





Case-report

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*Author for correspondence. Email:
maria.maleitas@gmail.com

Ludwig's Angina: a case report management from the ICU to full recovery

Maria Guedes Maleitas ^{*}, Rita Maria Cabral , Jéssica Lourenço , Daniela Pereira, and Rui Moreira 

Stomatology Department, Hospital de Santo António, ULS de Santo António, Porto, Portugal

Abstract

Ludwig's Angina (LA) is a diffuse cellulitis of the floor of the mouth and cervical region, specifically submandibular, sublingual and submental spaces. LA can present with several different manifestations, correlated with its proximity to the mouth and neck areas. This case describes a young male, 28 years-old, with a late diagnosis of LA that was managed until full recovery. He presented at our emergency room with submandibular and cervical oedema, enlargement and protrusion of the tongue, abundant sialorrhea, severe dyspnea and dysphagia – all late symptoms leading to impending airway obstruction. Protecting the patient's airway is the cornerstone of the medical management of LA, since it is the leading cause of mortality. The patient was transferred to the emergency OR and once the airway was secured, multiple dental extractions of decayed teeth and extra-oral drainage of the submandibular and sublingual abscesses were performed. The patient was later relocated to an intensive care unit, and was discharged after 20 days. He showed complete resolution of the submandibular and cervical oedema, with a perfectly patent airway and without any sequelae. This article aims to raise awareness of this pathology, and to share a case report that began with a life-threatening condition but resulted in a successful outcome without severe sequelae. It illustrates the importance of a rapid intervention when the diagnosis of Ludwig's Angina is suspected. Having a multidisciplinary team with an experienced anesthesiologist and oral and maxillofacial surgeon is paramount in the management of this life-threatening condition.

Highlights

- Ludwig's Angina (LA) is a severe, rapidly progressing cellulitis affecting the submandibular, sublingual, and submental spaces, potentially leading to life-threatening airway obstruction.
- This case report highlights the successful management of a 28-year-old male with late-stage LA, emphasizing the critical importance of rapid intervention and multidisciplinary teamwork.
- The patient presented with severe symptoms including submandibular and cervical edema, tongue protrusion, and dyspnea, necessitating immediate nasotracheal intubation and surgical drainage.
- Effective treatment involved securing the airway, performing dental extractions, and draining submandibular abscesses, followed by a 20-day ICU stay with broad-spectrum antibiotics.
- The article underscores the necessity of prompt diagnosis and treatment of LA to prevent fatal outcomes, advocating for awareness and preparedness in handling this medical emergency.

1. Introduction

Ludwig's Angina (LA) is a diffuse cellulitis of the floor of the mouth and cervical region, specifically submandibular, sublingual and submental spaces. This entity can easily escalate to a medical emergency, since it has a rapid onset and can lead to airway compromise [1]. Besides this main fatal complication, LA can also lead to carotid artery rupture, internal jugular vein thrombosis, descending mediastinitis, necrotizing fasciitis, pericardial or pleural effusion, osteomyelitis, subphrenic abscess and aspiration pneumonia [1, 2]. Although this type of cellulitis has many starting points, in adults it is mainly caused by odontogenic infections involving the mandibular molars [1–4]. In children, the most frequent etiology is upper respiratory infections [2].

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In this article, we will describe a case of a young male with a late diagnosis of LA, who was transferred from another hospital to our emergency room. This case illustrates the importance of a rapid intervention when the diagnosis of Ludwig's Angina is suspected. When the patient arrived, he already presented with advanced symptoms indicating eminent airway obstruction, which demanded immediate intervention. When we are presented with such a late stage of this infection, every minute is crucial to the outcome and survival of the patient. This brings to light the importance of having a multidisciplinary team with experienced professionals in the fields of anesthesiology and oral and maxillofacial surgery.

2. Clinical Case Description

M.A.L.B., male, 28 years-old. Past medical history of schizophrenia and hard drugs abuse (abstinent at the time). Without known allergies.

The patient presented at our emergency room after being transferred from another hospital with complaints of facial swelling and unable to open his mouth completely for 3 days (Figure 1). At the physical exam the patient was conscient and showed bad oral hygiene, submandibular and cervical oedema, enlargement and protrusion of the tongue, abundant sialorrhoea, severe dyspnea and dysphagia. The submandibular oedema was indurated, non-fluctuant, and tender to the touch.

