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REVIEW ARTICLE

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## URGENT PROTOCOLS FOR ACUTE APICAL ABSCESS: LITERATURE REVIEW

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### ABSTRACT

**Introduction:** The dentoalveolar abscess is a purulent collection which arises from apulp infection that has disseminated to the periodontal ligament. It can be characterized as acute or chronic and it is originated from primary or secondary sources. **Objective:** To review the literature about the acute apical abscess and the therapeutic protocols available for the diagnosed cases. **Materials and Methods:** Achieved throughout scientific articles searched from 2009 and 2019, using the following keywords: Periapical lesion, Dentoalveolar Abscess, Infections and Endodontics. **Results:** As the dentoalveolar abscess spontaneously develop, the symptoms progress showing swelling and redness at the patient gingiva and skin, whereas the purulent collection searches for the easiest points for dissipation, inducing the formation of a fistulous path responsible for drainage excretions from the necrotic process present at the covered area. The decision for which treatment should be accomplished varies by patient symptoms, once the dentoalveolar abscess can present local and systemic cases, which can diversify the indicated therapy. **Conclusion:** The appropriate diagnosis is of major importance to define the patient's best therapy approach and life maintenance. Once it improves the selection of the best therapy approach to be used and avoid medicine indiscriminate use, mainly antibiotics, and maximally reducing malpractice and/or unnecessary procedures.

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### INTRODUCTION

The dental pulp is composed of a loose conjunctive tissue highly vascularized and innervated, containing lymphatic vessels and other cells, between them the odontoblasts stand out. They are responsible for differentiate pulp tissue from other conjunctive tissues found at the human body (Leonardi *et al.*, 2011). Due its intense metabolism, the dental pulp has an excellent repair capacity, however, because of the fact that they are made of conjunctive tissue, when in contact with any aggressor agent, they can suffer a process of vasodilation, since they are surrounded by rigid walls. Thus, the nervous cells compression happens and causes painful episodes (Campanelli *et al.*, 2008). The pulp defense capacity is directly harmed when vasculature's exudative phenomenon occur, as the pulp volume growth interferes the region's blood circulation,

increasing the immunologic system response, besides the local blood supply (Estrela *et al.* 2008). As a consequence of dental caries non-removal and/or pulp tissue contact with aggressive agents, a necrosis happens and, so, infection and contamination of the radicular canal systems. When these etiologic agents exceed the tolerance limit, the pulp starts the settlement of pulp pathologies (Leonardi *et al.*, 2011). The acute apical periodontitis is the first periapical tissue defense reaction, in which benefits vascular permeability and exudates for spaces between tissues advancement, resulting at an edema in the periapice region. These exudates rise leads to a discredental extrusion, in which the patient relates to feel a sensation of "bigger tooth than its normal size" (Carrillo *et al.*, 2008). Previously to the chronic inflammatory process, when the patient do not show any painful symptomatology, the periapice that was formerly acute goes through a chronification process, which is radiologically observed as an periapice space growth, thickening of the hard blade and a denser bone trabeculate. The local and systemic patient factors that will determine if

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the periapical development will be of an acute dentoalveolar abscess or granuloma and cyst (Carrillo *et al.*, 2008). Aiming to distinguish the bacteria, inflammatory cells shift to the periapical region although, when they cannot combat the bacterial contamination from the radicular canal system, there is an inflammatory condition exacerbation which makes it acute purulent or exudative, known as acute dentoalveolar abscess (ADAA). This clinical scenario requires an urgent treatment due its painful episode and the possibility of systemic involvement. The acute dentoalveolar abscess requires a precise diagnosis, since, according to the purulent collection localization, it can be classified as initial, in evolution or developed and each of them has a different therapy conduct trying to avoid the ADAA evolution to a systemic complication as Angina de Ludwig, Turner teeth and even death (Matthews *et al.*, 2003). In this context, this study aimed to perform a literature review about the acute dentoalveolar abscess and the therapeutic protocols available to treat diagnosed cases.

## MATERIALS AND METHODS

This literature review was performed through scientific articles research at LILACS, PubMed/MEDLINE, SciELO and Google Scholar digital data basis. The following statements researched were, as follows: Periapical lesion; Dentoalveolar Abscess; Infections and Endodontics. The inclusion criteria were the publication period, from 2009 to 2019 and only the papers published in English and Portuguese. As exclusion criteria, articles that showed no clinical relevance about the chosen subject and those that did not follow the inclusion criteria.

