

## CLINICAL AND MICROBIOLOGICAL ASPECTS OF THE PERIODONTAL ABSCESS

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**Keywords:** periodontal abscess, periodontal pocket depth, tooth mobility

**Abstract:** The aim of this study was to offer more information in order to help in recognizing and characterizing of the periodontal abscess associated to periodontitis. A consecutive series of 29 patients with the diagnosis of acute periodontal abscess were recorded during October 2008-march 2010 in the Clinic of Odontology and Periodontology Tg.Mures regarding subjective and objective clinical parameters. Microbiological samples were taken for anaerobic microorganisms. The patients were selected based on the following criteria: edema, redness, tenderness and moderate pain related to a periodontal area. The results showed that 18 (62%) abscesses occurred in untreated periodontitis patients, 4 (14%) immediately after basic periodontal treatment and 7 (24%) developed during the maintenance phase. A total of 20 (69%) cases were associated with molar teeth, 5 (17%) were upper premolars, 2 (7%) lower premolars and 2 (7%) incisors. Moderate to severe pain was noted in 62% of patients, edema and redness were noted with scores of moderate-severe in 93%, 84% and 75% of the abscesses, respectively. The microbiological tests showed that *Fusobacterium nucleatum*, *Porphyromonas gingivalis* and *Prevotella intermedia* were the most frequent species found in the periodontal abscesses from our study. In conclusion, the periodontal abscess is a moderately painful clinical condition which demands emergency treatment in over 60% of the patients. The abscesses involve teeth with severe destruction, associated with deep periodontal pocket depths, mobility, bleeding and suppuration. This study shows that this condition has clear clinical and microbiological characteristics and further investigation is needed in order to define efficient treatment modalities.

**Cuvinte cheie:** abces parodontal, pungă parodontală, mobilitate dentară

**Rezumat:** Scopul acestui studiu este de a oferi informații în plus pentru a facilita recunoașterea și caracterizarea abcesului parodontal asociat frecvent diferitelor etape de evoluție a bolii parodontale. În perioada 01.10. 2008–01. 03. 2010, în Clinica de Odontologie-Parodontologie Tg.Mureș am examinat o serie consecutivă de 29 pacienți cu diagnosticul de abces parodontal. Au fost înregistrați parametri clinici subiectivi și obiectivi și microbiologici, pentru evaluarea prezenței microorganismelor anaerobe. Pacienții au fost selectați ținând cont de următoarele criterii: edem, roșeața mucoasei, sensibilitate la palpare, durere. Rezultatele au arătat că 18 abcese (62%) au apărut la pacienții fără tratament parodontal, 4 (14%) imediat după faza inițială de tratament și 7 (24%) în cursul perioadei de menținere. 20 de cazuri (69%) au apărut la dinți molari, 5 (17%) la premolari superiori, 2 (7%) la premolari inferiori și 2 cazuri (7%) la incisivi. Durerea moderată sau severă a fost înregistrată la 62% pacienți iar edemul și roșeața au fost observate cu calificativul de moderat-sever la 93%, 84% și respectiv 75% dintre abcese. Examinările microbiologice au arătat că *Fusobacterium nucleatum*, *Porphyromonas gingivalis* și *Prevotella intermedia* au fost speciile izolate cel mai frecvent în studiul nostru. În concluzie, abcesul parodontal este caracterizat de o durere de intensitate moderată care impune tratament de urgență în peste 60% din cazuri. Abcesul interesează dinți cu suport osos distrus, asociat cu adâncimi mari ale pungilor parodontale, mobilitate, sângerare la palpare și prezența exudatului purulent. Acest studiu demonstrează ca abcesul parodontal are caracteristici clinice și microbiologice clare și pentru o abordare optimă din punct de vedere terapeutic sunt necesare mai multe studii clinice și de laborator.

### INTRODUCTION

The periodontal abscess is a frequent condition in which the periodontal tissues may be rapidly destroyed and the patients may seek immediate care. It is important not only for the prognosis of the affected teeth, but also for the possibility of infection spreading.

Periodontal abscess has been either directly associated

to periodontitis or to sites without the prior existence of a periodontal pocket. In the evolution of periodontitis, the abscess appearance marks an active bone destruction period passing, although such events also may occur without abscess formation. The existence of a tortuous pocket which eventually becomes isolated may favor the formation of abscesses<sup>(1)</sup>. The marginal closure of a periodontal pocket may lead to an extension of the

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Articol intrat în redacție în 28.03.2011 și acceptat spre publicare în 21.07. 2011  
ACTA MEDICA TRANSILVANICA Septembrie 2011; 2(3)468-471

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infection into the surrounding periodontal tissues due to the pressure of the suppuration. Changes in the composition of the microflora, bacterial virulence or in host defense mechanisms could also make the pocket lumen inefficient to drain the increased suppuration.

