

## MULTIPLE LOCAL AND SYSTEMIC CONDITIONS AS PREDISPOSING RISK FACTORS FOR PERIODONTAL DISEASE EVOLUTION AND DECREASED QUALITY OF LIFE

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### Abstract

Local risk factors could influence directly the periodontium, the most often involved local risk factors being dental calculus, malocclusions, improper or aged and degraded dental or prosthetic treatments, orthodontic appliances, affecting also the masticatory, esthetical and phonetical function consequently decreasing the quality of life. A good domestic plaque control performed by the patient and its removal professionally may be insufficient for the resolution of periodontal inflammation, as the local/systemic risk factors may still favour plaque accumulation or cause a misbalance of the host immune response. Therefore, plaque removal should be always accompanied by a sustained effort of the dental practitioners' team to correct, or to, at least, control the predisposing local and systemic risk factors.

**Keywords:** *systemic conditions, periodontal disease, quality of life*

### 1. Introduction

The evolution pattern and rate of progression of periodontal disease (PD), is influenced by the existing balance between the bacterial challenge and the efficiency of the host immune response. In other words, the host immune response has to be able to restrain and limit the bacterial action and to prevent it from extending deeper, into the supporting tissues of the tooth (the periodontal ligament, cementum and alveolar bone). [1]

Once a clear diagnosis of periodontal disease has been reached by the periodontist, it is important to identify and acknowledge the involvement of local

or systemic risk factors in its pathogenesis process.

Local risk factors could influence directly the periodontium, the most often involved local risk factors being dental calculus, malocclusions, improper or aged and degraded dental or prosthetic treatments, orthodontic appliances. [2] The first step of periodontal treatment, which is essential and mandatory for any periodontal disease patient, is the removal of soft and hard (dental calculus) subgingival bacterial biofilm, followed by good domestic plaque control performed by the patient. [3]

However, in certain circumstances, this step may be insufficient for the

resolution of periodontal inflammation, as the local/systemic risk factors may still favour plaque accumulation or cause a misbalance of the host immune response. Therefore, plaque removal should be always accompanied by a sustained effort of the dental practitioners' team to correct, or to, at least, control the predisposing local and systemic risk factors. [3]

Diabetes is one of the most important, if not the most important systemic risk factors for periodontal health, due to the important changes that diabetes mellitus inflicts on the characteristics of the bacterial subgingival biofilm, on the normal behaviour of leucocytes, the up-regulation of the release of pro-inflammatory cytokines, the gingival vascular micro-architecture and the resulting cellular insulin resistance. [4]

Rheumatoid arthritis (RA) is a systemic, chronic, autoimmune disease which is characterized by the onset of

persistent synovial inflammation and the destruction of the articulating bone and cartilage, eventually leading to functional disability. [5,6]

Despite the fact that the entire aetiology of RA has not yet been completely understood, certain clinical trials have shown a possible connection of this condition with periodontal disease. [7,8]

Both conditions share similar characteristics, being defined as inflammatory, destructive diseases that imply the accumulation and persistence of an inflammatory infiltrate within the local lesions. [9]

There are recent studies, in which it was stated that hepatitis C could be an aggravating factor for the development of the periodontal pathology, the mechanisms that have been suggested to be responsible were related to pro-inflammatory mediators and insulin resistance. [10]

## **2. Case presentation**



Figure 1 – Initial intra-oral examination of the patient



Figure 2 – Panoramic radiography of the patient

### **2.1 Patient anamnesis**

The 56-year-old female patient was referred to the Department of Periodontology of the University of Medicine and Pharmacy of Craiova, for periodontal evaluation. The patient's main complaint was the mobility of the forth

quadrant dental bridge affecting the masticatory function and the inter-dental spaces on the upper and lower incisors, affecting her esthetical and phonetical functions.

