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PD098: Use of a new Er: YAG laser setting (Quantum Square Pulse) for managing peri-implantitis

M. Dorri¹, R. Mannan¹, A. Nobbs¹, I. Madden²

¹Bristol/United Kingdom, ²Ljubljana/Slovenia

Background & Aim: Peri-implantitis is a growing public health concern. The key to disease prevention and treatment is the management of biofilm formation on titanium implant surfaces. Conventional treatments include non-surgical plaque control and chemo-mechanical debridement. Surgical treatments include exposure of the implant in combination with chemo-mechanical debridement or removal of the implant. The laser ablation has recently been suggested as a less invasive approach for the management of peri-implantitis. However studies have shown unwanted thermal side effects and delayed healing. The Fotona Lightwalker system introduces a new patented Quantum Square Pulse (QSP) setting that avoids excessive heat production. Aims: To investigate the effectiveness of the Fotona Lightwalker QSP Er: YAG laser ablation for the management of biofilms on titanium discs.

Methods: Biofilms of Streptococcus gordonii (SG) and Enterococcus faecalis (EF) were grown individually on titanium discs, which were then disinfected on one side and the remaining side was irradiated with the Fotona Lightwalker Er:YAG laser. The discs were then sonicated in a sterile phosphate buffer saline solution and the colony forming units (CFU) were calculated. The discs were irradiated with one of three laser settings: QSP; Super Short Pulse (SSP) or Micro Short Pulse (MSP). Live-dead fluorescence staining was carried out for visualisation of living and dead bacteria.

Results: The CFUs were significantly lower following the application of the laser QSP ablation setting compared to the MSP and SSP settings, for both the SG and EF biofilms (p < 0.0001). There were particular challenges utilising the fluorescence staining as an additional result.

Conclusion: The QSP setting was significantly more effective than MSP and SSP settings in the reduction of the bacterial load from biofilms of S. gordonii and E. faecalis on titanium. The QSP setting may be a very positive treatment adjunct in the cleaning of a topographically challenging implant surface.