The development of a periodontal abscess in periodontitis may occur at different stages during the course of the infection: as an acute exacerbation of an untreated periodontitis, during periodontal therapy, in refractory periodontitis or during periodontal maintenance.

The prevalence of this condition has been studied in emergency and general dental clinics and it ranges from 8% of all dental emergencies in Spain up to 14% in USA. Patients undergoing active periodontal treatment had a prevalence of a periodontal abscess of 13,5% while untreated patients showed 59,7%<sup>(2, 3)</sup>.

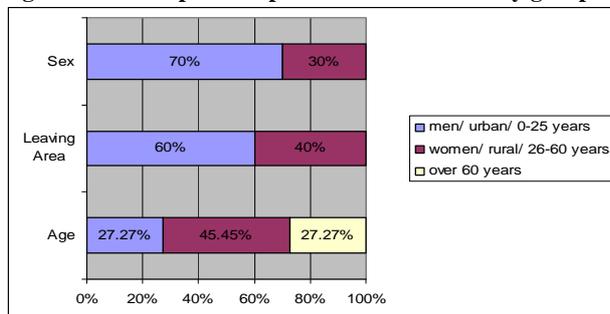
### THE AIM OF THE STUDY

The aim of this clinical and microbiological study was to offer more information in order to give a clear characterization of the periodontal abscess associated with periodontitis, early diagnosis and efficient treatment methods.

### MATERIAL AND METHOD

A consecutive series of 29 patients with the diagnosis of acute periodontal abscess were recorded during October 2008-march 2010 in the Clinic of Odontology and Periodontology Tg.Mureş, 20 men (68,9%) and 9 women (31,1%), 8 with the age under 25 years (27,58%), 13 between 26-60 years (44,82%) and 8 over 60 years (27,58%); 17 from the city (58,63%) and 12 from the rural area (41,37%). (Fig.1).

**Figure no. 1. Graphical representation of the study group**



The patients were selected based on the following criteria: edema, redness, tenderness and moderate pain related to a periodontal area. Usually a deep periodontal pocket with bleeding and suppuration on probing was observed during clinical examination. The abscesses with endodontic origin were excluded based on vitality tests and radiographs.

During the clinical evaluation we recorded the pain, redness, edema, which were assessed using a scale ranging from 1 to 4 as follows: 1 (none), 2 (mild), 3 (moderate) and 4 (severe). We also recorded clinical dichotomous variables such as bleeding on probing, suppuration, cervical lymphadenopathy and tooth mobility. The periodontal pocket depth was also recorded using a manual periodontal probe.

Data from subjective clinical variables are expressed as percentage of abscesses/patients in each category. Quantitative clinical variables, as probing pocket depth, are expressed as mean (SD) and range. Qualitative clinical variables, as bleeding, suppuration and lymphadenopathy and tooth mobility) are presented as percentages.

The microbiological samples were taken before the clinical evaluation. We used sterile paper points (Maillefer,

Switzerland) placed deep into the periodontal pocket and maintained for 10 seconds and then transferred in 1,5 ml of transport fluid; the microbiological samples for anaerobic culture were put in transport fluid and within 2 hours were dispersed on blood agar plates. These were studied after 7 and 14 days and several species were identified: Porphyromonas gingivalis, Prevotella intermedia, Fusobacterium nucleatum, Peptostreptococcus micros. For microbiological variables, for each bacterial species, the frequency of occurrence and mean proportion was calculated.

### RESULTS

When the abscess condition was linked to the patients periodontal condition, 18 (62%) occurred in untreated periodontitis patients, 4 (14%) immediately after basic periodontal treatment and 7 (24%) developed during the maintenance phase.

