

Immediate Loading of Implants: Influence of Surface Characteristics

Thomas Hanser¹, Jörg Neugebauer², Fouad Khoury¹

¹ Clinic Schloss Schellenstein, Olsberg, Germany; ² University to Cologne, Germany



Introduction

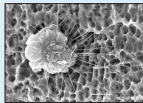
Recent clinical studies indicate that an implant with a roughened surface may be loaded sooner than traditional healing protocols have recommended. The presentation reports the results of a study evaluating the clinical performance of immediate loading of dental implants with a porous microstructured grit blasted/acid etched/neutralized surface in different treatment modalities.

Materials and Methods

Between 1999 and 2003, 273 XiVE® screw-type implants were consecutively placed with a placement torque of at least 35 Ncm in 82 patients and immediately loaded. 224 were placed in the mandible and 49 in the maxilla. 152 implants were inserted in the interforaminal area of the mandible and restored with a bar and overdenture, further 20 implants in the same region were restored with bridges and also functionally loaded. 101 implants mainly in the esthetic area of the maxilla and mandible were immediately restored but without functional loading (out of occlusion), for single-tooth or bridge restoration.



⊗ The XiVE® screw-type implant with the grit blasted/acid etched/neutralized FRIADENT® CELLplus surface in different diameters (D 3.0, 3.4, 3.8, 4.5, 5.5) and the colour-coded XiVE® TempBase as an implant holder, placement head and temporary abutment for provisional restorations.



⊗ The three-dimensional porous microstructured FRIADENT® CELLplus surface allows accelerate attachment of osteoblasts leading to intensive bone formation in the early stages of osseointegration (5 to 25 days after implant placement) due to an improved wetting behavior.

Results

After a follow-up of 12 to 60 months (average 36.3 months) 3 implants failed in the edentulous mandible during the first 2 months of loading. All other implants are still in function with acceptable peri-implant parameters. Bone loss > 3 mm was observed in 6 implants placed in the edentulous mandible and in 1 implant inserted in the maxilla. The 101 non-functionally loaded implants osseointegrated and were restored with a functionally loaded ceramic crown or screw-retained bridge 3 to 4 months after implant placement. Peri-implant probing depth and bone loss showed no significant difference between functional and non-functional implant loading.

Discussion

The data and the experience described of this 5-year analysis indicate that immediate loading beyond the proven and documented standard of splinting four implants in the anterior mandible can be a predictable technique for shortening dental rehabilitation time with relevant satisfaction for patients, in cases of implants with a high primary stability, using appropriate surgical and restorative techniques. The specific surface roughness on the endosseous section of the implant seems to enhance the regeneration potential at the interface, thus improving clinical implant osseointegration, allowing accelerate implant protocols.

Single Tooth



At implant placement a torque of 35 Ncm should be ensured for sufficient primary stability for immediate loading.



XiVE® TempBase screw-retained with the implant after flap repositioning.



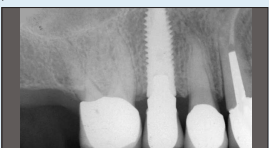
TempBase cap on XiVE® TempBase. The prefabricated sleeve is filled up with composite and positioned over the cap intraplastically.



Non-functionally loaded provisional restoration (out of occlusion) fixed with provisional cement on XiVE® TempBase.



Radiograph taken immediately after implant placement and provisional restoration.



Radiograph of the final restoration taken one year after implant placement.

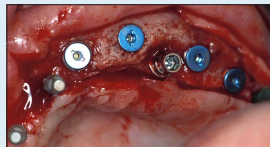
Complex Restoration



Four interim implants in the maxilla for a fixed temporary anterior bridge in connection with a block augmentation with iliac bone.



Four months after the augmentation one interim implant is movable and has to be removed.



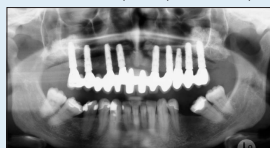
XiVE® implant inserted in place of the lost interim implant for immediate functional loading in connection with the remaining interim implants.



