

CASE REPORT

Ludwig's Angina in A Rural Hospital- An Infection Spreads from Dental Caries

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ABSTRACT

Ludwig's angina is one of the emergency cases associated with impending upper airway obstruction. Through this case report, the neglected case of emergency medical diagnosis could be prevented and it will become a piece of evidence for the great importance of collaboration among clinicians. A 17-year old boy admitted to the emergency setting of a rural public hospital, East Belitung, Indonesia with major complaints of progressively swallowing difficulty and breathlessness with fever and chills for two weeks before hospital admission. There was a history of dental caries in mandibular right second molar. Non-surgical and surgical management has been conducted immediately and the patient was discharged after day three postoperatively. In this rural hospital setting, early and proper management based on accurate diagnosis is a pivotal step to prevent medical negligence amid limited resources and equipment.

Keywords: Cellulitis, Infection, Systemic antibiotics

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INTRODUCTION

Ludwig's angina is a rare type of cellulitis involving submandibular space. This space is separated by mylohyoid muscle into two compartments; the sublingual and submaxillary. The structure delineates between upper parts, a thin layer of mucous membrane of the mouth floor, and lower parts that extend through hyoid and mandible bone under the superficial layer of deep neck fascia. Dental caries, trauma, immunosuppression, alcohol consumption, and drug abuse accounts for the susceptibility of spreading the infection to submandibular space that subsequently leads to the presentation of Ludwig's angina (1). Suppurative species bacteria, aerobic and anaerobic, frequently triggers Ludwig's angina, such as *Streptococcus pyogenes*, *Staphylococcus aureus*, *Streptococcus viridans*, *Klebsiella pneumoniae*, or rarely *Pseudomonas aeruginosa*, *Haemophilus influenzae*, and *Escherichia coli*. Ludwig's angina can manifest as a predominantly edematous reaction of the surrounding tissue in the mandibular region and it is closely related to the airway obstruction, pharyngeal and laryngeal airways, that needs urgent airway management (2). Complications associated with Ludwig's angina include mediastinitis, thrombophlebitis of the internal jugular vein, empyema, pleural effusion, aspiration pneumonia,

osteomyelitis, or carotid arterial rupture (3).

We present a classic presentation of Ludwig's angina that has been successfully treated with the surgical approach as well as empirically systemic antibiotic administration and collaboration among clinicians.

CASE REPORT

A young teenage boy, 17 years old, was admitted to the emergency department of East Belitung Public Hospital, East Belitung, Bangka Belitung Province, Indonesia with a chief complaint of dyspnea. There were additional symptoms, including swallowing difficulty, excruciating pain in the lower jaw, and fever that have been experienced for two weeks. The patient also complained about his effort in opening his mouth; therefore, there was a considerable reduction in food intake for two weeks. Clinical manifestation did not resolve and worsen seven days before hospital admission. He came to one of the general practitioners in the city and he was prescribed with an antibiotic (not mentioned), paracetamol, and vitamin. However, the symptoms did not alleviate, but it progressed with moderate dyspnea and worsening acute pain in the mandible region. There was a history of dental caries in mandibular right second molar since a few months ago; it was left untreated, although there was one episode of toothache.

The blood pressure was 100/70 mmHg, heart rate 114 bpm, and respiratory rate 25 breaths/min as a response

of pain (Visual analog scale 6), and normal oxygen saturation (96%) with high-grade fever (38.3°C) during the admission. During physical examinations, there was erythematous and swollen tissue of the surrounding skin in the lower part of mandible accompanied by tenderness and fluctuating on palpation, particularly when he tried to open his jaw (trismus) that accompanied by drooling (Fig. 1). Intraorally, it revealed poor oral



Figure 1: Clinical presentation of the patient (inferior view)

hygiene with mandibular right second molar had type I dental caries (diagnosis obtained from a dentist) and the tongue was in an upward position, causing airway obstruction. Laboratory investigation showed a high white blood cell count of $21.9 \times 10^9/L$ with neutrophil predominance, while ECG and chest roentgenogram demonstrated normal interpretation, but neck X-ray demonstrated radioopaque appearance compressing trachea inferiorly (Fig. 2). In the hospital settings, there was no advanced imaging equipment that could support the diagnosis. Nevertheless, the otorhinolaryngologist decided to conduct a trial; hence pus aspiration in the most fluctuating location was done. A 0.2 cc of pus was extracted from the location.

Ludwig's angina has been established as the primary diagnosis and it was planned to conduct pus evacuation on the following day. Later, the commencement of empirically intravenous antibiotic therapy was initiated in the emergency room using ceftriaxone (2 gram per 24 hours) and metronidazole (500mg per 8 hours) for three days. The administration of intravenous Acetaminophen (1 gram per 8 hours) and intravenous corticosteroid (dexamethasone, 5 mg per 8 hours) were also given to the patient to attenuate the inflammatory reaction and pain. Nasogastric tube feeding has been advised to supply food intake, but the patient refused that instruction and signed rejection consent, while tolerance for fluid diet was still adequate.



