CLINICAL ORAL IMPLANTS RESEARCH

Posterior jaws rehabilitated with partial prostheses supported by 4x4 mm or by longer implants: a 4-month loading randomised controlled trial

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Background: Short dental implants are used as an alternative to longer implants in purposely augmented bone to support fixed prostheses in the rehabilitation of patients with atrophic jaws. There are a few randomised controlled trials (RCTs) comparing the effectiveness of dental prostheses supported by short implants with those supported by longer implants placed in augmented bone. Results of these ongoing trials having follow-ups up to 5-year post-loading, suggest that 5 to 8 mm long implants can be a viable, if not a better, alternative to augmentation procedures, especially in posterior mandibles. More recent clinical questions are whether to use short implants also in those situation were longer implants could have been used and how short could be an implant still able to provide a good long-term outcome.

Aim/Hypothesis: To evaluate whether 4x4 mm dental implants could be an alternative to implants at least 8.5 mm long placed in posterior jaws in the presence of adequate bone volumes.

Material and methods: One-hundred-fifty patients with posterior (premolar and molar areas) mandibles having at least 12.5 mm bone height above the mandibular canal or 11.5 mm below the maxillary sinus, were randomised according to a parallel group design to receive one to three 4 mm long implants or one to three at least 8.5 mm long implants at 3 centres. All implants (TwinKon Universal SA2, Global D, Lyon, France) had a diameter of 4 mm. Implants were loaded after 4 months with definitive screw-retained prostheses. Patients were followed to 4-month post-loading and outcome measures were: prosthesis and implant failures, any complication and peri-implant marginal bone level changes. All data analysis was carried out according to a pre-established analysis plan. A biostatistician with expertise in dentistry analysed the data, without knowing the group codes. The patient was the statistical unit of the analyses. All statistical comparisons were conducted at the 0.05 level of significance.

Results: No patients dropped-out. Three patients experienced the early failures of one 4 mm short implant each vs. two patients who lost one long implant each (difference in proportion = 1; CI 95% 0.034 to 7.2; $P = 0.50$). Consequently, two prostheses in each group could not be delivered as planned (difference in proportion = 0; CI 95% 0 to 4.8; $P = 0.69$), and one patient from each group is still waiting to have their prostheses delivered. Three short implant patients experienced three complications vs. two long implant patients (difference in proportion = 1; CI 95% 0.034 to 7.2; $P = 0.50$). There were no statistically significant differences in prosthesis failures, implant failures and complications. Patients with short implants lost on average 0.378 mm of peri-implant bone at 4-month and patients with longer mandibular implants lost 0.416 mm. There were not statistically significant differences in bone level changes up to 4-month (mean difference 0.038 mm, 95% CI −0.118 to 0.041; $P = 0.274$).

Conclusions and clinical implications: Four-month after loading 4x4 mm implants achieved similar results as 8.5x4 mm long or longer implants in posterior jaws, however 5 to 10 years post-loading data are necessary before making reliable recommendations.