Radiograph taken immediately after implant insertion.

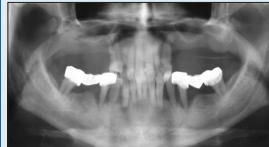


The existing interim restoration can easily be altered using a chairside fabricated composite cap for the new implant.

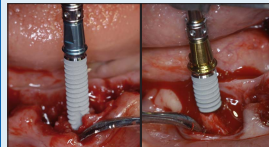


Radiograph of the final restoration one year after placement. The functionally loaded XiVE® implant is still in function and used.

Temporary Restoration



Panoramic radiograph showing the presurgical finding.



Insertion of XiVE® CELLplus implants without irrigation inducing direct blood contact on the surface for accelerate healing process.



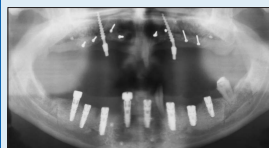
Impression taken immediately after implant placement using the pick-up technique.



Functionally loaded cemented temporary bridge in the mandible.



Radiograph taken immediately after temporary treatment.

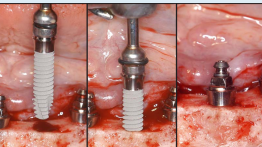


Radiograph taken on the day of definitive implant placement and augmentation 5 weeks after the first surgery. The immediately loaded implants are still in function.

Edentulous Mandible



Clinical situation of the edentulous mandible before implant insertion.



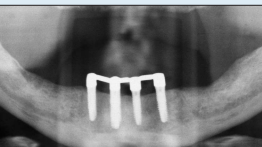
Insertion of the XiVE® TG CELLplus implants with a structural-polished gingival collar and endosseous design analogous to XiVE® implant.



The prosthesis is used for the impression. For the master model the transfer coping is mounted to the analog and resealed.



The clinical situation of the bar on four XiVE® TG implants. The denture is fixed with three matrices on the bar on the day of surgery.

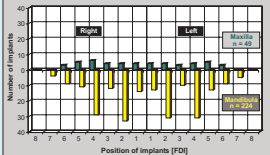


Panoramic radiograph after three months at first time bar removal and check of osseointegration.

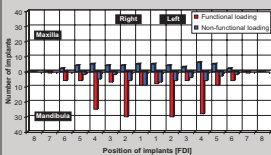


Healthy soft tissue after three months with stable implants in place. Easy hygiene due to transgingival placement of implant abutment connection.

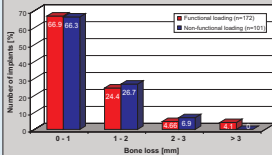
Number and position of implants



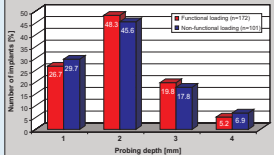
Kind of loading



Peri-implant bone loss



Peri-implant probing depth



References

Gehrke P, Neugebauer J. Implant surface design: using biotechnology to enhance osseointegration. Interview. Dent Implantol Update 2003;14(8):57-64.
 Novais AS, Papalexidou V, Grisi MF, Souza SS, Taba M, Kajiwara JK. Influence of implant microstructure on the osseointegration of immediately implants placed in periodontally infected sites. Clin Oral Implants Res 2004;15(1):34-43.
 Rupp F, Schneider L, Reibeln D, Axmann D, Geis-Carstoffer J. Roughness induced dynamic changes of wettability of acid etched titanium implant modifications. Biomaterials 2004;25(17-5):1429-35.



European Association for Osseointegration
 13th Annual Scientific Meeting
 Paris, France
 September 16-19, 2004

Dr. Thomas Hanser
 Privatambulanz Schloss Schellenstein
 Am Schellenstein 1, 56909 Olsberg, Germany
 Phone: +49 05297 910
 E-Mail: Hanser@Schellenstein.de