

Immediate Anterior Zirconia Implant: three years follow-up

High-Tech Aesthetics

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A lost single maxillary anterior, unless replaced at an early stage, will sooner or later result in alveolar atrophy. This can cause serious problems from both a functional as well as an aesthetic point of view. When the root of a tooth is lost and the alveolar socket is nearly undamaged, it is important to prevent the collapse of the alveolar bone and the surrounding soft tissues by immediately placing a dental implant.

The material of choice for dental implants is titanium. The grey color of titanium might present an aesthetic problem in the maxillary anterior region when the soft-tissue status and aesthetic parameters are unfavourable. Tooth-coloured implant materials that improve the aesthetic appearance while at the same time being highly biocompatible and withstanding the forces present in the oral cavity might be a solution. Today's material of choice for dental implants with these properties is zirconia.

Objective

The objective of this case report is to evaluate the clinical outcome three years after immediate placement of a cylindrical zirconia 3Y-TZP dental implant with a rough surface and simultaneous use of bone-augmentation biomaterials in the anterior maxilla.

Materials and methods

A flapless surgical procedure was used for the extraction of a maxillary left central incisor fractured due to trauma, followed by immediate placement of a one-piece roughened-surface cylindrical zirconia implant (zit-z, ziterion, Uffenheim, Germany) in the undamaged socket and simultaneous use of a bone-augmentation biomaterial (Bio-Oss, Geistlich, Wolhusen, Switzerland) to fill voids and gaps between the implant surface and the surrounding alveolar bone on the coronal aspect. A zirconia all-ceramic crown was delivered after a healing period of six months under unloaded and protected conditions.

Case report



Fig. 1 The traumatized upper left central incisors 21 and 11.



Fig. 2 A horizontal root-level fracture on tooth 21 was detected.



Fig. 3 Root of tooth 21 scheduled for extraction.



Fig. 4 Careful extraction of the remaining part of the root.



Fig. 5 The alveolar socket was large. No socket defect and no loss of buccal bone were observed. The direction of the preparation was moved toward the palatal side following the golden preparation rules for immediate implant placement.



Fig. 6 An immediate 3Y-TZP zirconia dental implant (zit-z, ziterion, 13 mm long, 4 mm in diameter) was inserted in the prepared site at a torque of 35 N.



Fig. 7 The remaining bone defect was filled with a bone replacement material (Bio-Oss, Geistlich). The biomaterial was overfilled to the most coronal part of the polished neck of the implant. No protective membrane was used in this clinical situation.



Fig. 8 The mucosa was carefully fitted around the neck of the implant using sutures, which were removed after ten days.

Fig. 9 Radiographs were taken immediately after implant placement. Note the condensed biomaterials at the coronal aspect and the bone morphology at the mid-apical aspect of the implant. The crown of the extracted tooth was modified to serve as a provisional restoration protecting the implant during the healing period.



Fig. 10 Radiograph at six months. Note the perfect bone healing in the mid-apical part. With one-piece implants, special care must be taken to avoid premature loading.



Fig. 11 The implant has a highly polished neck of 1.5 mm, allowing a tight connection of the circular collagen fibres and epithelium of the mucosa. Note the creeping attachment on the zirconia surface, which confirms the findings of several studies about the excellent affinity of the soft tissue and a certain degree of direct attachment to a zirconia surface.



Fig. 12 Occlusal view of the pentagonal connector of a zit-z zirconia implant six months after implant placement.



Fig. 13 A conventional impression of the implant (open tray technique) was taken. A CAD/CAM zirconia framework (Pro-cera, Nobel Biocare, Göteborg, Sweden) was checked against the implant replica to evaluate its fit and marginal integrity.



Fig. 14 Radiographic examination of the adaptation of the zirconia coping on the pentagonal connector of the zirconia implant.



Fig. 15 Ceramic build-up layering and final zirconia crown.

Discussion

The clinical images demonstrate that all-ceramic single-tooth restorations are characterized by appealing aesthetic results, high levels of biocompatibility and an excellent clinical aesthetic success rate. While zirconia implants have so far been used mostly experimentally and only few clinical cases are presented in the literature, the biocompatibility of zirconia seems very similar to that of titanium, and the restorative

structures appear capable of withstanding occlusal forces over a long period. The zit-z implant design is based on a one-piece toughened zirconia implant. The implant is transmucosal and therefore exposed to the oral cavity immediately after placement. This necessitates special attention to prevent occlusal loads during the healing period in order to protect the bone apposition process to the implant surface.



Figs. 16 to 19 Pink aesthetics and emergence profile: The colour of the overlaying oral mucosa is an “ideal pink”. The highly polished ceramic surface of the transmucosal part of the zirconia implant (coronal part of the abutment) contributes toward a healthy gingival margin. The ideal placement of the implant palatally to the adjacent teeth and the perfect vertical and horizontal position of the implant’s prosthetic neck work in favour of soft-tissue healing and an ideal emergence profile – both aesthetic prerequisites.



Figs. 20 to 23 An excellent aesthetic and functional result was achieved with the zirconia crown. No clinically discernible bone resorption or soft-tissue recession was observed after two years.



Fig. 24 Radiographs were taken immediately after implant placement, at the moment of the final evaluation and at the periodical clinical controls.



Fig. 25 Clinical situation at three years follow-up.



Fig. 26 Radiographic examination at three years follow-up. Bone stability directly at the 1.5 mm polished neck limit.

Conclusion

The preliminary results of this clinical report show that cylindrical zirconia implants with roughened surfaces placed simultaneously with bone-augmentation materials can be a viable aesthetic alternative for immediate tooth replacement in the anterior maxilla. This approach will maintain the function and volume of the alveolar bone, as well as preserving

the contour of the mucosal soft tissues. Further research is needed to evaluate the long-term success rates for this technique. The treatment method presented would offer an optimal foundation for aesthetic restorations of anterior missing teeth using zirconia implants and all-ceramic zirconia crowns or bridges. ■

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