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Ludwig Angina in a Comorbid Patient: A Case Report

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Abstract

Ludwig's angina is a potentially fatal cellulitis that affects the neck's submandibular, sublingual, and submental regions. It is usually caused by infection in the mandibular teeth. The aggressive nature of this condition is attributed to the bacteria that cause it, which include Staphylococcus, Streptococcus, Peptostreptococcus, Fusobacterium, Bacteroides, and Actinomyces. This case report delves into the complex clinical course of Ludwig's angina in a patient with abdominal lipoma, hypertension, and diabetes. The example highlights the difficulties in handling complications such as breathing obstruction and cellulitis spread. A four-week post-operative follow-up was essential to guarantee appropriate healing. This article provides light on the difficulties of Ludwig's angina, highlighting the significance of individualized care in patients with a variety of comorbidities.

Keywords: ***Ludwig's angina, Comorbidities, Diabetes mellitus, Challenges.***

1. Introduction

Ludwig's angina is a rapidly evolving and sometimes fatal illness that affects the submandibular, sublingual, and submental regions on both sides of the neck [1]. This is an aggressive type of cellulitis characterized by extensive infection of the soft tissue's fascia. It is often caused by an infection of the mandibular molars by a variety of bacteria from the oral flora, including both aerobic and anaerobic components [1]-[3]. The most often observed organisms in Ludwig's angina are Staphylococcus, Streptococcus, Peptostreptococcus, Fusobacterium, Bacteroides, and Actinomyces [3]. Patients frequently experience symptoms such as fever, malaise, chills, and overall weakness. Advanced stages may

show trismus, meningismus, drooling, dysphagia, and a tripod stance, indicating possible airway difficulties when severe blockage worsens, providing a danger of airway collapse [4]. Ludwig's angina is diagnosed mostly by clinical examination, with imaging tests not being directly engaged in the patient's immediate assessment [2]. The primary objective in handling such cases is to secure the airways, either by intubation or surgery. To cover all probable germs, a broad spectrum antibiotic should be used. Intensive surgical drainage and debridement, as well as removal of the source of infection, are required for definitive therapy [4], [5]. The major complications of Ludwig angina are airway obstruction and spread of cellulitis. Immunocompromised patients were found to be at increased risk of developing sepsis [2]. We present a case of a Ludwig's angina patient with a history of abdominal lipoma, hypertension and diabetes who developed sepsis and needed 4 weeks postoperative follow up to ensure proper healing.

2. Case Presentation

We review the case of a 45-year-old obese female patient with a 10 kg neglected abdominal lipoma and a history of uncontrolled diabetes and hypertension who was presented to the emergency department with acute neck edema. A clinical examination of the mouth cavity indicated fascial infection in the submandibular and sublingual areas, as well as the submental space, which resulted in Ludwig angina. The rest of the physical examination was unremarkable. The patient's family history included a diabetic mother and a father who died from liver illness. Upon her admission, she received full blood testing as well as a dental X-ray, which revealed an odontogenic causative wisdom molar teeth on the right lower side. To drain the considerable amount of pus, bilateral submandibular incisions were performed, followed by the evacuation of the submandibular, submental, and sublingual areas, as well as the submasseteric spaces, and extraction of the causative tooth. She was closely monitored in the ICU and on the ward after developing sepsis, with normal saline administered every 4 hours, betadine followed by normal saline and hydrogen peroxide for the first two weeks to debride necrotic tissue and aid in its sloughing, then hydrogen peroxide was discontinued, and Meronam, Tygacil, Unacyn, Perfelgan, and Actrapid were administered as needed. She was put on NPO for the entire month to enable appropriate healing of the intraoral dehiscence and to prevent oral-neck communication until late January. Nutrition was managed by the hospital's clinical pharmacology department. She was released from the ward once her flawless oral intake was certified. The patient is currently stable, and the neck incisions have healed completely since late January 2023, but she still has severe bed sores and is receiving daily routine care, which includes saline, betadine, hydrogen peroxide, hyalo 4 start, and heolosol to promote healing, as well as clindamycin oral tablets (Fig. 1).

Fig. 1. This figure depicts cellulitis on the patient's left side of the face upon admission.

3. Discussion

Ludwig's angina is generally odontogenic in origin (70%–90% of cases in various reports) commonly arising from an inferior molar caries infection [6], [7]. Other contributing factors exist, including infections originating from the pharynx or tonsils, infections caused by foreign bodies, and secondary infections associated with squamous cell carcinoma in the base of the tongue and the floor of the mouth. Approximately one-third of cases have been linked to systemic conditions like chronic glomerulonephritis, systemic lupus erythematosus, aplastic anemia, neutropenia, compromised immune system diseases such as HIV and AIDS, and diabetes mellitus (DM) [7]. Ludwig's angina is typically known to affect previously healthy individuals, nonetheless, some predisposing factors have been identified, such as diabetes, hypertension, alcoholism, malnourishment, as well as immunosuppression—such as in AIDS patients or those who have had organ transplants [8], [9].