## LITERATURE REVIEW

The diseases that affect the dental pulp come from aggressor agents, essentially bacteriological, that can progress to a pulp necrosis slowly or quickly, depending on the host defense and the intensity of the aggressor agent (COHENS and BURNS, 2000; Domingues and Rosa, 1989). When the pulp necrosis happens, the reminiscent tissue stops receiving blood supply and defense cells, which allows dental pulp infection installation and the colonization and development of microbes in the periapical tissues direction. The feature and evolution of the periapical disease are greatly related to the host immunological capacity, aggressive agents virulence and the diameter of the apical foramen (Leonardi *et al.*, 2011). When there are the presence of high virulence microbes associated with the host's organic defense system inefficiency, the installation of an acute inflammatory tends to happen at the periapical region. This can evolve to local infections that require a less aggressive treatment and systemic infections at the facial spaces that can be mortal (Silva *et al.*, 2010).

### Apical Periodontitis

Usually mistaken by the acute periapical abscess, this condition is characterized by an inflammation of the periodontal ligament that precedes the abscess, where the differential diagnosis is made by evaluating the patient's clinical history, related symptoms and a pulp vitality exam (besides both present negative results) (Leonardi *et al.*, 2011). It can present itself as an acute or chronic and it is characterized by an inflammatory process of the periapical

tissues, which has been initiated as an acute apical periodontal inflammation which was extended to the adjacent bone's support (Rocas *et al.*, 2018). Teeth that are submitted to a previous endodontic therapy can develop an apical periodontitis when the endodontic treatment traumatizes the periodontal ligament, it may happen through material leaking beyond the foramen, when the intracanal medicine liberates vapor, when there is a lateral perforation in the root's, among other situations. Due the flattening of the radicular canal ducts, the lower molar and premolar are the teeth that are usually affected by chemical or bacterial trauma during the endodontic therapy (Leonardi *et al.*, 2017). Similar as the acute model, the chronic apical periodontitis is different to present a slow evolution process and, most of the times, absent symptoms represented often as a transition to the granuloma formation (Sassone *et al.*, 2009).

**Acute Apical Abscess:** The acute apical abscess is an inflammatory response of the periapical tissues front of the aggression suffered by the tooth, caused by dental caries or by a dental trauma. It consists in a considerable edema of the soft tissues, presenting mobility, as well as extrusion of the dental element, with spontaneous, intense, continuous and localized painful symptoms (Tortamano *et al.*, 2018). The consolidation of the acute periapical abscess is directly related to the presence of a high virulence infection at the radicular system's interior that won the organism immunological system (Rocas, Riche, Provenzano, 2018). Characterized as polymicrobial infections to present microbial floravariations that act synergistically, and consequently increasing its virulence. Studies have proved that strict anaerobic bacteria are the most found species at teeth radicular canals that show painful symptomology of endodontic source (Saini *et al.*, 2012). A study made by Ribeiro *et al.* (2011) showed that besides dominance of bacteria in endodontic infections, it was also perceived protozoan, fungus, yeasts and virus presence in the radicular conduct interiors. *Archae*, in particular, which embraces a group of microbes capable of living in extreme conditions. Some bacteria species as *Porphyromonas spp*, *Prevotella spp*, *Fusobacterium spp* and *Peptostreptococcus spp*, are related to clinical symptoms beyond being important in inflammatory lesions pathogenesis of the periapical region. Despite that fact, it is well known that part of the endodontic microbial flora was not yet recognized, needing further studies using procedures that have fewer limitations to estimate this microbiota diversity (Montagner *et al.*, 2012).

When broadcasted further than the dental alveolar boundary, the apical abscess, can be confined at the periapical region or continue the diffusion process through adjacent bones and soft tissues, as a diffuse abscess or cellulitis (Aminoshariae and Kulild, 2016). In case of not being treated, the apical abscess can reach the blood flow and result into systemic complications (Alfenas *et al.*, 2014). In its initial and acute form, the dentoalveolar abscess presents a symptomatology consisting on pulsatile pain, local and systemic hyperthermia, sweating, general malaise, lack of appetite, irritability and inflammatory regional lymphadenopathy. When the dental element is present at the oral cavity (primary abscess), extensive dental caries or incorrect dental restoration need to be observed (Estrela *et al.*, 2008). This lesion can sometimes induct to a fistulous path formation to drain excretions from the necrotic process at the involved area. According to Carrillo *et al.* (2008), "the region where the fistula is going to manifest depends on the muscular insertions of the involved area". The

