Review Article

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# Periodontal Abscess - A Neglected Dental Emergency

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## ABSTRACT

**Background**: Periodontal abscess is a localised purulent inflammation in the periodontal tissues. It represents 7-14% of all the dental emergencies and the third most frequent dental emergency. Various predisposing factors are considered for its formation like exacerbations of the existing disease, post-therapy abscesses, impaction of foreign objects and the factors that can alter the root morphology. By analysing the signs and symptoms, diagnosis is done. Some evidence conclude that the microflora responsible for its formation are not specific and usually dominated by gram-negative strict, anaerobe, rods, etc. Today different therapeutic approaches are use for its management like drainage and debridement, systemic antibiotics and periodontal surgical procedures. Antibiotics like Penicillin, Metronidazole, Tetracyclines and Clindamycin are the drugs of choice.

**Keywords:** Periodontal abscess, Incision and drainage, Antibiotics.

## INTRODUCTION

Periodontal abscess is a localised purulent inflammation of the periodontal tissues, also known as lateral abscess or parietal abscess.[1] (Fig 1) It is a common emergency in the dental clinic. In 1977, the international conference on research in the biology of periodontal disease has defined a periodontal abscess as, "an acute, destructive process in the periodontium resulting in localized collection of pus communicating with oral cavity through the gingival sulcus or other periodontal sites and not arising from the tooth pulp."[3] Based on anatomical locations in the periodontal tissues, the abscesses of the periodontium has been classified as: Gingival, Periodontal & Pericoronal abscess (according to Meng et al in 1999).[4] Abscesses of any type are one of the main cause to seek emergency care in the dental clinic.[2] This condition should be promptly managed otherwise its failure may lead to loss of teeth and danger of cellulitis in susceptible patients. An immediate attention is required to relieve pain and systemic complications. In many cases, the prognosis of the involved tooth may be modified due to presence of an abscess and may be responsible for extraction of tooth. Therefore in the management of an periodontal abscess, accurate diagnosis and the immediate treatment is an important step.[3] It is important in clinical periodontal practice due to its: high prevalence amongst dental emergencies and in periodontitis patients; usually closely related with periodontitis and periodontal pockets, affecting not only untreated patients, but also patients during active treatment or during maintenance; one of the main causes of tooth extraction and tooth loss, mainly in maintenance patients and may result in complications, due to bacteremia, that may cause infections in distant locations.[5]

**Etiology:**

Factors causing periodontal abscess are:

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1. Extension of infection from a periodontal pocket deeply into the supporting periodontal tissues, and localization of the suppurative inflammatory process along the lateral aspect of the root.[1,3]

2. Lateral extension of inflammation from the inner surface of a periodontal pocket into the connective tissue of the pocket wall resulting in localization of the abscess when drainage into the pocket space is impaired.[1]

3. Formation in a pocket with a tortuous course around the root. A periodontal abscess may form in the cul-de-sac, the deep end of which is shut off from the surface.[1,3]

4. Changes in composition of the micro flora, bacterial virulence or defect in host defense could also make the pocket lumen inefficient to drain the increased suppuration.[3]

5. Incomplete removal of calculus during treatment of a periodontal pocket where calculus is dislodged and pushed into the soft periodontal tissue. The gingival wall shrinks, occluding the pocket orifice, and a periodontal abscess occurs in the sealed-off portion of the pocket.[1,3]

6. In patients with advanced periodontitis treatment with systemic antibiotics without sub gingival debridement leads to a change in the composition of the sub gingival microbiota leading to super infection and abscess formation.[3]

7. After trauma to the tooth, or with perforation of the lateral wall of the root in endodontic therapy. In these situations, a periodontal abscess may occur in the absence of periodontal disease.[1,3]

**Classification:**

1. **Based on etiology:**[2,5,7]

   a) **Periodontitis related abscess:** when an acute infection originates from a biofilm present in a deepened periodontal pocket.

   b) **Non-Periodontitis related abscess**: when an acute infection originates from other local source, like foreign body impaction or alterations in root integrity.

2. **Based on course:**[1,5]

   **a) Acute abscess:** Develops in a short period of time and lasts for a few days or a week and sudden in onset. Characterized by painful, red, edematous, smooth, ovoid swelling of the gingival tissue. Exudate may be present with gentle pressure; the tooth may be percussion sensitive and feel elevated in the socket. The area may be dome like and relatively firm or pointed and soft. Fever and regional lymphadenopathy are occasional findings.