The patient's medical history revealed that she was diagnosed with type II diabetes mellitus 8 years ago,

rheumatoid arthritis 6 years ago and chronic hepatitis C from 5 years. The patient is also a heavy smoker and exhibited poor oral hygiene habits. The patient issued her informed-written-consent for case documentation and presentation.

## **2.2 Intra-oral examination**

The following odontal and periodontal changes were observed upon oral examination:

- dark-red colouring of the mandibular anterior gingiva
- maxillary and mandibular lateral area gingival recessions
- spontaneous and induced gingival bleeding
- significant mandibular plaque and calculus deposits
- periodontal pockets with average 6,8 mm and maximum depth 12 mm
- buccal migration of the anterior dental group
- increased width of inter-dental spaces and dental malocclusion with propulsion movement interference (1.1-4.2) and end-to-end bite (1.2-4.3) following buccal dental migration
- abfraction non-carious cervical lesions (1.3, 2.3)
- old cervical coronal marginally non-adapted obturations (3.4, 4.4)
- old, marginally non-adapted dental bridges
- incisal edge fracture caused by occlusal static and dynamic

trauma, following dental migration (1.1, 1.2)

The following radiologic changes were observed while analyzing the panoramic radiographic image:

- generalized alveolar bone horizontal resorptions
- 60-70% root length alveolar bone resorption (3.5)
- periodontal space enlargement around the abutment teeth
- root resorption and destruction (4.7, 4.8)

## **2.3 Local and systemic risk factors**

The patient anamnesis and examination enabled the identification of the following predisposing periodontal disease risk factors:

Systemic: gender, age, smoking, multiple systemic medical conditions

Local: dental malocclusion and trauma, as a consequence of dental migrations, incorrectly marginally adapted old dental bridges

## **3. Discussions**

As in many periodontal disease cases, setting an exact diagnosis is the first step towards a carefully planned therapeutic protocol. A similar important step is to precisely identify the risk factors than predispose the patient to the onset and evolution of periodontal disease and to try to improve or correct them as best as possible.

Smoking leads to nicotine deposits' formation on the walls of small gingival arterial vessels, therefore reducing blood

and oxygen supply to the periodontium. This can decrease the defensive immune capabilities of the periodontal tissues. In addition, smoking has been proven to promote the development of highly-pathogenic periodontal bacterial species, but to reduce the immune activity of neutrophil and lymphocyte cells. [11]

Calculus consists of calcified bacterial biofilm. As the bacterial biofilm is left undisrupted on the tooth crowns and roots, it increases its content in minerals, originating from saliva and the gingival crevicular fluid. These minerals will enter the biofilm and the bacterial cells, mineralizing the entire structure. [12]

A stable occlusion is a key element of periodontal health. When occlusal contacts between teeth, either static or dynamic, become traumatic, the teeth are subjected to harmful mechanical forces.[2] As in our patient, this initially leads to gingival recession, followed by an increase of the width of the periodontal space around the tooth's roots, alveolar bone resorption and consequent tooth loss. Thus, such teeth are more predisposed to periodontal bacterial challenge, as they are under constant mechanical stress.[2]

RA patients are more predisposed to the onset of chronic PD, as compared to non-RA patients and more likely to manifest a higher rate of periodontal

tissue destruction. [13,14] Moreover, it has been suggested that, in terms of periodontal bacterial pathogens, certain species which are involved in the pathogenesis of PD (*Porphyromonas gingivalis*, *Treponema denticola*) can be also be pathogenic factors for the onset of RA. [15, 16]

PD is more frequent in diabetic patients, as compared to non-diabetic ones, and there is also a close influence of periodontal inflammatory processes on glycaemia status and control in diabetic individuals. [4, 17]

Considered to be linked to the malfunction of the immune system, possibly to the insulin resistance and caused by the patients poor oral hygiene, the periodontal impairment of HCV-infected patients affects their life quality. [10]

#### 4. Conclusion

As exhibited by this case report, local and systemic risk factors play a significant predisposing role in the pathogenesis process of periodontal disease, affecting their quality of life.

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