HISTOLOGICAL AND ULTRASTRUCTURAL OBSERVATIONS OF PERI-IMPLANTITIS AND PERIODONTITIS

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INTRODUCTION

Periodontitis and peri-implantitis are characterised by chronic microbial inflammation modified by the host, resulting in loss of periodontal attachment (Holde et al., 2017; Papapanou et al., 2018). The periodontium and peri-implant supporting structures share similar histological and clinical characteristics; in the light of current knowledge, the histological differences between periodontitis and peri-implantitis are not yet well understood. The aim of this morphological pilot study was to observe and compare peri-implantitis and periodontitis samples by optical microscopy (OM) and by transmission electron microscopy (TEM).

MATERIALS AND METHODS

Peri-implantitis (n=10) and periodontitis (n=3) samples were collected for therapeutic purposes. For optical microscopy, the samples were fixed in 10% formaldehyde, dehydrated in alcohol with ascending concentrations, embedded in paraffin, cut with a microtome, and stained with haematoxylin-eosin. The sections were observed under an Olympus® CX41 OM at 10x, 20x and 40x magnification. The samples were photographed with the DFK 33UX262 camera coupled to the Olympus® U-CMAD3 adapter, using IC Capture 2.5 software. Samples for observation in TEM were prepared according to standard protocols. Semi-thin sections were cut with a glass knife and ultra-thin sections with a diamond knife. The observations were made on the JEOL 1200EX TEM.

RESULTS

PERI-IMPLANTITS

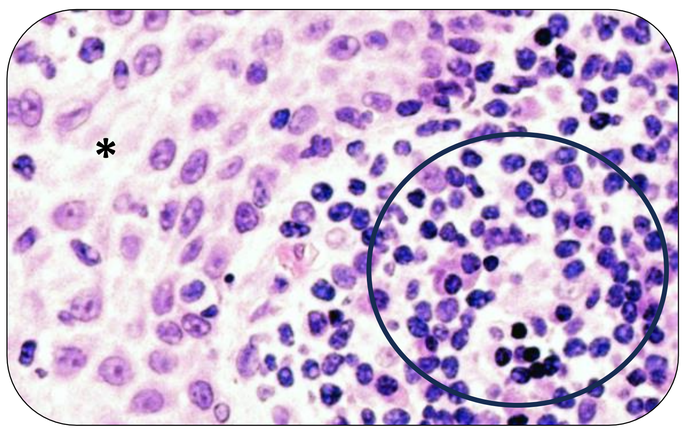

Fig. 1 – OM image of peri-implantitis: stratified epithelium (*) and intense inflammatory infiltrate with plasma cells, macrophages and lymphocytes with apparent morphological changes (O). 40x.

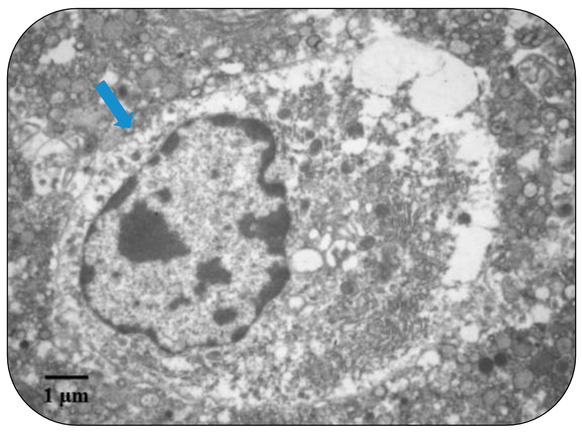

Fig. 2 - TEM image of peri-implantitis: macrophage (➡) in necrotic zone (condensed chromatin).

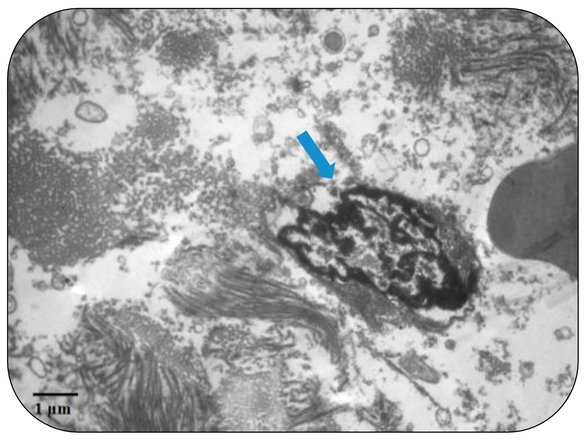

Fig. 3 - TEM image of peri-implantitis: lymphocyte degradation (➡).

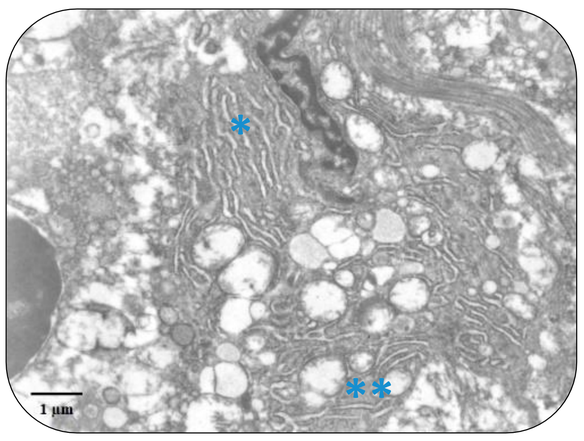

Fig. 4 - TEM image of peri-implantitis: endoplasmic reticulum (*) and mitochondria (**) of plasma cells.

