

From Contaminated Gloves and Nosocomial Endodontic Infections to Global Cardiometabolic Risk.

ABSTRACT

Apical periodontitis is inflammation affecting the periapical area of tooth. It can contribute to a low-grade systemic inflammation which might impact patient's systemic health. Bacteraemia can also occur following root canal treatment. Therefore, apical periodontitis and its treatment can be regarded a potential source for the dissemination of microbes, soluble microbial compounds, or active inflammatory mediators via periapical vasculature, resulting chronic systemic inflammation impacting patient's health. Studies have suggested a relationship between chronic apical periodontitis and risk of developing cardiovascular diseases, however the available evidence is limited.

The microbiota of apical periodontitis is extremely diverse. My previous studies have confirmed that the gloves worn by dentists during root canal treatment can get heavily contaminated with nosocomial pathogens transferred from patients' saliva or skin, affecting the clinical outcome. My research theme involving Endodontic host-microbiome interaction and their systemic impact is aimed to find this confirmatory link between nosocomial endodontic infections, and cardiometabolic risks.

My research group have carried out a longitudinal cohort study (**Bakhsh *et al.*, 2022**) investigating both; the microbiome and host interactions in apical periodontitis. The salivary, gloves, endodontic microbiota, and bacteraemia profile were characterised with high-throughput sequencing of the 16S rRNA gene (V1-V2 hypervariable region) performed using the Illumina MiSeq 300 platform. The pre-operative serum levels of inflammatory cardiovascular diseases biomarkers in apical periodontitis patients and healthy controls were analysed using Multiplex microbead immunoassay and ELISA. The impact of root canal retreatment and periapical surgery on the post-operative biomarker levels was also investigated. These levels were correlate with the pre-operative size of the radiolucency and treatment outcome. Furthermore, associations between nosocomial endodontic infections, bacteraemia and systemic biomarkers profile were also revealed.

We found that the microbiome of saliva, blood, gloves, and intracanal were diverse, however, common microbial taxa were identified between these different sources. The most abundant OTUs from intracanal samples included *Prevotella*, *Streptococcus*, *Staphylococcus* and *Actinomyces*, which were also recovered from the pre-operative blood samples, indicating that bacteraemia is not only associated with treatment but also with presence of the root canal infection. Nosocomial endodontic pathogens, *Staphylococcus* and *Cutibacterium*, were identified from gloves and inside the canal before obturation and also in the post-operative blood samples, suggesting the source of bacteraemia. The presence of apical periodontitis was seen to have caused an increase in the serum levels of certain biomarkers at baseline as compared to control. Certain bacteria in blood showed positive correlation with some serum inflammatory markers, indicating the impact of these endodontic bacteria in triggering the host inflammatory response. The successful endodontic treatment resulted in reducing these inflammatory markers levels; hence the systemic burden of apical periodontitis and associated cardiometabolic risk.

Bakhsh, A., Moyes, D., Proctor, G., Mannocci, F. & Niazi, S.A. (2022) The impact of apical periodontitis, non- surgical root canal retreatment and periapical surgery on serum inflammatory biomarkers. International Endodontic Journal, 00, 1–15. Available from: <https://doi.org/10.1111/iej.13786>