

The influence of thin gingival tissues on crestal bone stability around implants with platform switching. A 1- year pilot investigation



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Introduction

Evidence from clinical and animal studies suggests that platform switching concept may reduce early crestal bone loss around implants, as implant-abutment interface is shifted away from bone in horizontal dimension. Vela-Nebot et al. in a controlled clinical trial has shown that indeed implants with platform switching experience significantly lower amounts of marginal bone loss, compared to implants with a regular connection (1). In addition, Norton has published 3-year retrospective analysis showing very favorable clinical performance of Astra Tech (Mölnådal, Sweden) implants with microgap being in close proximity to bone (2). However, some studies indicate that thin gingival tissues may cause marginal bone loss. Classical animal study by Berglundh and Lindhe provides sufficient evidence, at least, in level of histological trials, that tissue thickness may play a significant role in crestal bone stability (3). Already, there is some clinical evidence, supporting latter animal experiments (4). Therefore, it is not clear if the bone will be stable around implants with platform switching, placed in thin gingival tissues.

Objective

The aim of the study was to evaluate the influence of thin gingival tissue on crestal bone stability around implants with platform switching.

Materials and Methods

Ten 3i (Biomet, USA) implants with platform switching and 10 Prodigy (BioHorizons, AI, USA) implants with traditional implant-abutment connection were placed in 6 patients, using non-submerged approach. The flap was raised in two stages: (a) palatal-lingual flap was raised and mucosal thickness was measured with periodontal probe (Fig. 2); (b) buccal flap was raised to expose implant site. Implants were positioned according to manufacturers recommendations.

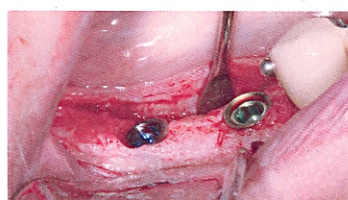
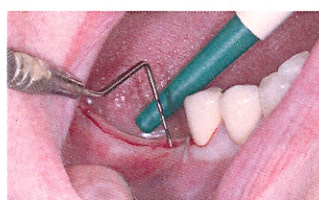


Fig 1. Tissue thickness measurement

Fig 2. Test and control implants

Fig 3. Healing abutments

After appropriate healing time and prosthetic manipulations, implants were restored with splited 2 unit metal-ceramic fixed partial dentures, connecting both types of implants. Radiographic images were taken after implant placement, before prosthetic treatment and 1-year follow-up. Radiological evaluation and measurements were performed using RVG Windows Trophy 5.0 software measurement program with a magnification (x 3) by one examiner. Two images were selected for calculation of crestal bone changes; (1) after implant placement and (2) of implants after 1 year post reconstruction. Before calculation of the crestal bone changes, the calibration of RVG images was performed, using calibration program in Trophy RVG software. Statistical analysis: descriptives, paired samples T-test, one-way ANOVA test were done with SPSS ver. 14 (SPSS Inc., Chicago, IL) in order to compare means of crestal bone loss between groups ($P < 0.05$).

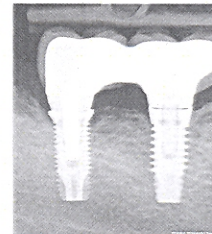
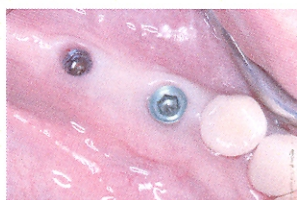


Fig 4. Peri-implant tissues

Fig 5. Implant-supported splinted crowns

Fig 6. Bone loss around implants

Results

Totally, 20 implants (10 test and 10 control) were placed. A pair of implants (test and control) was considered as one case. All implants at a time of evaluation were successfully integrated. Mean bone loss around 3i implants was $1.58 \text{ mm} \pm 0.16$, while Biohorizons implants underwent $1.61 \text{ mm} \pm 0.24$ of bone loss. T-test revealed no statistical difference between tested implants. Overall, the implant success rate after 1 year of function in test and control groups was 100%. No prosthetic complications were recorded at follow-up visits.

Discussion

The present study focused on the influence of initial gingival thickness on crestal bone changes around non-submerged implants with different implant-abutment interface after 1 year follow-up. The main observation was that if thin gingival tissues were present, platform switching concept did not prevent crestal bone loss. All implants in test group with initially thin tissues overcame additional bone loss both mesially and distally. The bone loss around control implants was expected, as placement of microgap and polished collar at crestal level can cause marginal bone loss. The results of current clinical experiment are in agreement with an animal study, which showed the potential of the thin tissues to cause crestal bone loss in process of biologic width formation (3). Our observations contrary to opinion that horizontal shifting of microgap always can prevent apical migration of bone (1). The explanation of this disagreement might be the lack of registration of initial mucosal thickness at a time of implant placement in previous studies.

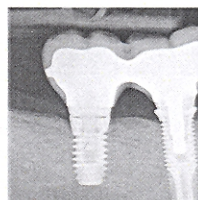
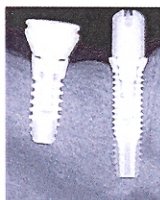
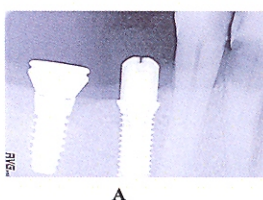


Fig 7. Bone loss (A - after placement, B - before reconstruction, C - after 1 year)

References

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Conclusions

Within the limitation of the present study it can be concluded, that platform switching may not preserve marginal bone level, if positioned in thin tissues. Of course the sample size of the implants and patients preclude any definitive conclusion drawing. This report can be interpreted as a case series, which require further investigation. Furthermore, the measurement of gingival thickness should be mandatory in any experiment of marginal bone loss. Another point could be thickening of thin tissues before implant placement.