

Literature Review Article

Ludwig's angina: diagnosis and treatment

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Abstract

Introduction: Ludwig's angina is often an infection of odontogenic origin affecting the soft tissues of the submandibular, sublingual and submental area. **Objective:** This review aimed to analyze the existing literature regarding the clinical features, applications for diagnosis and treatment modalities of Ludwig's angina. **Literature review:** Because it is a disease of rapid evolution, and if not previously identified, may compromise the patient's general health and even lead to death. **Conclusion:** Therefore, it is important to identify the correct diagnosis based on careful and complementary clinical examination, together with an effective drug coverage and early surgical intervention to provide greater control of the patient's health.

Introduction

The odontogenic infection is one of the most difficult clinical cases in Dentistry [12]. According to Bross-Soriano *et al.* [2], Ludwig's angina is a type of infection of odontogenic origin in more than 70% of the cases.

For Vasconcellos *et al.* [22] and Jiménez *et al.* [9], most of the odontogenic infections are of multimicrobial origin because oral cavity is a medium with a normal resident flora very diversified. Such microbiota, at first, lives harmoniously without causing damages to the host. However, when there is an imbalance between the virulence

of the organism and the conditions of the patient, the infection tends to develop.

Ludwig's angina is a cellulitis frequently located at the area of the mandibular second and third molars involving the submandibular, sublingual and submental spaces. The apexes of these teeth are located just below the insertion of the mylohyoid muscle and consequently they are in close relationship with the submandibular space [13, 24].

According to Ugboko *et al.* [21] and Duprey *et al.* [3], the Ludwig's angina is an aggressive infectious pattern of fast dissemination, characterized by a swelling area in the oral floor, tongue, and submandibular region, which in evolution can lead to the patient's death.

Thus, the aim of this literature review study was to exhibit the characteristics, diagnosis and treatment of the Ludwig's angina.

Literature review

Ludwig's angina

The Ludwig's angina was firstly described in 1836 by Wilhelm Frederick von Ludwig as a cellulitis of fast evolution involving the region of the submandibular gland which is disseminated through anatomic contiguity without tendency towards abscess formation [19].

Among the main etiologic factors of the angina is the tooth infection, for example, a recent tooth extraction, endodontic and periodontal condition and tooth trauma [13]. However, Gulinelli *et al.* [7] pointed out other factors such as in the cases of submandibular sialadenitis and parapharyngeal or peritonsillar abscesses.

According to Soares *et al.* [18] and Tavares *et al.* [20], Ludwig's angina can show a greater susceptibility to occur in subjects with some degree of systemic compromise, such as Aids, glomerulonephritis, diabetes mellitus and aplastic anemia.

The diagnosis of Ludwig's angina

The diagnosis process of the angina is eminently clinical. In physical examination, the patient normally shows a volume increasing hard to palpation in the sublingual, submandibular region bilaterally and submental region, which can extend in many times to the suprahyoid region, leading to

the elevation of the oral floor and the falling of the tongue towards the posterior direction with risk of obstruction of the airways [4, 10].

According to Nogueira *et al.* [14] and Saifeldeen and Evans [17], the elevation of the tongue is associated with dysphagia, odynophagia, dysphonia and cyanosis, and in all cases the signs and symptoms characteristic of infectious processes are observed: high fever, malaise, anorexia, tachycardia and chills. On the other hand, the volume increasing in oral cavity contributes for the appearance of clinical cases of muscle hypertonia.

Because of the fast evolution through the anatomic contiguity between the fascial spaces, the knowledge of the head and neck anatomy is essential to understand the clinical presentation and the possible complications of this infection. Thus, as auxiliary diagnosis method, some conventional radiographic tools can be used. For example, through panoramic x-ray, it is possible to identify possible odontogenic sources. Cervical, profile and posterior-anterior radiographs enable to observe the volume increasing in the soft tissues and any deviation of the trachea [4].

Currently, computed tomography is the most complete resource available because through both the axial/coronal cuts and differentiation of the density of soft tissues, it can provide more accurately the dimensions and localization of the infection areas [16].

According to Fogaça *et al.* [4], the clinical examination is decisive for the diagnosis of Ludwig's angina; however, it must be added by a complete anamnesis, image examinations and laboratorial tests. The laboratorial tests, such as hemogram, renal function, culture and antibiogram, are also of vital importance to monitor the general state of the patient and to determine the microorganisms involved to define the antimicrobial therapy.

Treatment approaches for Ludwig's angina

Ludwig's angina is a severe condition once it has a fast evolution that can put the patient's life at risk because either the obstruction of the airways secondary to the sublingual and submandibular swelling or at a latest stage of the process, the dissemination of the infection that could lead to mediastinitis, necrotizing fasciitis or sepsis [9]. Thus, the treatment concentrates around four attitudes: maintenance of the airways, incision and

drainage, antimicrobial therapy and elimination of the infectious site [11].

The maintenance of the airways must be a priority in the treatment of the patient, since the main cause of death at a first moment is the asphyxia due to obstruction. The patients must be rigorously followed-up regarding signs and symptoms of airway obstructions, such as stridor and use of accessory muscle of breathing. The control of the airways can be executed through endotracheal intubation or tracheostomy.

The endotracheal intubation is not recommended because of some factors such as the risk of not planned extubation with difficult of re-intubation due to the swelling and possibility of leading the infection to other sites through the rupture of pustules during intubation. Consequently, the tracheostomy has been indicated for the most severe cases and has the risks inherent to any surgical procedure and some difficult of execution due to the loss of the anatomic references because of the swelling [15].

The stage of incision and drainage is indicated for the decompression of the fascial spaces involved and suppuration evacuation. The execution of multiple incisions could be necessary. The location and size of the incision will depend on the anatomic spaces involved by the infection. Normally, it is necessary the separation of the superficial lobes of the submandibular gland and divulsion of the milo-hyoid muscles to decompress the fascial spaces [24].

Freire-Filho *et al.* [5] recommended the surgical drainage associated with the antimicrobial therapy in the cases of Ludwig's angina completely developed to avoid the previous dissemination to the internal anatomic spaces.

Ludwig's angina is a mixed polymicrobial infection (aerobes and anaerobes), which normally colonizes the oropharynx and it is commonly to find streptococcus, staphylococcus, bacteroids, pseudomonas, B melaninogenicus and peptostreptococcus [1, 23]. Thus, the use of the antimicrobial therapy of broad spectrum is primordial to treat the disease [6].

Penicillin G at high doses through endovenous route associated with metronidazole is generally the antimicrobial therapy of choice in the emergence treatment of Ludwig's angina. The use of cephalosporin, erythromycin or clindamycin is an alternative antimicrobial therapy for patients allergic to penicillin, and this antimicrobials should be employed for the specific microorganism present in the infection [14].

Additionally, some authors as Hutchison and James [8] have associated corticosteroids aiming to reduce the swelling of the upper airways.

Conclusion

Ludwig's angina, because of its fast evolution and aggressive power of dissemination, assumes a character of emergence treatment when diagnosed to prevent the swelling of the fascial tissues and the obstruction of the upper airways

Therefore, it is important the correct identification of the diagnosis based on careful clinical and complementary examination together with an effective drug coverage and an early surgical intervention to provide a higher control of the patient's health.

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