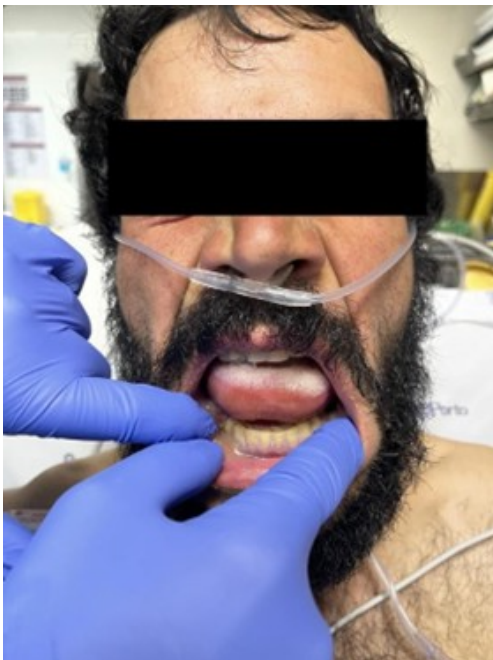


Figure 1. Patient presentation at the emergency room.

The patient had already made a CT scan in the previous hospital that showed several fluid collections in the submandibular and sublingual spaces leading to airway compromise due to mass effect (Figure 2). There was also enhanced density of the surrounding subcutaneous

tissue, suggesting inflammation/infection of that region.

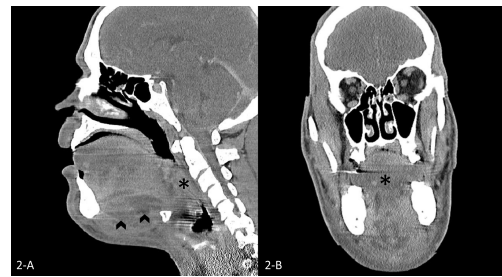


Figure 2. CT scan of the head and neck, obtained at the index admission of the patient. 2-A: sagittal plane showing several fluid collections in the submandibular and sublingual spaces (arrows), leading to a constricted upper airway (*). 2-B: coronal plane offering another perspective on the fluid collections on both submandibular and sublingual spaces, along with severe edema of the tongue (*).

His laboratory results at admission revealed elevated inflammatory parameters – leukocytosis of $16.86 \times 10^3/L$ with 91.4% of neutrophils and C-Reactive Protein of 265.65 mg/L.

Combining the clinical and laboratory findings with the imaging from the CT scan, we assumed the diagnosis of Ludwig's Angina.

The patient was transferred to the emergency OR and was nasotracheally intubated while awake and in seated position, with a flexible intubating endoscope previously scrubbed with lidocaine gel (Figure 3). Once the airway management was secured, to eliminate any oral focus of infection, multiple dental extractions of decayed teeth were performed (18, 28, 35, 36, 37, 38 and 45). The abscesses were subsequently drained extra-orally, through 3 incisions in the submandibular region, and the drained pus was sent to microbiology analysis (Figure 4). The cavity was irrigated with a mix of sodium chloride and hydrogen peroxide (50:50).



Figure 3. Patient with nasotracheal intubation, before surgery.

The pus analysis came back positive to *Streptococcus constellatus*, sensitive to ampicillin.

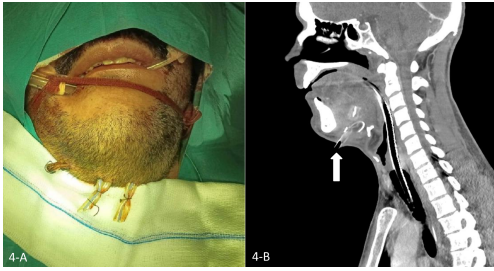


Figure 4. Patient status after surgery. 4-A: Presentation immediately after surgery, with 3 incisions in the submandibular region, used to drain the fluid content in that area. 4-B: post-operative CT scan of the head and neck, highlighting the surgical drains on the submandibular and sublingual spaces (arrow).

The patient was later transported to the intensive care unit, where he remained for a total of 20 days. During that time, he was under a broad-spectrum antibiotic (amoxicillin and clavulanic acid 1000 mg + 200 mg, intravenous) for 13 days. At the time of the discharge, the patient showed complete resolution of the submandibular and cervical oedema, with a perfectly patent airway and without any pain or tenderness within that area. After 1 month, the patient was fully recovered, without any infectious stigmas and in good general condition.

3. Discussion and Conclusions

LA was firstly described in 1836 by a German physician named Karl Ludwig and the word angina is derived from *angere*, Latin for choke [1, 5]. It is mostly caused by mandibular molar's infections, since these teeth have their roots inserted below the mylohyoid muscle mandibular attachments. This anatomic feature allows the infection to spread to the sub-mylohyoid space, and infiltrate from there to other cervical spaces [2, 5]. Other etiologies of LA include penetrating injuries in the floor of the mouth, osteomyelitis or fracture of the jaw, otitis media, tongue piercings, sialadenitis, or sialolithiasis of the submandibular glands [1, 3, 4].

