights the importance of timely medical intervention, socioeconomic barriers, and antibiotic resistance challenges.

Keywords: cellulitis, Ludwig's angina, traditional tooth extraction, necrosis, DIC, septicemia

Introduction

Ludwig angina is life-threatening cellulitis involving soft tissues of the floor of mouth and the neck.¹ It involves the three compartments of the floor of mouth including the sublingual, submental, and submandibular [Figure 1] can rapidly progress to cause airway obstruction. Its most common etiology is dental infection mainly involving the second and third lower molars which account for over 90% of cases.^{1,2} Other predisposing factors may include recent injury to the oral



Figure 1 External aspect of the submandibular and sub-mental swelling.



cavity, oropharynx or floor of mouth, immune-suppressive conditions such as diabetes Mellitus, oral malignancy, and dental caries among others.^{1,2} Prompt recognition and treatment are vital due to the high risk of airway compromise and the significant morbidity and mortality associated with it.³ This case report discusses the challenges and complications in managing Ludwig’s Angina in resource-limited setting.

Case Presentation

This was a 29-year-old mother of five who presented to the Kampala International University Teaching Hospital accident and emergency department with history of difficulty swallowing, trismus and painful neck swelling for over a week. The condition had begun shortly after a tooth extraction performed by a traditional healer in the community. She had reportedly experienced progressive symptoms including fever, sharp pain, submandibular swelling, and difficulty swallowing. For which she had received two ampoules of penicillin from a nearby clinic with no improvement. She had no known chronic diseases or drug allergies.

Physical Examination

The patient appeared ill but not in respiratory distress. Her vital signs were: temperature: 38°C, heart rate: 85 beats/minute, blood pressure: 120/70 mmHg, respiratory rate: 15 breaths/minute and oxygen saturation at 94% on room air. Head and neck examination revealed redness and tender swelling involving the sublingual, submental, and submandibular spaces bilaterally. She exhibited trismus and could only open her mouth up to about 1.5 cm. The floor of the mouth was inflamed and elevated, and the tongue was also inflamed and swollen but did not push back far enough to obstruct the airway.

Diagnostic Intervention

Diagnostic tests revealed critical findings indicative of systemic infection. A pus culture isolated Escherichia coli and Enterococcus faecalis, with antibiotic sensitivity testing showing resistance to ceftriaxone, cefoxitin, rifampicin, amoxiclav, chloramphenicol, and azithromycin. The isolates were sensitive to ciprofloxacin, imipenem, and amikacin. Laboratory results (Table 1) highlighted elevated white blood cell and granulocyte counts, anemia, and thrombocytosis, reflecting the body’s response to severe infection. A contrasted CT scan was recommended, but was not done due to the patient’s financial limitations. A chest X-ray revealed cardiomegaly and features of a secondary lung infection (Pneumonia), Figure 2.

Table 1 Patient’s Investigations Over Time

Investigation	Initial Presentation	Normal Range	Follow-Up	Interpretation
White Blood Cell Count (WBC)	14.6 x 10 ⁹ /L	4.0–11.0 x 10 ⁹ /L	12.6 x 10 ⁹ /L	Elevated WBC, indicating the body's response to a significant infection.
Granulocytes	12.8 x 10 ⁹ /L	2.0–7.5 x 10 ⁹ /L	9.3 x 10 ⁹ /L	High granulocyte count, which typically suggests a bacterial infection.
Hemoglobin (HGB)	12.4 g/dL	12.0–15.5 g/dL	9.4 g/dl	Hemoglobin levels dropped, likely due to anemia from the ongoing infection.
Platelet Count (PLT)	192 x 10 ⁹ /L	150–450 x 10 ⁹ /L	449 x 10 ⁹ /L (increased, thrombocytosis)	Platelet count rise, possibly as the body's natural reaction to the infection.
Renal Function - Creatinine	98.1 μmol/L	80–133 μmol/L	Not re-evaluated	Within the normal range, showing that kidney function remained stable despite the infection.
Urea	8.94 μmol/L	2.8–7.2 μmol/L	Not re-evaluated	Slightly higher than normal, which could be related to stress from the infection.
Uric Acid	397.0 μmol/L	256–338 μmol/L	Not re-evaluated	Elevated, likely reflecting the body's increased metabolic activity due to the severe infection.

