OXIDATIVE STRESS AND MICROBIOLOGICAL ASESSEMENT IN AGGRESSIVE PERIODONTITIS - A CASE REPORT

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Abstract

We present the case of a 17 years-old male with aggressive periodontitis who underwent periodontal therapy along with a 7-day antibiotic regimen.

Keywords: aggressive periodontitis, antibiotics, oxidative stress

Introduction

The oral cavity is a very complex and unique environment characterized by numerous interactions between different surfaces: soft and hard tissues, food, air and microorganisms (1).

Periodontal diseases are common inflammatory conditions which manifest as a loss of supporting connective tissue and alveolar bone around teeth, and if they occur in an aggressive form it can lead to tooth loss before the age of 20 years (2, 3). Aggressive forms of periodontitis usually affect young individuals at or shortly after puberty and presents a rapid rate of progression (4). It is recognized that the majority of periodontal tissue destruction is caused by abnormal host responses to microorganisms and their products (5), especially *Aggregatibacter actinomycetemcomitans (Aa),* which has been implicated in the etiology of in localized juvenile periodontitis and is associated with some forms of adult chronic periodontitis (6).

The non-surgical periodontal treatment (scaling and root-planing SRP) does not always lead to the microbiological changes necessary for maintaining the long-term stability of the clinical results. Therefore, the use of systemic antimicrobials as adjunctive to SRP have the potential to affect periodontal pathogens via gingival crevicular fluid at subgingival areas insufficiently reached by mechanical instrumentation (7). The combination of metronidazole and amoxicillin (AMX + MTZ) as adjunctive to SRP, has shown promising results in the treatment of both aggressive and chronic periodontitis (8-11). Combining AMX+ MTZ results in a synergisticbactericidal effect that in turn reduces the time and dosage level required to obtain optimal effect, and ultimately minimizes the toxicity of both drugs (7).

Oxidative stress (OS) arises when there is an imbalance between oxidants and antioxidantsand its increase is involved in the progression of diseases like diabetes mellitus, cardiovascular diseases and periodontitis (5). Recently, a method for measuring reactive oxygenmetabolites (ROM) in bloodsamples has been developed, which was recognized to be useful for the evaluation of oxidative stress in the organism (12).

Case report

We present the case of a 17 years-old young man, non-smoker and with no systemic disease who accused gingival bleeding and pain when brushing.The patient underwent a clinical and radiographic examination that assessed the following parameters: periodontal pocket depth, clinical attachment level [measureed at six sites per tooth (mesio-buccal, buccal, disto-buccal, disto-lingual, lingual, and mesio-lingual) at all teeth, to the nearest millimeter with a periodontal probe (PCPUNC 15, Hu-Friedy, Chicago, IL, USA), and using the cement–enamel junction as a reference point for the clinical attachment level], full mouth bleeding score and full-mouth plaque score. The evaluation results were recorded in a periodontal chart (http://www.periodontalchart-online.com/uk/) that was subsequently saved in a pdf format, printed, and attached to the patient's observation file. Based on the clinical findings, the periodontal diagnosis was localized aggressive periodontitis (4).

After the clinical evaluation, samples of subgingival plaque were collected from the deepest periodontal sites in each quadrant using sterile paper points inserted into sterile sealed Eppendorf tubes and sent for polymerase chain reaction (PCR) testing that was performed with a commercial Micro-Ident® Kit (Hain Lifescience GmbH, Nehren, Germany). *Pg* and *Pi* were identified as well by this method along with *Aa.*

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In order to assess oxidative stess level, blood samples were collected from the antecubital vein, and transported to the laboratories of the Department of Pathophysiology of the Victor Babes University of Medicine and Pharmacy Timisoara, within one hour after the venipuncture. The d-ROM (derivatives reactive oxygen metabolites) test and BAP (biologic antioxidant potential) test were used to analyze reactive oxygen metabolites and biological antioxidant potential, respectively, by use of photometric methods (Diacron International®, Grosseto, Italy). d-ROM values of 658.9 U CARR indicated the prescence of very high level of oxidative stress and BAP values of 1507.3 µmol/L a high deficiency status of antioxidants.

After completing the measurements, all pockets with periodontal pocket depth ≥ 4 mm were scaled and root planed under local anesthesia with Gracey curettes (Hu-Friedy®, Chicago, IL, USA) and ultrasonic instruments (Piezon®250, Electro Medical Systems SA, Nyon, Switzerland) following the protocol used for One-Stage Full-Mouth Disinfection - OSFMD (13). As home care, the patients were advised to rinse their mouth twice daily for 2 min with a 0.2% chlorhexidine digluconate solution for 14 days and took a systemic antibiotic therapy consisting in AMX+MTZ, 500mg each, three times daily for 7 days.

After one month, the investigations were repeated. The patient was symptom-free, and no bacterial strains were identified. The patient reported no side ffects associated with the intake of the antibiotic treatment. d-ROM values decreased to 367.6 U CARR indicating a medium level of oxidative stress and BAP values increased to 2038.6 µmol/L, situtatig the patient near the optimal values of antioxidants.

Disscussions

Aggregatibacter actinomycetemcomitans is frequently associated with localized aggressive periodontitis, and is detected in higher numbers and frequency in aggressive than in chronic periodontitis (14). Its identification in our patient confirmed the clinical diagnostic. In the literature, there are strong indications that, *Aa* is resistant to mechanical treatment and its incomplete eleimination achieved by SRP only, may provide a poor clinical response (6, 15-17). Therefore, if identified, the adjunctive antibiotic threatment is compulsory for *Aa* suppression in the periodontal pockets.

Akalin et al. 2007 (18) showed that periodontitis patients have the tendency to be more inclined to a disproportion of pro-oxidants and antioxidants in comparison with healthy individuals. In this direction, a proper early diagnosis of the periodontal disease and the administration of the therapy, will help to obtain an improvement in both local and systemic control of the inflammatory precess.

In studies of D'Aiuto et al. 2010 (19) and Tamaki et al. 2008 (12) carried on chronic periodontitis patients, it was demonstrated that non-surgical periodontal treatment improved both periodontal clinical parameters and plasma d-ROM values, fact confirmed by our findings. Measuring systemic oxidative status in aggressive periodontitis patients may be useful for evaluating the effects of systemic stus on periodontal health.

Conclusions

Adjunctive antibiotic therapy to non-surgical periodontal treatment has a beneficial effect on suppressing bacterial load, improving clinical parameters and improving the oxidative balance.

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