In order to better diagnose this rare infection, there are some risk factors that we should pay close attention to. Recent dental work or trauma, oral piercings, immunosuppression, malnutrition, diabetes mellitus, injection drug use and chronic alcohol abuse can all predispose our patient to LA [2–4].

Ludwig's Angina can present with several different manifestations, correlated with its proximity to the mouth and neck areas. Whereas early symptoms can include local tenderness, fever and general weakness, more advanced infections can present with trismus, sialorrhea, dysphagia and dyspnoea [2, 3]. The airway compromise is a later sign and can be seen in many patients adopting the tripod position (leaning forward in order to maximize the caliber of the upper airways), with stridor and cyanosis [2, 3].

Regarding microbiology, LA is polymicrobial in most cases, including microorganisms already present in the oral cavity or the skin flora [2–4]. The most commonly found are *Streptococcus viridans* (40%), *Staphylococcus aureus* (27%) and *Staphylococcus epidermidis* (23%) [2]. In this case, we found the pus to be positive for *Streptococcus constellatus*, and even though it is commensal in the oral, genitourinary and gastrointestinal tracts, it is a pathogen that has propensity for abscess formation [6].

Concerning the mortality of this infection, it varies widely depending on whether it is given treatment or not. If the patient is left untreated, mortality rates can reach up to 50%. On the other side, if the patient receives adequate treatment the rate drops to 8% [1, 2]. The mortality and incidence of complications is also higher in patients above 65 years old, suffering from diabetes, with previous history of alcohol abuse and immunocompromise [2].

The diagnosis of LA is largely based on the clinical findings and ideally on computed tomography scan (CT) or magnetic resonance imaging (MRI) [1–3, 7]. Since the diagnosis and treatment should never be delayed, laboratory testing is of limited utility, even though blood cultures should be collected [2]. The gold standard mean of diagnosis is the CT scan of the head and neck with intravenous contrast, followed by the MRI, which has superior image definition but is not promptly available in most medical centres [2, 7]. Similarly to the reported case, many patients arrive to the hospital already in respiratory distress, and will not tolerate the supine position required to undergo a CT scan or MRI. In these advanced situations, point-of-care ultrasound can be used with the patient in the sitting position in order to detect hypoechoic lesions present in the submandibular and cervical regions and further to estimate the subglottic airway diameter and evaluate airway permeability [2, 4, 7].

Protecting the patient's airway is the cornerstone of the medical management of LA, since it is the leading cause of mortality [1–3]. Patients without compromised airway in initial stages of the infection can be managed with antibiotics, under close vigilance of the airway patency and hemodynamic status. Once the patient presents with respiratory distress red flags (airway swelling, dyspnea, tripod position, stridor, cyanosis) airway intervention is required and therefore the anesthesiologist should be consulted [2]. The preferred method is the nasotracheal intubation with the patient in seated position, as performed in the reported case. When this technique is not possible, in late stages of this infection, the clinicians should be prepared to perform a surgical airway – cricothyroidotomy or awake tracheotomy [1, 2]. Other adjunctive treatments can be provided such as intravenous corticosteroids (e.g. dexamethasone 10 mg IV), in order to reduce airway oedema and improve later antibiotic penetration [2].

The surgical treatment is recommended in case of unresponsiveness to antibiotics and conservative treatment,

presence of fluctuance in the physical exam or visible abscesses on imaging. As reported, the surgical approach involves decompression of the submental, submandibular, and sublingual fascial compartments by intra-oral and/or extra-oral incision and drainage of the fluid collections [1, 2]. This usually requires a parallel incision 2 fingerbreadths bellow the mandibular angle, sometimes multiple incisions are needed as in the reported case (Figure 4). This procedure is followed by the displacement of the submandibular gland and dissection of the mylohyoid muscle in order to decompress the neck compartments [3]. Although invasive, the surgical approach is safe and has no reported direct complications. It can also abbreviate the duration of the intubation and decrease the length of stay at the hospital [3].

4. Conclusion

Ludwig's Angina is a rare infection that can easily be missed in the early stages of the disease. This article aims to raise awareness of this pathology, given its high mortality rate when left untreated, and to share a case report that began with a life-threatening condition but resulted in a successful outcome without severe sequelae. In this case report, we assumed odontogenic infection as the starting point of the infection, with microbiology positive for *Streptococcus constellatus*. Since odontogenic infections are the leading cause of Ludwig's Angina (70% of the cases), this report pretends to enlighten healthcare professionals about this avoidable condition [2]. By adopting healthy and simple oral hygiene habits we could be avoiding a potentially fatal outcome. When an infection of this magnitude is already established and causing airway impairment, it is paramount to act promptly and efficiently, as any hesitation could cost the patient's life.

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