Undoubtedly, our patient's clinical course was complicated by her comorbidities, including diabetes and hypertension, both which have been associated with an increase in the severity of LA and worsening of its outcomes [10]. Most often, multiorgan failure follows prolonged or severe sepsis in LA, which can be life-threatening and may result in death [11]. It is demonstrated that sepsis and septic shock may even lead to worse outcomes in the presence of concomitant illnesses like hypertension and cardiac diseases [12].

Ludwig's angina in individuals with comorbidities poses a complex medical challenge, as the presence of underlying health conditions can significantly impact the course and management of this severe bacterial infection. Diabetes mellitus (DM) has been well-documented as a comorbid disease in patients presenting with LA internationally. These individuals are widely recognized to be susceptible to bacterial infections, primarily because the persistent hyperglycemia and poor chronic control lead to a weakening of the immune system [7]. DM is well-documented as a cause of compromised immunity, poor wound healing, and increased risk of both infection and prolonged hospital stays due to increased severity of infection. Also, diabetic patients are more at risk of developing bacteremia, pneumonia, and necrotizing fasciitis [11]. This is explained by the fact that hyperglycemia in diabetes have been identified as a factor that impairs neutrophil function and the complement pathway while enhancing the virulence of certain pathogens. The resulting immune dysfunction, particularly in uncontrolled diabetes as in our case, diminishes the ability to effectively contain an infection. This is notably evident in the increased occurrence of multispace involvement in diabetics with deep neck infections (DNIs). Moreover, diabetic patients have an increased risk for developing Ludwig's angina secondary to submandibular space infections [13].

The presence of comorbidities such as uncontrolled diabetes mellitus and hypertension in this case imposes challenges on the management of Ludwig angina, reflecting the results of previous other studies [7], [14]. Hypertension, insulin resistance and obesity contribute to the progression of Ludwig's angina to sepsis [15]. These diseases lead to a low-grade inflammatory state: with weakened immune function, damaged tissue perfusion, and virulent odontogenic pathogens, the immune system will be affected negatively and may result in an inflammatory cascade, which is one step away from sepsis if not tightly controlled [15], [16]. Early diagnosis and management at the emergency department of

a periodontal infection in a patient that has uncontrolled diabetes, including the removal of the infected tooth, can lead to a stable state, as shown in a study. However, abstaining the removal of the infected tooth in patients presenting with poorly controlled diabetes mellitus can lead to death, as described in another study where 2 of the cases got complicated by severe sepsis and necrotizing fasciitis [17]. Furthermore, in addition to the evident predisposition that diabetes causes to severe neck infections (like Ludwig) and its progression to complications and sepsis in comparison to non-diabetic patients [14], there's many other factors that come into play, such as lack of oral hygiene [18], and dental caries with their synergistic effects [19], all of which are also similar to our patient's case.

There are various factors that can impact wound healing that intervene with one or more stages in this process, therefore producing inappropriate or poor tissue restoration. Wounds that show poor healing, such as delayed acute wounds and chronic wounds, typically don't heal through the stages that are expected to occur. These wounds often progress into a pathologic inflammatory state as a result of a delayed, inefficient, or disorganized healing process [20]. In the presented case, our patient wasn't successful in showing the consistent progress that may be expected in a non-diabetic, non-hypertensive individual in spite of employing treatment following the conventional surgical and medical approach [21] with regard to the management of this infection. This highlights the significance of the connection between diabetes mellitus, hypertension and infection control.

The patient was admitted with a history of uncontrolled diabetes mellitus, thus predisposing her to infections with increased complexity and severity in such cases of bacteremia [22]. Diabetes mellitus is known to cause a number of hematologic changes, which may exacerbate wound healing and make infection control more challenging [23]. Poorly managed diabetes has been linked to abnormalities in plasma viscosity, red cell aggregation, red cell deformities, and 2, 3 diphosphogylcerate concentrations [24]. High blood pressure in hypertensive patients may interfere with reducing blood flow via the small blood vessels that transport oxygen and nutrients to the wound area, leading to tissue hypoxia. Prolonged hypoxia, which can result from both inadequate perfusion and inadequate angiogenesis, is bad for the healing of wounds. Hypoxia can increase the production of oxygen radicals, which can prolong injury by intensifying the early inflammatory response [25]. This convergence of diabetes and hypertension complicated our case and made it harder to keep the patient's overall health under control. The need to manage blood glucose levels and hypertension, added to delayed wound healing and the risk of co-infection, all together led to the need for prolonged hospitalization of the patient, where she was kept in the hospital for 2 months post-surgery. The most challenging complications are airway obstruction and infection spreading to the mediastinum; for this reason, early, aggressive treatment and the maintenance of a safe airway are essential [7].

4. Conclusion

Ludwig's angina is a critical situation that needs rapid assessment and management to prevent its complications that can be fatal if not treated. Our case highlights that comorbid patient having Ludwig angina may be at increased risk of developing sepsis and having longer postoperative stay. Thus, further attention should be raised towards these patients to have proper management.

5. Funding

Not applicable.

6. Conflicts of Interest

The authors declare no conflict of interest.

7. Ethics Approval

The case was approved by the patient.

8. Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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