   **b) Chronic abscess:** Develops slowly and lasts for a long time and usually presents a sinus that opens onto the gingival mucosa along the length of the root. The orifice of the sinus may appear as a difficult-to-detect pinpoint opening, which reveals a sinus tract deep in the periodontium when probed and the sinus may be covered by a small, pink, beadlike mass of granulation tissue. There may be a history of intermittent exudation. Usually asymptomatic however patient may report episodes of dull, gnawing pain; slight elevation of the tooth; and a desire to bite down on and grind the tooth and often undergoes acute exacerbations with all the associated symptoms.

3. **Based on number:**[5]

   **a) Single abscess:** Abscess confined to a single tooth.

   **b) Multiple abscess:** Abscess confined to more than one tooth.

**Prevalence:**

The prevalence of periodontal abscess was studied in emergency dental clinics, in general dental clinics, in periodontitis patients before treatment, and in patients during supportive periodontal therapy (SPT).[8,9,10,11]Among all dental conditions in need of emergency treatment,

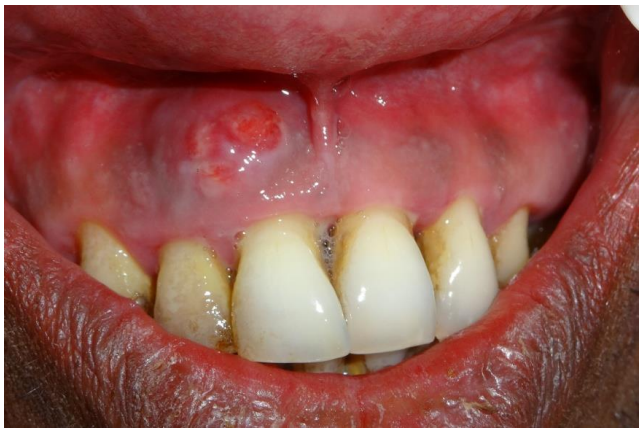

Fig 1: Periodontal abscess i.r.t. 11,12

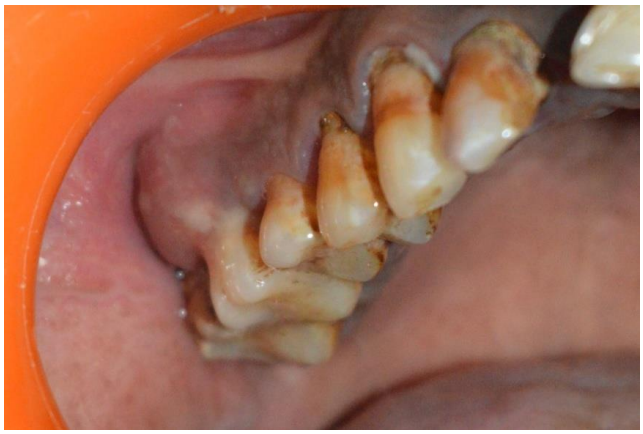

Fig 2: Periodontal abscess i.r.t. 16

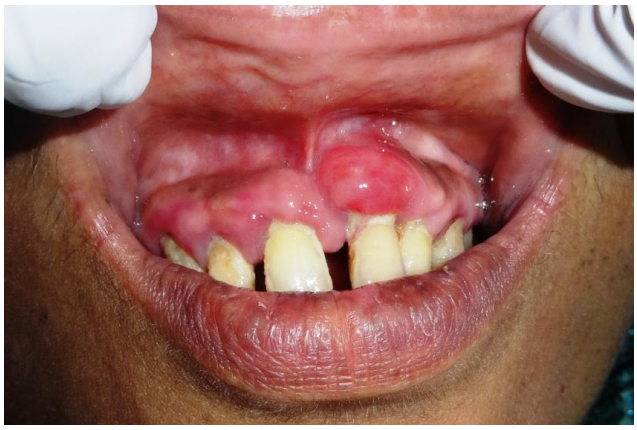

Fig 3: Periodontal abscess i.r.t. 21

periodontal abscess represent between 8% and 14%.[10] (Fig 2) Gray et al. (1994) monitored periodontal abscess in an army clinic and found that periodontal abscess had a prevalence of 27.5%. In this population 13.5% of the patients undergoing active periodontal therapy had experienced abscess formation, while untreated patients showed a higher figure, 59.7%.[11] McLeod et al. (1997) followed 114 patients in SPT and identified 42 patients (27.5%) that had suffered from acute episodes of periodontal abscess.[12] Abscess often occur in molar sites, and molars represent more than 50% of all cases of abscess formation. Reason for this high prevalence of abscesses in molars could be lesions involving the furcation and the complex root morphology of such teeth.[12]