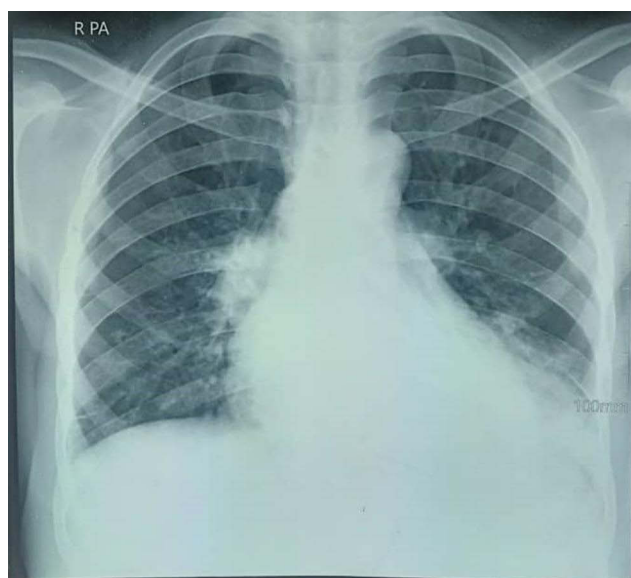


Figure 2 Cardiomegaly, secondary lung infection (consolidation on left lower lobe, Hilar lymphadenitis on right lower lobe).

Therapeutic Intervention

Initial management included:

- Antibiotics:
 - IV Ceftriaxone 2g twice daily
 - IV Metronidazole 500mg three times daily
 - IV Gentamicin 80mg twice daily
- Rehydration - Intravenous Normal Saline and Dextrose every 6 hours
- Intravenous paracetamol 1g three times daily for pain management
- Steroid Therapy – Intravenous dexamethasone 4mg TDS for 3 days.
- **Adjusted Antibiotic regimen (post-culture sensitivity results)**
 - IV Ciprofloxacin 400mg three times daily.
 - IV Metronidazole 500mg three times daily.
 - IV Amikacin 500mg once daily.
 - Imipenem was indicated as sensitive but could not be administered due to its prohibitive cost.

Surgical Intervention

Multiple incisions for drainage were performed under sedation to manage the extensive abscesses. [Figure 3] Specifically; two incisions were made in both submandibular spaces. One incision was made in the submental area. Another incision was made in the left zygomatic area, as the swelling had extended to the left temporal area. The final incision was placed between the suitable submandibular and submental spaces. A sublingual incision was not required.

The following day, the patient reported to be feeling better, with her tongue returning to its normal position. However, we observed necrosis on her left cheek upon removing the dressing. We immediately took the patient to the operating theater and performed debridement, which revealed that the necrosis had extended to the floor of mouth, buccal mucosa, and parotid area near the division of the facial nerve. Additionally, there was a discharge from the left temporal region. Throughout these days, the patient's vital signs remained stable, and she did not experience any respiratory distress until her final day.

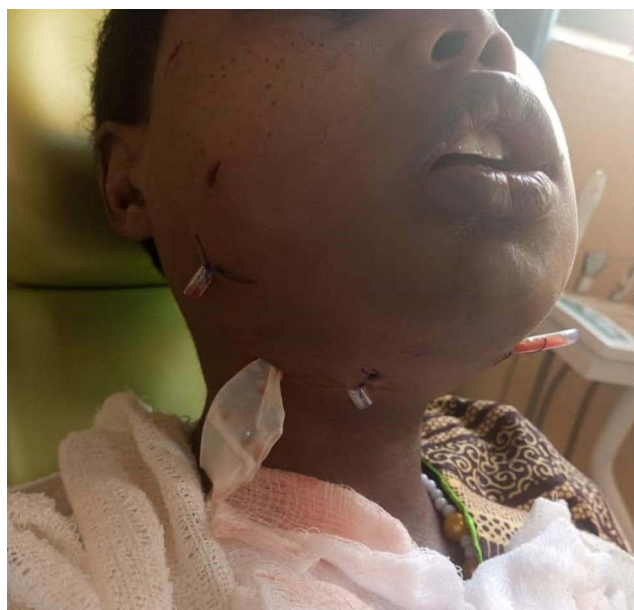


Figure 3 Cervical incision with glove and tube drainage, as necrotic lesion on the skin.

Necrosis Management

The patient developed necrosis on the left facial side, involving the submandibular space, anteromedial floor of the mouth, buccal mucosa, and posterior angle of the mandible near the facial nerve division. Debridement was performed until the necrotic tissue was cleaned. [Figure 4] The infection seemed to extend to other deep neck spaces, evidenced by foul-smelling pus and trismus, preventing oropharynx visualization.

Outcome

The patient's condition deteriorated despite these interventions. On the morning of her death, there was significant bleeding from the injury site, mouth, and nose. We administered tranexamic acid (1g) in response to the bleeding, and



Figure 4 Figure (A) is before the Debridement of the necrosis, and Figure (B) is after Debridement.

a sample was taken to confirm DIC. She also subsequently developed respiratory distress, necessitating oxygen therapy, and a cross-matched blood transfusion was started. Preparations were made for an urgent tracheostomy in the operating theater for the possibility of difficult intubation because of the trismus. However, the patient experienced cardiorespiratory arrest on the table, and despite extensive resuscitation efforts, she succumbed to her condition.