fistula is a connection between a pathological space and a body anatomic cavity or skin surface. It can also be drained periodically and continuously and can be intra or extrabuccal (Leonardi *et al.*, 2011). After the purulent collection breaks its first barrier, a decreasing in the pressure occurs, the symptoms start to cease and, in some cases, it fully disappears. This fistulous path and its floating point occur intra or extrabuccal, occurring then spontaneous drainage (Tortamano *et al.*, 2018). Alfenas *et al.* (2011) assured that the human body, when in its healthy state is capable of localizing the infection source, in addition to take the infecting agent out, it sets the body free of the infectious process. Furthermore, Cope, Wood and Chestnutt (2018) agreed that antibiotic therapy is not necessary when the aggressor agent removal is effective.

#### **Antibiotic therapy in the treatment of acute apical abscess:**

Frequently prescribed as an attached therapy in endodontic infections, antibiotic have its use frequently questioned. The main concern regards the fact that some bacteria have already presented a high resistance to some antibiotic groups deriving from mistaken prescriptions. Since its use is indicated only to 20% of individuals with endodontic infectious diseases and it is noticed that they are prescribed in 80% of the cases, of which approximately half are wrong by its indication, dose or period (Alfenas *et al.*, 2014). Studies have been trying to validate that antibiotic therapy is not effective, due to the lack of blood flow at the necrotic pulp interior, the medicine does not reach and extinguish the present microbes in the root canal system. However, there are situations where it has to be prescribed, but always supported by clinical therapy, for example, when there are infectious process propagation symptoms and the patient presents dyspnoea, palpable lymph nodes, fever, headache, trismus or when they have some defense system impairment, such as leukemia, decompensated diabetes, AIDS, and leukopenia (Rocas, Riche and Provenzano, 2018). It is important to address that patients who do not present any abscess drainage pathway and infection aggravations have no need of antibiotic therapy. There is the necessity of heat physiotherapy objecting to facilitate an access pathway formation to drain the abscess, the antibiotic use, in this situation, leads to a chronification process (Saini *et al.*, 2012). Madarati *et al.* (2018) analyzed the dental professional's preference to treat pulp necrosis and acute apical abscess patients. It was established that only 26% of the interviewed prescribed antibiotics. When questioned about the endodontic chosen treatment, 26,9% only would instrument the canal at the first visit, 56,8% declared that they would proceed with disinfection and modeling. In cases which the exudated extravasation do not cease, 40,5% of them would steal the canal in the first visit. Finally, they conclude that there is no protocol pre-established on the treatment of these infections.

Bolfoni *et al.* (2018) investigated the habit of prescribing antibiotics by Brazilian endodontists and it was observed that 81,5% of the interviewed ones had antibiotics as their first choice, and 30,7% chose amoxicillin associated with clavulanic acid. When questioned about the acute apical abscess treatment displaying diffuse edema, fever and trismus, 90,1% prescribed antibiotic, whereas 88,1% prescribed antibiotic even with systemic involvement absence. Assuredly, it is necessary to disseminate more knowledge regarding prescription of those drugs, since many professionals prescribe it in non-indicated situations or in incorrect period of use.

**Service Protocols:** Dom (1977) published one of the first researches about the urgent endodontic care conduction, and since then, it has been emerging a variety of opinions regarding the type of treatment that should be chosen in acute apical abscess cases. These philosophies vary from the intracanal medicine choice of use, antibiotics class prescription and quantity of sessions. Saini *et al.* (2012) reported that after the acute apical abscess diagnosis, dental surgeons have some treatment choices. The endodontic care promotes cleaning and disinfection of the radicular canal systems, removing the cause of the acute problem, however, does not remove the abscess itself. Accordingly, the drainage is the most effective and less traumatic way to reduce pain. Campanelli *et al.* (2008) suggested that during the endodontic therapy the length of treatment should exceed 2 to 3 mm of the apical foramen, which would promote then, foraminal extension. Since the instrumentation beyond the apex promotes the exudate drainage and the extravasation of the irrigating substances to the periapical region, minimizing the microbe activity, facts that would favor the host defense system and facilitate the body repair process. Silva *et al.* (2010) concluded that the basic treatment to be done in acute apical abscess cases consists in removing the cause, which invariably are in the interior of the root canal. Removing the irritant agents through mechanic instrumentation, the use of chemical substances to irrigate and canal systems obturation must be done in order to reduce as much as possible the action of the microorganisms in the region. Matthews *et al.* (2013) informed that the exudate drainage through the apical foramen cannot be enough for the resolution of the problem. Although the amplitude is a limitation since the purulent collection is usually viscous and the diameter of the foramen corresponds to a endodontic file of 20 or 25, the amount of drainage obtained by this path becomes questionable and therefore should be planned carefully to evaluate the risks and benefits of doing this procedure.

