

REVIEWS

PERIODONTAL ABSCESS—THE EMERGENCY IN DENTAL MEDICINE (DEFINITION, CLASSIFICATION, EPIDEMIOLOGY, ETIOLOGY, MICROBIOLOGY, PATHOGENESIS AND HISTOPATHOLOGY, PATHOPHYSIOLOGY)

Tsvetalina Gerova-Vatsova¹, Ralitsa Yotsova²

¹*Department of Periodontology and Dental Implantology, Faculty of Dental Medicine,
Medical University of Varna, Bulgaria*

²*Department of Oral Medicine, Faculty of Dental Medicine,
Medical University of Varna, Bulgaria*

ABSTRACT

INTRODUCTION: Periodontal abscesses are the third most common dental emergency, following periapical and pericorony abscesses. They are of utmost importance based on the need for urgent medical intervention, the deteriorating prognosis of the tooth involved, and the potential of rapid spread of infection.

AIM: The purpose of this study is to summarize the current information in the published literature regarding the definition, classification, epidemiology, etiology, microbiology, pathogenesis and histopathology, and pathophysiology of periodontal abscesses.

DISCUSSION: The periodontal abscess is an acute localized infection due to invasion of pyogenic bacteria. Periodontal abscesses are classified based on their location (gingival and periodontal), duration of persistence (acute and chronic), and their number (single and multiple). This condition is more common in patients suffering from periodontitis, but a periodontal abscess can also occur in areas where periodontal pockets are not present, i.e., the cause of its development is different. The main microorganisms that are present are gram-negative anaerobic bacteria. Their invasion into the soft wall of the periodontal pocket is the beginning leading to the formation of a periodontal abscess. The majority of periodontal abscesses occur due to disruption of periodontal pocket drainage, which can occur in a variety of situations.

CONCLUSION: In conclusion, we can summarize that periodontal abscesses are of utmost importance based on the need for urgent medical intervention, the deteriorating prognosis of the tooth involved, and the potential of rapid spread of infection. Considering that it occurs relatively frequently in the clinical practice, it is necessary for dentists to be thoroughly familiar with the diagnosis of periodontal abscess.

Keywords: *periodontitis, gingivitis, periodontal abscess, gingival abscess*

Address for correspondence:

Tsvetalina Gerova-Vatsova
Faculty of Dental Medicine
Medical University of Varna
84 Tzar Osvoboditel Blvd
9002 Varna, Bulgaria
e-mail: cvetalina21@gmail.com

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INTRODUCTION

The periodontal abscess is an acute localized infection due to invasion of pyogenic bacteria (1,2). Depending on the source of infection, abscesses are divided into periapical, periodontal, and pericorony abscesses (3,4,5). Periodontal abscesses are classified based on their location (gingival and periodontal), duration of persistence (acute and chronic), and their number (single and multiple) (4,6). The peri-

odontal abscess is less common than the periapical and pericoronal abscesses, but it is nevertheless considered a common complication requiring emergency dental care (1,6). It occurs more frequently in patients suffering from periodontitis, but a periodontal abscess can also occur in areas where periodontal pockets are not present, i.e., the reason for its development is different (1). The main microorganisms present are gram-negative anaerobic bacteria (4,7,8). Their invasion into the soft wall of the periodontal pocket is the beginning leading to the formation of periodontal abscess (4,9). The majority of periodontal abscesses occur due to disruption of periodontal pocket drainage, which can occur in a variety of situations (4,7,10).

AIM

The purpose of this study is to summarize the current information in the published literature regarding the definition, classification, epidemiology, etiology, microbiology, pathogenesis and histopathology, and pathophysiology of periodontal abscesses.

MATERIALS AND METHODS

To find pertinent research on the topic, we searched the PubMed and Google Scholar archives. All of the articles under review were published between 1979 and 2024. Several keywords and their combinations were used in the search, such as „periodontitis,“ „gingivitis,“ and „periodontal abscess.“

RESULTS AND DISCUSSION

1. Definition

The periodontal abscess is an acute localized infection due to invasion of pyogenic bacteria into the soft tissue wall of the periodontal pocket. It occurs more frequently in patients with existing periodontal pockets. Periodontal abscesses are of paramount concern based on the need for urgent medical intervention, the deteriorating prognosis of the involved tooth, and the potential for rapid spread of infection (1,2).

They are of utmost significance, which is based on the necessity of immediate medical intervention, the deteriorating prognosis of the tooth in question and the risk of quick spread of infection (6).

2. Classification

Depending on the source of infection, abscesses are divided into periapical, periodontal, and pericoronal abscesses (3,4,5).

