

Hard tissue response to argon plasma cleaning/sterilisation of customised titanium abutments versus 5-second steam cleaning: results of a 2-year post-loading follow-up from an explanatory randomised controlled trial in periodontally healthy patients

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Abstract

Purpose: The aim of this triple-blinded randomised controlled trial was to test if argon plasma cleaning/sterilisation of customised abutments can affect peri-implant marginal bone levels when compared to 5 seconds of steam cleaning.

Materials and methods: A total of 20 consecutive periodontally healthy patients requiring single implant-supported restorations in the maxillary premolar or anterior area were selected. All patients received a single implant. At abutment connection, customised abutments were randomly allocated to control (subjected only to usually adopted steam cleaning, CG) and test groups (subjected to plasma cleaning/sterilisation, TG). Abutments were screwed in at 32 Ncm, provisional restorations adapted and periapical radiographs were taken using customised film holders. Two weeks later, definitive restorations were placed. Patients were followed-up for 2 years post-loading. Outcome measures were implant/crown success, complications, periapical marginal bone level changes on periapical standardised radiographs, and microbiological analyses of the abutments after customisation and cleaning procedures but before connection. Comparisons between groups were performed by independent sample t tests (significance threshold of $P \leq 0.05$).

Results: No patient dropped out 2 years after loading. The presence of bacterial growth (staphylococci, including *Staphylococcus aureus*) was observed only on the CG abutments. No implant failed and no complications occurred. After 2 years of prosthetic loading, radiographic analysis revealed a statistically significantly higher mean bone loss for the CG group (mean difference 0.4 mm; 95% CI 0.08-0.73; $P = 0.018$).

Conclusions: This study suggests that removal of contaminants from titanium abutments using plasma of argon can allow for better bone level maintenance when compared to 5-second steam cleaning of titanium abutments. It is therefore important to use cleaned and sterilised customised abutments in patients.