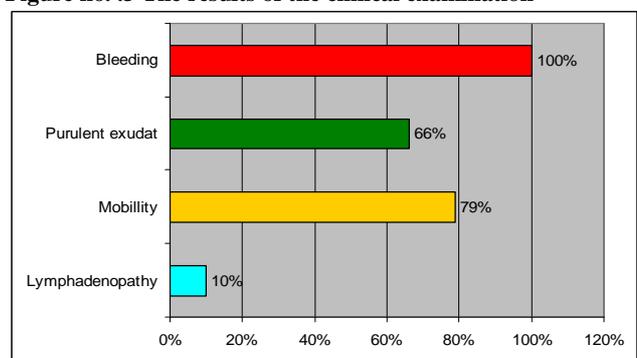
In relation to the location of the abscess in the oral cavity, 20 (69%) were associated with molar teeth, 5 (17%) with upper premolars, 2 (7%) with lower premolars and 2 (7%) with incisors.

In the study group, 62% of patients complained of moderate to severe pain and in all cases, edema and redness were noted with scores of low-moderate and severe, recording 93%, 84% and 75% respectively. The distribution of the abscesses in each category is presented in Fig.2.

**Figure no. 2 Graphical representation of subjective and objective clinical signs**

Bleeding on probing was present in all cases, while suppuration was detected in only 66% of the cases. The affected tooth showed mobility in 79% of the cases, associated lymphadenopathy was present in 10% of the cases (Fig. 3).

**Figure no. .3 The results of the clinical examination**



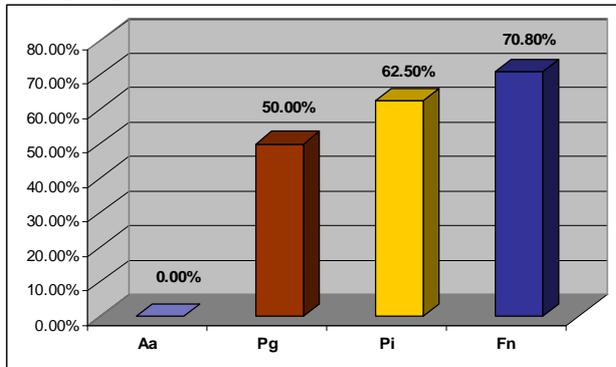
The probing pocket mean depth was 7,28 mm (2,1) ranging from 3-13 mm. In 62% of the cases the periodontal pocket was deeper than 6 mm, while in 34% it ranged between 4-6 mm, the rest being under this score.

The microbiological results were evaluated from 21

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samples because 8 were lost due to technical reasons. The most frequent detection was noted in the case of *Fusobacterium nucleatum* (70,8%) followed by *Porphyromonas gingivalis* (50%) and *Prevotella intermedia* (62,5%). We could not identify *Actinobacillus actinomycetemcomitans* (Fig.4).

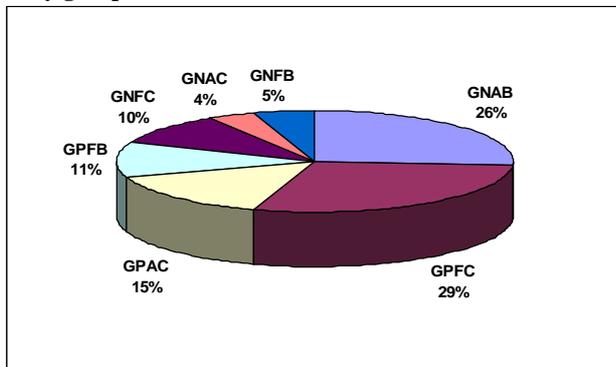
**Figure no. 4. The prevalence of microbial species in the study group**



\*Aa, *A. actinomycetemcomitans*; Pg, *P. gingivalis*; Pi, *P. intermedia*; Fn, *F. nucleatum*

Morphotypes and aerotolerance were studied in the microbiological samples and we observed that gram-negatives represented 45% of the flora, gram-positives 55%, strict anaerobes 35% and rods 42% (Fig. 5).

**Figure no. 5. The prevalence of microbial species in the study group**



\*GN-gram-negative;F- facultative;C-coci; GP-gram-positve; A-only anaerobe;R-rod

lesion.

Trope and the colab.( 1988)<sup>(8)</sup> recommended the use of dark-field microscopical exam of the abscess microflora in order to exclude the endodontic origin, based on the high percentage of spirochetes in periodontal abscesses.

Periodontal abscesses have been classified in different ways based on the main criteria of classification. Depending on the location, they have been divided into periodontal and gingival abscesses<sup>(1, 9,10)</sup>. The gingival abscess is described as a localized painful swelling, affecting only the marginal and interdental gingival, which in most cases is determined by impactation of foreign objects and it may develop on previously healthy gingival. Periodontal abscess have similar symptoms but usually affect deeper periodontal structures, including deep pockets, furcations and vertical osseous defects.

