CLINICAL ORAL IMPLANTS RESEARCH

PBR-161 Basic Research

Evaluation of local 14% doxycycline gel for bacterial decontamination on rough and smooth implant surfaces

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Background: There is no reliable evidence suggesting which could be the most effective interventions for treating peri-implantitis. Nonsurgical treatment has been shown to be effective in dealing with inflammatory lesions around implant without bone loss. However, when bone loss is noticed, surgical treatment may be needed. Nonetheless, before the surgical approaches can be effective, the contaminated implant surface has to been detoxified. Since peri-implantitis lesions are usually well demarcated, controlled delivery devices, originally developed for the therapy of localized periodontal infections, may be a successful means of treatment for peri-implantitis. Local antibiotics have been showed to be successful in peri-implant decontamination and, in particular, doxycycline has shown to be effective in improving clinical parameters. Anyway, to date no scientific data have validated the effectiveness of 14% locally delivered doxycycline gel in the decontamination of implant surfaces being them machined or rough.

Aim/Hypothesis: The aim of this study was to evaluate the antimicrobial effect of a locally delivered 14% doxycycline gel (Ligosan, Heraeus Kulzer, Hanau, Germany) applied on machined and rough implant surfaces in an experimental peri-implantitis model.

Material and Methods: Twenty-four smooth and twenty-four rough sterile 4.2x10 mm implants (i-Fix Uniqo, FMD Medical Devices, Rome, Italy) were placed into screwcap glasses that were then filled with 3½ cc of sterile agar in order to leave the last 2 mm of the apical portion of the implant exposed. The samples were divided into 4, equally divided, groups according to surface and treatment modality: rough test, rough negative control, smooth test, smooth negative control. After agar gelification, the exposed portion of the implant was inoculated with 10 microliters of S sanguinis transported in tryptic soy broth. The glasses were then placed in an incubator with the atmosphere of 5% CO2 at 37 Celsius degrees for 24 hours to allow the bacteria to grow. After 24 hours, the test groups were treated with the doxycycline (Ligosan, Heraeus Kulzer, Hanau, Germany) injecting the gel circumferentially over the exposed surface of the implant for 3 minutes. The gel was then mechanically removed with a sterile excavator and all the implants were took off from the screwcap glasses and placed in microtubes containing 600 cc of tryptic soy broth and vortexed to allow the bacteria to detach from the surface. The samples were then diluted 1:100 and plated on tryptic soy agar plates. The plates were placed in an incubator with the atmosphere of 5% CO2 at 37 Celsius degrees for 48 hours. After incubation, the colony forming units were eye-counted and recorded. The statistical analysis was done through independent samples T-test.

Results: Our study shows that the use of a 14% doxycycline gel, without considering the differences of surfaces, minimize CFU counts compared to the control groups, with the difference being statistically significant. However, when comparing the surfaces groups separately, although the reduction of CFUs is visibly evident between the rough groups, the difference doesn't reach statistically significance. The reduction of CFUs between the smooth groups (control and test) is more marked than in the rough groups, with the difference being statistically significant ($P < 0.05$).

Conclusions and Clinical Implications: The use of 14% doxycycline gel in implant surface decontamination was efficacious in this in-vitro study regardless the implant surface. Adjunctive use of locally delivered 14% doxycycline gel is a viable option in the management of peri-implantitis and peri-implant mucositis considering its efficacy in reducing bacterial colonization. Further studies with larger samples size should be carried out to validate and strengthen our conclusions.