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Review

Periodontal disease in HIV-infected adults in the HAART era: Clinical, immunological, and microbiological aspects

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ABSTRACT

The introduction of highly active antiretroviral therapy (HAART) has decreased the incidence and prevalence of several oral manifestations such as oral candidiasis, hairy leukoplakia, and Kaposi's sarcoma in HIV-infected patients. Regarding periodontal disease the findings are not clear. This disease represents a group of chronic oral diseases characterized by infection and inflammation of the periodontal tissues. These tissues surround the teeth and provide periodontal protection (the gingival tissue) and periodontal support (periodontal ligament, root cementum, alveolar bone). Clinical, immunological, and microbiological aspects of these diseases, such as linear gingival erythema (LGE), necrotizing periodontal diseases (NPD) (necrotizing ulcerative gingivitis [NUG], necrotizing ulcerative periodontitis [NUP] and necrotizing stomatitis), and chronic periodontitis, have been widely studied in HIV-infected individuals, but without providing conclusive results. The purpose of this review was to contribute to a better overall understanding of the probable impact of HIV-infection on the characteristics of periodontal infections.

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1. Introduction

In recent years, human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), characterized by a rapidly progressive immunodeficiency course leading to death, has become a manageable chronic condition and have significantly improved the life of HIV infection individuals as a consequence of the introduction and use of HAART since 1996.[1] HIV-infected individuals are living longer and developing non-HIV-related chronic conditions similar to the rest of the population.[2] This therapeutic regimen is known as highly active antiretroviral therapy (HAART), which consist of combination of at least three antiviral drugs, preferably from at least two different classes. As today there are several drug combinations, HAART has been defined as one or more NRTIs combined with a PI and often supplemented with one drug from another class[3].

HAART has decreased the viral load and has reduced morbidity and mortality related to AIDS. The mortality index has fallen from 97.4% in 1993 to 19.8% in 2001.[4] Furthermore, after the introduction of HAART, there was a significant decrease of opportunistic infections in HIV-infected patients,[5] including oral manifestations such as oral candidiasis, hairy leukoplakia, Kaposi's sarcoma, herpes simplex and periodontal disease.[6–9] However the impact of these changes in periodontal disease is less clear.[10]

Previous studies reported that HIV-infected patients have an increased risk of developing more aggressive periodontitis.[11–13] Recent studies however have not confirmed these findings.[14–19] In fact, the establishment of HAART may have provided a protective effect, keeping the pathogenic subgingival microbiota of these subjects under control, even in a condition of severe immunosuppression.[20] In addition, evidence has shown that protease inhibitors may also inhibit proteinases of other microorganisms such as species of Candida.[21] Although HAART has decreased the incidence and severity of atypical forms of periodontal diseases, such as linear gingival erythema (LGE) and necrotizing periodontal diseases (NPD) in HIV-infected individuals,[22] with regard to chronic periodontitis, these factors need to be clarified.[23] Therefore the objective of this study is to perform a review of the literature on periodontal diseases in HIV-infected adults.

2. Periodontal diseases

Periodontal disease represents a group of chronic oral diseases characterized by infection and inflammation of the periodontal tissues. These tissues surround the teeth and provide periodontal protection (the gingival tissue) and periodontal support (periodontal ligament, root cementum, alveolar bone) (Fig. 1). The colonization of oral bacteria on the surface of a tooth leads to the formation of a dental biofilm, which can harbour pathogenic species (periodontal pathogens). These microorganisms initiate an inflammatory response in the gingival connective tissue resulting in gingivitis. However if the inflammatory process continues, it can result in a chronic non-reversible inflammatory state of the supporting structures.[24] The detection of these subgingival microorganisms, such as classic periodontal pathogens (*Porphyromonas gingivalis*, *Aggregatibacter actinomycetemcomitans*, *Tannerella forsythia*, *Treponema denticola*, etc.) as well as others species (*Eubacterium nodatum*, *Porphyromonas endodontalis*, *Prevotella tannerae*, *Filifactor alocis*), *has been performed by the utilization* of molecular techniques such as DNA/DNA chequerboard analysis, cloning, polymerase chain reaction (PCR). These molecular technologies also provide new resources to identify not only single microorganisms, but communities with potential pathogenic importance.[25]

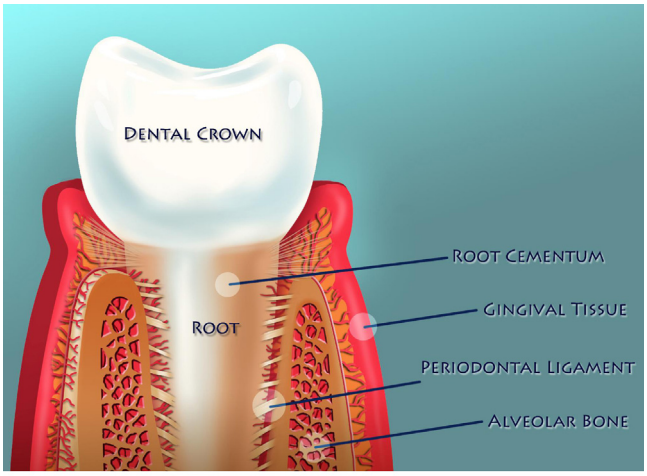

Illustration Ricardo Guimarães

Fig. 1 – Periodontal tissues: gingiva, periodontal ligament, root cementum, and alveolar bone.

The progress of the periodontal disease establishes conditions for the destruction of collagen fibres and root surface attachment as well as resorption of alveolar bone, with consequent loss of teeth if periodontal treatment is not performed.[26] Although periodontal diseases are initiated by bacterial species living in biofilms at or below the gingival margin, it is the intensity of the host response to microbial challenge that seems to be responsible for tissue destruction,[27] with a Th-1 response more related to gingivitis and a Th-2 to periodontitis (EFP). However, animal experimental studied have shown that distinct microorganisms result in different rates of bone loss. In fact, combinations of periodontal bacterial species have been shown to have synergistic effects on tissue destruction. In addition, studies have shown a direct influence of different bacterial complexes on gene and protein expression in periodontal tissues and conceivably on clinical phenotypes.[25]

3. Periodontal disease in HIV-infected individuals

3.1. *Linear gingival erythema*

LGE was first described by Winkler and Murray.[28] This lesion is defined as an intense linear erythema, most frequently found in anterior teeth, accompanied in some cases by bleeding and discomfort. It normally manifests in immunosuppressed individuals.[28–30] The development of oral candidiasis[31] can

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