**Pathogenesis and histopathology:**

A periodontal abscess is formed by occlusion or trauma to the orifice of the periodontal pocket, resulting in extension of the infection from the pocket or by the entry of bacteria into the soft tissue wall of the periodontal pocket. Inflammatory cells are then attracted by chemotactic factors. Tissue destruction is caused by the inflammatory cells and their enzymes. An inflammatory infiltrate is formed followed by the destruction of the connective tissues, encapsulation of the bacterial mass and pus formation. A periodontal abscess contains bacteria, bacterial products, inflammatory cells, tissue breakdown products and serum. The lowered tissue resistance and the virulence as well as the number of bacteria present determine the course of the infection.[8,13] (Fig 3)

In the initial phase, neutroplhils are found in the central area of the abscess, close to soft tissue debris and with remains of tissue destruction. At a later stage, a pyogenic membrane, composed of macrophages and neutrophils, is organised. The rate of tissue destruction within the lesion will depend on the growth of bacteria inside the foci and their virulence, as well as on the local pH. An acidic environment will favour the activity of lysomal enzymes and promote tissue destruction.[8,13]

De Witt et al. (1985) studied biopsies sample taken from 12 abscesses. The biopsies were taken just apical to the centre of the abscess. They observed that the sites examined had a normal oral epithelium and lamina propria, but an inflammatory cell infiltrate resided lateral to the pocket epithelium. There were foci of neutrophil and lymphocyte accumulations in areas characterized by massive tissue destruction and a mass of granular, acidophilic and amorphous debris present in the pocket. In 7 out of 9 biopsies evaluated by electron-microscopy, Gram-negative bacteria were

seen invading both the pocket epithelium and the altered connective tissue.[13]

**Microbiology:**

Streptococcus viridians is the most common isolate in the exudate of periodontal abscess when aerobic techniques are used.[17] Newman & Sims (1979) studied 9 abscesses and found that 63.1% of the microbiota was comprised of strict anaerobes.[14] Topoll et al. (1990) analysed 20 abscesses in 10 patients who had taken antibiotics prior to the study. They reported that 59.5% of the microbiota was made up of strict anaerobes.[15] Herrera et al. reported that 45.1% of the bacteria in the abscess comprised of anaerobes.[8,9] The microflora found in periodontal abscesses is polymicrobial, dominated by non-motile, Gram-negative, strict anaerobic, rod-shaped species. Porphyomonas gingivalis is the most virulent bacteria. The occurrence of P. gingivalis in periodontal abscesses ranges from 50-100%.[9,14,15] Using a polymerase chain reaction technique, Ashimoto et al. (1998) investigated 7 cases of periodontal abscess and they found P. that gingivalis was predominantly present.[16] Culture studies of periodontal abscesses have revealed high prevalence of the following bacteria: Prevotella intermedia- 25-100%; Porphyromonas gingivalis- 55-100% ;Fusobacterium nucleatum -44-65% ; Actinobacillus actinomycetemcomitans- 25%;Camphylobacter rectus- 80% ;Prevotella melaninogenica-22%.[3,5]

**Diagnosis:**

Diagnosis is based on the chief complaint and the history of the present illness. An acute form of a abscess can be differentiated from a chronic form by the severity of pain and distress. For proper diagnosis relevant medical and dental history should be taken. After proper history, the patient and the lesion should be examine. Steps in examination include:[5]

a) **General features:** Healthy or unhealthy features that may indicate on- going systemic diseases, competency of immune system, extremes of age, distress, fatigue.

b) **Extra Oral features:** Symmetry of face, swelling, redness, fluctuant, sinus, trismus and examination of cervical lymph nodes.

c) **Intra Oral Features:** Gingival swelling, redness and tenderness, pain ; suppuration either spontaneous, on pressure or from sinus; mobility, elevation and tooth tender to percussion and bleeding on probing.

Following examination the next step is to confirm the clinical findings on the basis of [3]

a) **Radiographs:** Radiographs like periapical, bitewing and OPG should be used. Gutta percha point placed through sinus might locate the source of the abscess.

b) **Pulp Vitality Test:** To assess the vitality of the tooth thermal or electric test should be used.

c) **Microbial Test:** Sample of pus from the sinus, abscess or purulent material expressed from the gingival crevice should be used for culture and sensitivity test.

**Differential diagnosis:**[3]

1) **Gingival abscess:** History of recent trauma; localisation to the gingiva and no periodontal pocket.

2) **Periapical abscess:** Located over the root apex; non-vital tooth, heavily restored or large filling; large caries with pulpal involvement;history of sensitivity to hot and cold food; no signs / symptoms of periodontal disease and periapical radiolucency on intraoral radiographs.