Leonardi *et al.* (2011) described that the cases where drainage does not occur through the tooth, the floating tissue must be incised. However, they attested that in case of having a diffuse edema, this procedure is contraindicated, which emphasize the particularity of each case. Cope *et al.* (2018) assured that the most efficient method of treatment to the cases of acute abscess is through soft tissues drainage, since the drainage through the tooth is unpredictable due the foramen's diameter and the possibility of becoming obstructed. Moreover, after the drainage through soft tissues incision, there is no contraindication for endodontic therapy, since besides releasing periapical pressure, the drainage allows the dried radicular canal instrumentation without exudate leakage. The intracanal medication aims to grant the antiseptic complementation to the biomechanical preparation, reducing as much as possible the microbial flora activity in the root conduct. Soares *et al.* (2014) studied that the present properties of Calen/PMCC and concluded that this would be more effective than the use of the isolated calcium hydroxide paste, since it is the association of calcium hydroxide paste with camphorated paramonochlorophenol, gathering all the antibacterial properties of both substances, therefore being the medicine indicated for use in cases of pulpal necrosis. According to Madarati *et al.* (2018), teeth that are left open after the urgency session, intending to facilitate the exudate drainage through root canal, present a higher indication of flare-up when compared to teeth that after the root canal system debridement, the coronary access was sealed with

provisory obturation material. This fact is associated with the prevention of more bacteria contamination in the oral cavity. The main objective of systemic drug therapy is to reduce stress, relieve pain and prevent the dissemination of the infectious process. Thus, it should be considered a routine procedure, intending more comfort and protection to the patient in the urgent care of patients with acute apical abscesses. It can be prescribed preoperatively and postoperatively, always respecting the individual's general health (Tortamano *et al.*, 2018). The pre surgery protocol indicated by Rocas *et al.* (2018) shows that between 30 and 40 minutes before the procedure, it should be done the use of analgesic, which can be 750mg of paracetamol or 500mg of sodium dipyrone. It should have the maintenance of the drug therapy in the post-operation, if needed. When there's no systemic signs as fever, trismus and lymphadenitis, the antibiotic prescription is unnecessary. When it is perceived that the infection is propagated and there is systemic involvement, 500 mg of amoxicillin or clindamycin in patients allergic to the penicillin group should be prescribed. It should be performed one dose attack with the ingestion of 2 pills 30 to 40 minutes before the procedure and maintained the therapy of 1 pill in each 8 hours for 7 days. There is no consensus about the antibiotic prescription in acute apical abscess cases yet. Therefore, it requires more specific and intense studies to evaluate a protocol to be followed.

## Conclusion

The acute abscess diagnosis must to be carefully done, evaluating the clinical history, signals and symptomology presented by the patient, since there is no proper therapy established, this can evolve to a systemic complication. The therapy using antibiotic is restrict to cases where the patient shows propagated infection or systemic aggravations, since the indiscriminate use of antibiotics can favor allergies, superinfection development due the presence of resistant bacteria, and unnecessary exposure of the patient to the medicine's collateral effects. There is a consensus that the most effective dentoalveolar abscess treatment is to remove the cause. It is observed that the choice of leaving the tooth opened after the endodontic instrumentation aiming for it to drain is up to the professional. Since some studies consider that the forame's diameter can prevent the total drainage through conduct. Fluctuant tissue incision drainage is an alternative, if it does not happen through the root canal, considering that its implementation promotes a relief in the symptomatology presented. Therefore, its practice is not indicated in cases of diffuse edema. Finally, each patient needs to be evaluated individually by reasons of the progression and evolution of the abscess being intimately related to the host's immunologic capacity, whichinterferes inthe care protocol determination in these cases.

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