Depending on the course of the lesion, they have been divided into acute and chronic periodontal abscesses. The first usually demonstrates symptoms like pain, tenderness, sensitivity to palpation and suppuration upon gentle pressure. The chronic abscess is usually associated with a sinus tract, is asymptomatic or the patient may have mild symptoms.

Depending on the number, they have been divided into single and multiple abscesses.<sup>(11)</sup> Single periodontal abscesses are related in most of the cases to local factors which contribute to the closure of the drainage of a periodontal pocket, while multiple abscesses have been reported in diabetes mellitus, medically compromised patients or in untreated periodontitis.

The periodontal abscess is not an homogenous clinical entity. Different causes may lead to the development of a periodontal abscess and when studying this clinical condition it is important to characterize properly the type of abscess studied. Our study investigated 27 periodontal abscesses from patients with moderate to severe periodontitis. Most affected patients suffered from untreated periodontitis (62%), others were during the maintenance phase (24%) and post-scaling abscesses were less frequent (14%).

In the clinical diagnosis of a periodontal abscess, the presence of pain and/or mild pain was the most frequent complaints. We found that most of the abscesses were diagnosed in a clear acute stage (65%) and only one was related to a sinus tract.

We detected bleeding on probing in all abscesses and the level of suppuration was 66%. Most of the associated pockets were deeper than 6 mm (62,1%), while 34,4% ranged between 4-6 mm. The mean probing depth in our study was 7,28 mm. We found 79% of teeth with some degree of mobility, probably due to a more severe periodontal destruction, since we included only patients with periodontal disease.

In our series molars were the most commonly involved teeth, representing 69% of the cases. A similar percentage was found by Gray et al(1994)<sup>(12)</sup> and slightly lower (53,8%) by Smith and Davies (1996)<sup>(13)</sup>. In a retrospective study an abscess development during the maintenance phase, McLeod et al(1997)<sup>(14)</sup> showed that 65% of the affected teeth were multirrooted. One reason for this high prevalence in molars could be the furcation involvement.

Few studies have analyzed the microbiology of periodontal abscesses. Newman and Sims (1979)<sup>(15)</sup> studied 9 abscesses and found that 63,1 % of the flora were strict anaerobes. Topoll et al (1990)<sup>(11)</sup> analyzed 20 abscesses in 10 patients who had taken antibiotics prior to the study and reported 59,5% of strict anaerobes, compared to 45,1% in our study. Percentages of gram negatives (59,6% versus 45%) and rods (72,2% versus 32%) were also higher in the study of Newman and Sims compared to ours, but the differences might be explained by the sampling techniques.

## DISCUSSIONS

The periodontal abscess diagnosis is based on the symptoms revealed by the patient and the signs found during the oral examination. Additional information can be obtained through a careful medical dental history and radiographic examination. The current sign on examination is an ovoid elevation of the gum along the lateral part of the root<sup>(1, 4)</sup>. Abscess located deep in the periodontium are less evident.

Symptoms range from light discomfort to severe pain, tenderness, swelling, tooth mobility, sensitivity to palpation. Another common finding is suppuration, spontaneous or after slight pressure. The radiographic examination may reveal a normal appearance or some degree of bone loss, ranging from a widening of the periodontal space to a dramatic radiographic bone loss<sup>(5,6)</sup>.

Van Winkelhoff and the colab.(1985)<sup>(7)</sup> established the following diagnostic criteria for the definition of a periodontal abscess: association with pockets 6 mm or more, bleeding on probing, radiographic alveolar bone loss, absence of a periapical

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In all these studies, the microflora of periodontal abscesses is dominated by periodontal pathogens and black-pigmented bacteria were the most prevalent group. Thus, *Porphyromonas gingivalis* ranged between 55-100%<sup>(11, 16, 17, 15)</sup>, *Prevotella intermedia* was found between 25-100% and *Fusobacterium nucleatum* has shown high prevalence in periodontal pockets and we found it in 70,8% of the abscesses. We could not find *Actinobacillus actinomycetemcomitans* in our samples, while Haffstrom et al (1994)<sup>(17)</sup> reported a prevalence of 25%.

### CONCLUSIONS

The periodontal abscess is a moderately painful clinical condition which demands emergency treatment in over 60% of the patients.

The abscesses involve teeth with severe destruction, associated with deep periodontal probing depths, mobility, bleeding and suppuration.

This study shows that this condition has clear clinical and microbiological characteristics and further investigation is needed in order to define efficient treatment modalities.

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