Figure 2: Neck roentgenogram of Ludwig's angina in the case (A mass compressed trachea and shift the structure downward- arrow)

Surgical management was performed through a horizontal incision at the lower border of abscess until it exposed platysma; this approach would aid in the visualization of abscess and drainage the pus equally under localized anesthesia (pehacain: aquabidest 1:2). Furthermore, a surgical operator would perform the identification of mylohyoid midline (Fig. 3) followed by draining the abscess using povidone-iodine and normal saline (1:5). A curved tip forceps with sterile gauze went down through the abscess area for wiping remnant abscess material and visualizing geniohyoid muscle. Lastly, a small piece of a sterile glove was embedded with povidone-iodine and placed into the abscess area as non-absorptive drainage. The anesthesiologist was also enrolled in the careful observation of the airway patency until the operation completed. After 24 hours of observation, partial symptom resolution attained, such as loss of trismus and food intake tolerance followed by hospital discharge on day three of the postoperative period (Fig. 4). On the seventh day, the patient was planned for dental caries extraction and postoperative care in the hospital.

DISCUSSION

Ludwig's angina stands as a part of deep neck infection, and its approximation with several vital structures could cause the dissemination of infection; thus, the condition might contribute to 40-50% of mortality rate producing a life-threatening condition in clinical settings. The



Figure 3: Horizontal incision to provide equal decompression and debridement

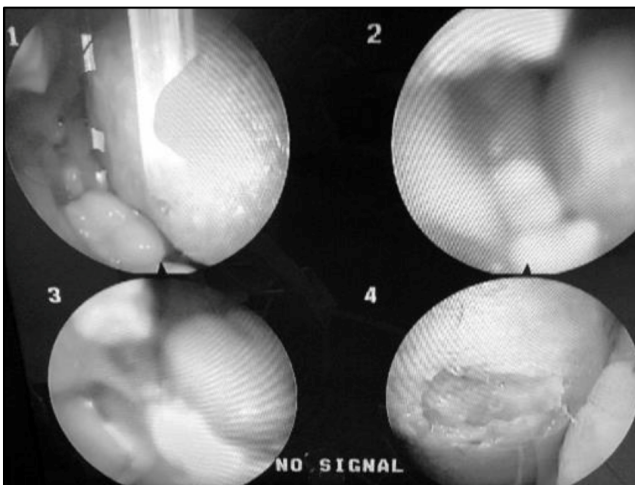


Figure 4: Buccal mucosa in two days of postoperative

classical presentation of Ludwig's angina includes progressive swallowing difficulty or odynophagia with accompanied fever and chills, but it can also appear as localized infection in sublingual space with just swelling of the mouth floor. Furthermore, the infection could spread into submaxillary space and submental region that also initiates the inflammatory reaction and enlarge the structure, while if there is an involvement of para pharyngeal space, trismus might be presented in varying degrees (1). In this case, the patient's airway has been mildly interrupted by the presence of structure enlargement in the mouth floor and it pressed the tongue backward but not closed the airway entirely.

Non-surgical and surgical management of the patients has been considered in every clinical presentation. Early administration of systemic antibiotics is a crucial step in treating patients with Ludwig's angina since it contains bacterial growth and prevents dissemination. The necessities to administer a broad-spectrum antibiotic covers gram-negative and positive bacteria, as well as aerobes and anaerobes, is mandatory; it commences as the first line to eradicate bacterial infection that commonly associated with polymicrobial infection, such as penicillin, ceftriaxone, metronidazole, clindamycin,

or ciprofloxacin (2).

Surgical decompression or debridement is another main option for Ludwig's angina; it includes pus incision and drainage and still being used as the mainstay management for Ludwig's angina. A scientific investigation reported an association between conservative management without surgical approach and airway compromise (3). There are two surgical approaches, intraoral and external. Intraoral drainage is performed when the infection is localized in sublingual space, while external approach will be utilized for infection involves submaxillary space. There are varieties of surgical techniques based on clinical experts, but the well-accepted procedure is to make a transverse incision between one angle of the mandible to the other, or horizontal incision (4). In this case, instantaneous surgical drainage has been performed on the second day of hospitalization, and finally, the patient revealed the attenuation of trismus severity and breathlessness following surgical drainage after 24 hours of careful observation.

There are several clinical challenges in the case; first, close monitoring of airway patency is indispensable since the infection can induce perilous conditions and it needs immediate action. Recommended airway management is tracheostomy as it has been reported that blind intubation or even with fiberoptic laryngoscopy were abortive (2); the infection affects anatomy visualization of the airway to accommodate intubation. Secondly, there are adjacent structures that can precipitate a spreading of infection. Although submandibular space is covered up by deep neck fascia, there is still an opportunity of severe infection propagates other bacterial foci to other structures if it is left untreated. Based on recent literature, there were two cases of necrotizing mediastinitis and aspiration pneumonia following Ludwig's angina caused by molar dental caries (5). Incomplete and improper surgical debridement also appear as the reason reinforcing dissemination of infection since complex visualization of submandibular space usually affects the clearance of infective substance during the draining process (2). Radio imaging facility is scarce in the setting, meanwhile, golden standard examination for deep neck infection including Ludwig's angina is contrast CT-scan (3); nevertheless, the apparent outlook of a mass compressing trachea, as well as pus extraction from the infection site, demonstrated a high likelihood of abscess or Ludwig's angina. Ideally, antibiotic susceptibility testing should be performed, but in this case, utilizing proper broad-spectrum antibiotics could again eradicate bacterial invasion.

CONCLUSION

Clinicians should consider a submandibular space infection after conducting physical examination supporting Ludwig's angina, particularly when the patient was admitted with dyspnea as chief complaint

and presented with the swelling appearance of the lower jaw. Furthermore, limited-resource settings have been undoubtedly caused several predicaments to establish a diagnosis as well as the initiation of therapy among clinicians; but constructive anamnesis, thorough physical examination, and prudent laboratory result interpretation can also support the comprehensive management of a patient with Ludwig's angina.

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