3) **Perio-Endo lesion:** Severe bone loss close to the apex, causing pulpal infection and non-vital tooth which is sound or minimally restored.

4) **Endo-Perio lesion:** Tooth usually non-vital, with periapical radiolucency and localised deep pocketing.

5) **Cracked tooth Syndrome:** History of pain on mastication; crack line noted on the crown; vital tooth and pain upon release after biting on cotton roll or rubber disc.

6) **Root fracture:** Heavily restored crown; non-vital tooth with mobility; possible fracture line and radiolucency around the root which are visible in periapical radiographs; localised deep pocketing, normally one site only and might need an open flap exploration to confirm diagnosis.

**Treatment:**

It includes:

1) Local measures

a) Drainage of the abscess
b) Elimination of the cause
2) Systemic measures: Antibiotics in conjunction with local measures.
3) Extraction of teeth with hopeless prognosis.

Management of a patient with periodontal abscess can divided into three stages:

1. Immediate management
2. Initial management
3. Definitive therapy

**Immediate Management:**

In life-threatening infections which lead to space infections of the orofacial regions or to diffuse spreading infections (facial cellulites). Hospitalization with supportive therapy, together with intravenous antibiotic therapy, is recommended usually. However, the clinical examination and the investigations and the initial therapy can be delayed to some extent depending on the severity of the infection and the local signs /symptoms. In non-life threatening conditions, systemic measures such as oral analgesics and antimicrobial chemotherapy will be sufficient to eliminate the systemic symptoms and severe trismus, if present. Before the microbiological analysis and before the antibiotic sensitivity tests of the pus and tissue specimens, antibiotics are prescribed empirically. On the severity of the infection, the empirical regimens are dependent.

Common antibiotics which are used are:[17,18,19]

i. Phenoxymethylepenicillin 250 -500 mg qid 5/7 days
ii. Amoxycillin 250 - 500 mg tds 5-7 days
iii. Metronidazole 200 - 400 mg tds 5-7 days

If allergic to penicillin

i. Erythromycin 250 –500 mg qid 5-7 days
ii. Doxycycline 100 mg bd 7-14 days
iii. Clindamycin 150-300 mg qid 5-7 days

**Initial Management:**

Usually done for the management of acute abscesses without systemic toxicity or for the residual lesion after the treatment of the systemic toxicity and the chronic periodontal abscess. Consists of:[17,18,19]

i. Irrigation of abscessed pocket with saline or antiseptics
ii. Removal of foreign bodies
iii. Drainage through sulcus with a probe or light scaling of tooth surface
iv. Compression and debridement of soft tissue wall
v. Oral hygiene instructions
vi. Review after 24-48 hours.

**Definitive Therapy:**

After initial therapy reassessment has to perform to restore, function, esthetics of periodontium & to enable patient maintain periodontal health. Periodontal flap surgery with systemic antibiotics or local antibiotics (tetracycline) is indicated as definitive treatment of perioodntal abscess.[17,18,19]

**Complications:**

**1. Tooth loss:**

Periodontal abscesses have been suggested as the main cause for tooth extraction during the phase of supportive periodontal therapy (SPT).[20] A tooth with a history of repeated abscess formation is considered to be a tooth with a questionable prognosis.[21]

**2. Dissemination of the infection:**

Two possible sources of dissemination have been described: the dissemination of the bacteria inside the tissues during the therapy; or bacterial dissemination through the blood stream due to bacteremia from the untreated abscess.[3] Mechanical

treatment of a periodontal abscess may result in bacteremia.[22] A case of pulmonary actinomycosis was related to the treatment of a periodontal abscess, which was ultrasonically scaled 1 month earlier.[23] A case of brain abscess was observed in a healthy patient with a periodontal abscess who was treated with drainage and curettage without systemic antibiotic 2 weeks earlier.[24]

## CONCLUSION

As periodontal abscess can lead to the loss of the involved tooth, so early diagnosis and appropriate intervention is important for its management. Patients who are under supportive periodontal treatment, the occurrence of periodontal abscesses has been frequently described. Different therapeutic alternatives have been proposed for the treatment of the periodontal abscess. Among them, incision and drainage, scaling and root planning and different antibiotics, are the sole therapies for the treatment. An infection has the possibility to spread micro-organisms to other body sites, with the possibility of causing serious diseases which can eventually be fatal. Decision to extract a tooth should be taken by taking some factors into consideration such as the degree of clinical attachment loss, the presence of tooth mobility, the degree of furcation involvement, and the patient's susceptibility to periodontitis due to the associated systemic conditions.

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## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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