Periodontal abscesses are classified on the basis of their location (gingival and periodontal), duration of persistence (acute and chronic), and their number (single and multiple) (4,6). Gingival abscesses extend within the gingival margin and interdental papillae, usually caused by an embedded foreign body (4,6). Periodontal abscesses are positioned in deeper periodontal structures and are usually associated with periodontal disease and present deep periodontal pockets and bony defects (1,4,6).

They are divided into two categories, chronic and acute, based on how long the infection has persisted. The two groups have distinct symptoms. The signs and symptoms of an acute periodontal abscess include pain, pus, and discomfort to the touch. On the other hand, a sinus tract and minimal or non-existent discomfort are more commonly linked to a persistent abscess (1,4,6).

Based on the number, they are separated into two categories: single abscesses, which are typically brought on by a local obstruction, and multiple abscesses, which are linked to systemic conditions like type 2 diabetes and individuals with untreated periodontal disease who are receiving antibiotics for conditions other than oral health problems (1,4,11,12).

3. Epidemiology

A study conducted in general dentistry clinics in the United Kingdom found that, after periapical abscesses (14–25%) and pericoronitis (10–11%), periodontal abscesses were the following most common acute orofacial infection (6–7%) (13).

Individuals having preexisting periodontal pockets had a higher prevalence of periodontal abscesses (2,6,14,15).

There is a reciprocal association between type 2 diabetes and periodontal disease, whereby diabetes might accelerate the onset and advancement of periodontal disease (16). Additionally, there is data that could indicate that individuals with type 2 diabetes are more likely to develop periodontal abscesses (17).

4. Etiology

This entity's formation can be explained by one of two etiologies: non-periodontitis-related or related to periodontitis. Periodontitis-related abscesses typically manifest as an aggravation of the disease when left untreated or as a side effect of periodontal therapy. Unusual root structure or the impaction of foreign items, like a piece of dental floss, can often lead to the development of abscesses unrelated to periodontitis (1,4,6,8,18).

Periodontal abscesses have also been related to the prescription of systemic antibiotics without mechanical debridement in individuals with periodontal disease (7).

5. Microbiology

Gram-negative anaerobic bacteria predominate in the microbiology of periodontal abscesses, which is strikingly similar to that of periodontal disease. *Porphyromonas gingivalis* is the most common bacteria discovered in periodontal abscesses, with a prevalence ranging from 50% to 100% (4,7,8). *Prevotella melaninogenica*, *Prevotella intermedia*, *Fusobacterium nucleatum*, *Tannerella forsythia*, *Treponema* species, *Prevotella melaninogenica*, *Campylobacter* species, *Capnocytophaga* species, *Aggregatibacter actinomycetemcomitans*, and gram-negative colonic rods are among the other bacteria linked to the illness (2,4,14,19,20). Proteinase-producing bacteria, like *P. intermedia*, are crucial because they can boost nutrition availability and hence boost the amount of bacteria in abscesses (4).

6. Pathogenesis and Histopathology

An abscess in the soft tissue is mostly caused by bacterial invasion of the pocket walls. The bacteria subsequently release chemotactic chemicals that attract inflammatory cells, and an inflammatory reaction results in the breakdown of connective tissue (4,9).

Periodontal abscess tissue samples were examined by De Witt et al. As they moved from the outside to the inside, they discovered a typical structure. On top was the normal mucosa with its typical components. Beneath, an acute inflammatory infiltrate was found, followed by an area of necrotic and unstructured connective tissue with plenty of neutrophils and lymphocytes, and an ulcerated attachment.

On the bottom of the structure, granular acidophilic and amorphous debris were located (21).

7. Pathophysiology

The majority of periodontal abscesses occur due to disruption of periodontal pocket drainage, which can occur in a variety of situations, including the buildup of calculus, calculus that was forced into the soft tissues during debridement, or an impaction of a foreign body such as dental floss or a toothpick (4,7,10). Bacteria build up results from the periodontal pocket closure's obstruction of gingival crevicular fluid clearance. However, the release of lysosomal enzymes from host neutrophils is mostly responsible for the tissue destruction observed in periodontal abscesses (4,19).

CONCLUSION

In conclusion, we can summarize that periodontal abscesses are of utmost importance based on the need for urgent medical intervention, the deteriorating prognosis of the tooth involved and the potential of rapid spread of infection. Considering that it occurs relatively frequently in the clinical practice, it is necessary for dentists to be thoroughly familiar with the diagnosis of a periodontal abscess.

However, it is necessary in the future to consider the topic fully, including diagnosis, differential diagnosis, treatment, prophylaxis, prognosis, and complications of periodontal abscess.