Discussion

Ludwig's angina is a severe life-threatening cellulitis of the soft tissues of the neck and floor of the mouth, which can rapidly progress to airway obstruction and sepsis if not promptly recognized and treated.^{4,5}

Pathophysiology and Clinical Presentation

Ludwig's angina typically begins with an odontogenic infection that spreads to the submandibular, sublingual, and submental spaces, often from a lower molar tooth.^{4,6} This can lead to rapidly progressive swelling, edema, and inflammation that can compromise the airway. Patients often present with fever, dysphagia, trismus, and a "woody" hard edema of the neck.^{4,6}

This case demonstrates the severe outcomes of delayed treatment and the limitations faced in resource-limited settings. Despite initial antibiotic therapy and surgical intervention, the fact that the infection progressed rapidly in this patient underscores the virulence of the pathogens involved and the importance of early and aggressive management.

The patient's delay in seeking professional medical care, compounded by financial constraints, contributed significantly to the severity of her condition. Using a traditional healer for tooth extraction highlights the need for public education on the risks of such practices and the importance of seeking timely medical care from qualified professionals.

Additionally, the patient's resistance to commonly used antibiotics necessitated a change in the therapeutic approach, further limited by the unavailability of certain medications due to cost.

Ultrasonography was not utilized in this case due to the advanced severity of the infection and the delayed presentation for medical intervention. During surgical debridement, extensive necrosis was directly visualized, providing critical information on tissue involvement.

This case underscores the challenges of managing advanced infections like Ludwig's angina in resource-limited settings. In contrast to cases reported in well-resourced environments, where early imaging and advanced antibiotic options may be standard, our management focused on immediate surgical debridement and supportive care due to the patient's delayed presentation and financial constraints. Direct visualization during debridement allowed us to assess the extent of tissue involvement effectively. This case highlights the need for adaptable, context-specific approaches in low-resource settings, where timely intervention remains critical to patient outcomes.

This case also illustrates the importance of accessibility to advanced imaging techniques like CT scans, which were recommended but could not be performed due to financial limitations, ultimately affecting the management and outcome.

Conclusion

This case illustrates the devastating impact of Ludwig's Angina, exacerbated by delayed presentation and financial limitations. The patient developed severe complications, including secondary lung infection, septicemia, and DIC, leading to her death. Notably, the patient's demise was not due to upper airway obstruction because her vital signs were typical; everything changed suddenly, and she developed bleeding and respiratory distress. This underscores the urgent need for accessible healthcare services and the importance of early, aggressive management of odontogenic infections. Enhanced awareness and prompt treatment in resource-limited settings are crucial for improving outcomes for patients with⁷ severe infections like Ludwig's Angina.

Recommendations

- Encourage early medical intervention through public health awareness.
- Discourage traditional tooth extraction practices.
- Improve accessibility to advanced antibiotics and imaging in low-resource settings.
- Establish healthcare funds to assist patients with financial constraints.

Abbreviations

KIU, Kampala International University; DIC, Disseminated Intravascular Coagulation; CBC, Complete Blood Count; CT, scan Computed Tomography Scan; TDS, three times a day; IV, Intravenous.

Ethics Approval and Consent to Participate

All consents have been taken.

Consent for Surgical Interventions

Consent for surgical interventions was obtained from the patient's next of kin, ensuring they were fully informed of the procedures and associated risks.

Consent for Publication

Consent for publication was obtained fully from the patient's next of kin.

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Author Contributions

All authors made a significant contribution to the work reported whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

References

1. CE Activity | Ludwig Angina | dentist. StatPearls. Available from: <https://www.statpearls.com/dentist/ce/activity/113457/>. Accessed December 06, 2024.
2. An J, Madeo J, Singhal M Ludwig Angina StatPearls Internet Treasure Island, FL StatPearls Publishing 2024 Updated May 24, 2023.
3. Wasson J, Hopkins C, Bowdler D. Did Ludwig's angina kill Ludwig? *J Laryngol Otol*. 2006;120(5):363–365. doi:10.1017/S0022215106000806 PMID: 16696873.
4. Candamourty R, Venkatachalam S, Babu MR, Kumar GS. Ludwig's Angina - An emergency: a case report with literature review. *J Nat Sci Biol Med*. 2012;3(2):206–208. doi:10.4103/0976-9668.101932 PMID: 23225990; PMCID: PMC3510922.
5. Dsouza R, Venkatesan M, Stephen J, Rao MS. Ludwig's angina – is management possible in a resource-limited rural surgical setup? *Curr Med Issues*. 2021;19:191–193. doi:10.4103/cmi.cmi_22_21
6. Ludwig's Angina: a diagnostic and surgical priority. International Journal of Infectious Diseases. Available from: [https://www.ijidonline.com/article/S1201-9712\(2020\)30030-8/fulltext](https://www.ijidonline.com/article/S1201-9712(2020)30030-8/fulltext). Accessed December 06, 2024.
7. Biswas J, Bethineedi LD, Dhali A, Miah JH, Ray S, Dhali GK. Challenges in managing anorectal melanoma, a rare malignancy. *Int J Surg Case Rep*. 2023;105:108093. doi:10.1016/j.ijscr.2023.108093

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