Clinical study with gradually anodized implants restored with two-piece anodized abutments – preliminary results

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Background and Aim

Surface chemistry and topography of the implant-abutment complex play a key role in implant osseointegration and proper adhesion of the soft tissue to the restoration. To optimize tissue integration at every level, novel anodized implant and abutment surfaces were developed. The implant surface has a gradual change in topography designed to promote early osseointegration and to support stable marginal bone, while the new surface at the tissue-level base promotes undisturbed mucointegration (Figure 1). This prospective study aims to evaluate the clinical performance of the gradually anodized implant surface and the smooth anodized abutment surface after 3 years of function. The primary outcome is soft tissue health, thickness and stability evaluated from implant insertion to the 3-year follow-up. Here we present the clinical outcomes collected by final prosthesis delivery.

Methods and Materials

Patients requiring one single tooth replacement in the premolar or molar area in either jaw were enrolled in this study. Variable thread tappered implants with gradual anodized surface (NobelActive TiUltra, Nobel Biocare AB, Gothenburg, Sweden) were placed in healed sites and on an On1 base with anodized surface (On1 BaseXea; Nobel Biocare AB) was immediately attached to the implant, and subsequently connected to an On1 healing cap. Digital impressions were taken on the day of surgery. Middle panel: Prosthetic finalization according to a fully digital workflow with the On1 IOS (intraoral scannable) healing cap. Right panel: final prosthesis in situ.

Results

- 61 patients (30 females, 31 males; mean age 51.4 ± 12.6 years) enrolled in the study.
- 35 implants were placed in the mandible and 26 in the maxilla. Most implants (n=39; 64%) were placed in hard bone (quality 1 and 2). The final mean insertion torque was 58.2 ± 12.5 Ncm (n=61).
- The prosthetic delivery visit on average took place 16.4 ± 7.3 weeks after implant placement and was completed by 60 patients (60 implants).

Outcome assessment:

- Healthy soft tissue demonstrated by improved keratinized mucosa status (figure 2), low sulcus bleeding index: 51 sites (85%) showed no bleeding when a periodontal probe was passed along the gingival margin adjacent to the implant, and healthy gingiva with 56 sites (93%) showing no signs of inflammation surrounding the crown. 35 sites (58%) had no plaque, while 20 and 5 sites showed minimal and moderate plaque accumulation, respectively.
- Excellent implant survival rate of 100% and success rate of 96.6%.
- Very high patient satisfaction with function and esthetics (mean score of 9.9 and 9.8, respectively, on a scale of 0 to 10) and improved oral-related quality of life (p=0.0420) from pretreatment to final prosthesis delivery.

Conclusion

Within the limitations of the short follow-up, 100% implant survival combined with improvement in keratinized mucosa status indicate that the novel anodized surfaces at implants and abutments are safe and promote excellent peri-implant soft tissue health.

References


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Clinical Case

Figure 1
Implant system with the newly engineered surfaces (left) and low magnification SEM images of the surfaces at indicated regions. The image on the left side has been updated since EAO presentation to reflect the actual system used in this study.

Figure 2
Improvement in keratinized mucosa status from implant insertion to prosthetic delivery.

Figure 3
Left panel: Occlusal view of the soft tissue healing and maturation 10 weeks after the surgery. Middle panel: Prosthetic finalization according to a fully digital workflow with the On1 IOS (intraoral scannable) healing cap. Right panel: final prosthesis in situ.

Figure 4
Left panel: Soft tissue health and quality on the day of the prosthetic delivery. Note the ideal soft tissue thickness and quality necessary to create optimal conditions to achieve an excellent esthetic outcome and long term stability. Right panel: Clinical view at the 6-month follow-up visit demonstrating the biological and esthetic integration.