REFERENCES

1. Yousefi Y, Meldrum J, Jan AH. Periodontal Abscess. 2023 Jun 12. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-.
2. Vályi P, Gorzó I. A parodontális abszcessus és kezelése [Periodontal abscess: etiology, diagnosis and treatment]. Fogorv Sz. 2004;97(4):151-5. Hungarian.
3. van Winkelhoff AJ, Carlee AW, de Graaff J. Bacteroides endodontalis and other black-pigmented Bacteroides species in odontogenic abscesses. Infect Immun. 1985;49(3):494-7. doi: 10.1128/iai.49.3.494-497.1985.
4. Hiya D, Aamir M, Sharma M. Periodontal Abscess: The Forgotten Emergency. IOSR-JDMS. 2023;22(12). doi: 10.9790/0853-2212080104

5. Corbet EF. Diagnosis of acute periodontal lesions. *Periodontol 2000*. 2004;34:204-16. doi: 10.1046/j.0906-6713.2003.003432.x.
6. Herrera D, Roldán S, Sanz M. The periodontal abscess: a review. *J Clin Periodontol*. 2000;27(6):377-86. doi: 10.1034/j.1600-051x.2000.027006377.x.
7. Herrera D, Alonso B, de Arriba L, Santa Cruz I, Serrano C, Sanz M. Acute periodontal lesions. *Periodontol 2000*. 2014;65(1):149-77. doi: 10.1111/prd.12022.
8. Newman MG, Sims TN. The predominant cultivable microbiota of the periodontal abscess. *J Periodontol*. 1979;50(7):350-4. doi: 10.1902/jop.1979.50.7.350. PMID: 38308.
9. Socransky SS, Haffajee AD, Cugini MA, Smith C, Kent RL Jr. Microbial complexes in subgingival plaque. *J Clin Periodontol*. 1998;25(2):134-44. doi: 10.1111/j.1600-051x.1998.tb02419.x.
10. Kareha MJ, Rosenberg ES, DeHaven H. Therapeutic considerations in the management of a periodontal abscess with an intrabony defect. *J Clin Periodontol*. 1981;8(5):375-86. doi: 10.1111/j.1600-051x.1981.tb00887.x.
11. Becker W, Berg L, Becker BE. The long term evaluation of periodontal treatment and maintenance in 95 patients. *Int J Periodontics Restorative Dent*. 1984;4(2):54-71.
12. Laudenbach JM, Kumar SS. Common Dental and Periodontal Diseases. *Dermatol Clin*. 2020;38(4):413-20. doi: 10.1016/j.det.2020.05.002.
13. Lewis MA, Meechan C, MacFarlane TW, Lamey PJ, Kay E. Presentation and antimicrobial treatment of acute orofacial infections in general dental practice. *Br Dent J*. 1989;166(2):41-5.
14. Silva GL, Soares RV, Zenóbio EG. Periodontal abscess during supportive periodontal therapy: a review of the literature. *J Contemp Dent Pract*. 2008;9(6):82-91.
15. Kaneko A. [Periodontal disease and periodontal abscess]. *Ryoikibetsu Shokogun Shirizu*. 1999;(25 Pt 3):354-6. Japanese.
16. Nascimento GG, Leite FRM, Vestergaard P, Scheutz F, López R. Does diabetes increase the risk of periodontitis? A systematic review and meta-regression analysis of longitudinal prospective studies. *Acta Diabetol*. 2018;55(7):653-67. doi: 10.1007/s00592-018-1120-4.
17. Meng HX. Periodontal abscess. *Ann Periodontol*. 1999;4(1):79-83. doi: 10.1902/annals.1999.4.1.79.
18. Andriani I, Gunawan A, Desky A. Periodontal abscess occurrence post wire splint therapy on mobile teeth: Case report. *Improve Quality in Dentistry Proceeding*. 2024:202-7
19. Herrera D, Retamal-Valdes B, Alonso B, Feres M. Acute periodontal lesions (periodontal abscesses and necrotizing periodontal diseases) and endo-periodontal lesions. *J Periodontol*. 2018;89 Suppl 1:S85-S102.
20. Topoll HH, Lange DE, Müller RF. Multiple periodontal abscesses after systemic antibiotic therapy. *J Clin Periodontol*. 1990;17(4):268-72. doi: 10.1111/j.1600-051x.1990.tb00024.x.
21. DeWitt GV, Cobb CM, Killoy WJ. The acute periodontal abscess: microbial penetration of the soft tissue wall. *Int J Periodontics Restorative Dent*. 1985;5(1):38-51.