PERIODONTITIS

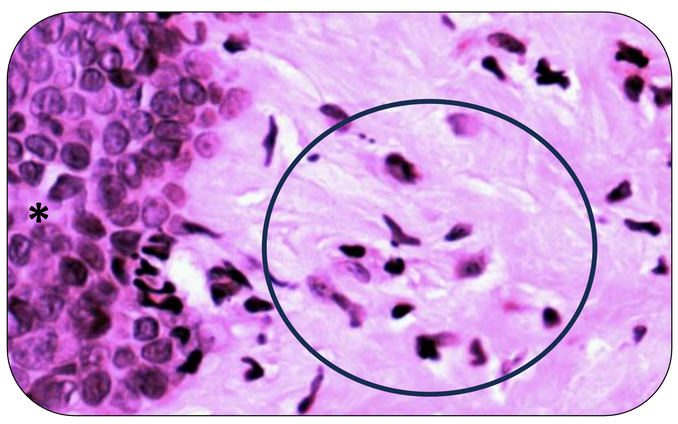

Fig. 5 - OM image of periodontitis: stratified epithelium (*) and inflammatory infiltrate with plasma cells, macrophages and lymphocytes (O). 40x.

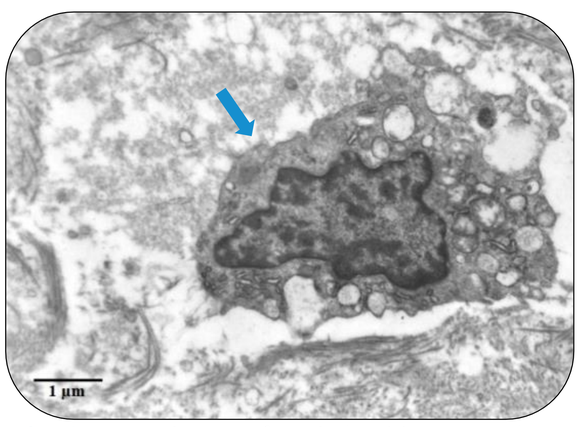

Fig. 6 - TEM image of periodontitis: macrophage (➡).

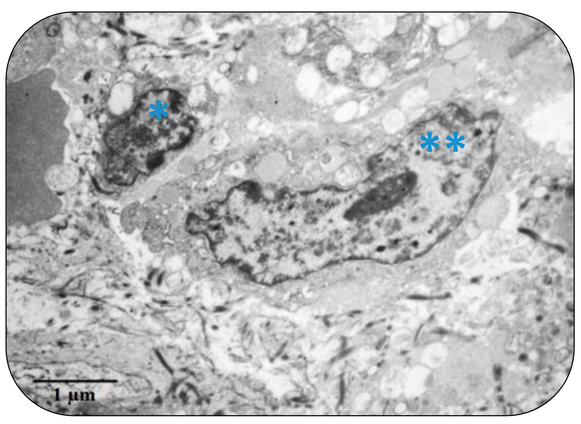

Fig. 7 - TEM image of periodontitis: lymphocyte (*) and macrophage (**) in the connective tissue.

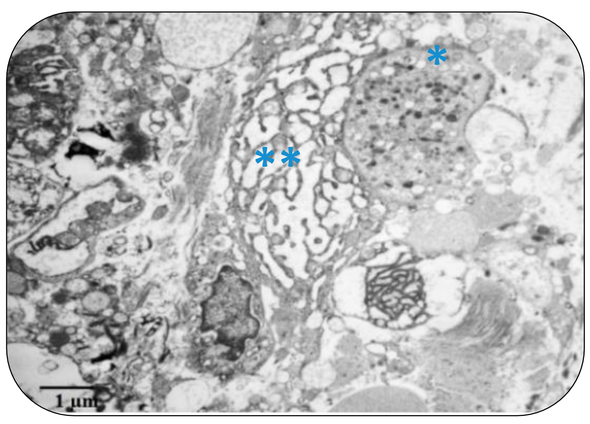

Fig. 8 - TEM image of periodontitis: plasma cell and granulocyte (*) in the connective tissue. Note the close contact between the cells and the dilated endoplasmic reticulum (**).

DISCUSSION AND CONCLUSIONS

Our histological and ultra-structural observations showed peri-implantitis areas with higher inflammatory cells than periodontitis areas. This was previously verified in the studies by Berglundh et al. (2011) and Schwarz et al. (2018); even in the studies by Carcuac & Berglundh (2014), twice as many inflammatory cells were counted in peri-implantitis compared to the number of inflammatory cells observed in periodontitis.

With regard to the type of inflammatory cells present in these pathologies, our first results are in line with the studies by Berglundh et al. (2011), Carcuac & Berglundh (2014) and Chaparro et al. (2020) where macrophages, lymphocytes and plasma cells were observed as cells present in both pathologies.

The literature reveals a predominance of plasma cells and lymphocytes in periodontitis, while neutrophils and macrophages tend to be more numerous in peri-implantitis (Berglundh et al., 2011).

Although we know that more studies are needed, particularly to determine the phenotype of the macrophages, our results showed a denser inflammatory infiltrate in the peri-implantitis samples compared to the periodontitis samples.

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