Multiple restoration with two-piece zirconia implants

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Literature

In the early days of implant dentistry there was a strong focus on osseointegration to make sure that the implants stayed in the bone for a long time. In recent years, the focus has shifted to soft-tissue integration and different prosthetic components to realise long-term aesthetic results with healthy gingiva and stable tissue levels. However, the increased complexity of the solutions and the phenomenon of peri-implantitis has created a lot of challenges for current systems, jeopardising their long-term success. The implant system inserted in following clinical case (Patent™ Dental Implant System, Zircon Medical) has a patented surface and is significantly rougher than other systems. Also, it's integrated abutment eliminates a micro-gap and the high-tech glass fibre post offers effective retention and load distribution for the superstructure. In addition, the implant system's success is backed by clinical long-term follow-up.[1] Studies indicate that the survival rates of ceramic implants are on par with titanium implants, and that stable marginal bone levels as well as soft-tissue integration are superior to titanium implants.[2, 3] These properties lead to complete biointegration of the implant system.

Initial situation

A 59-year-old male patient with partial edentulism asked for dental implants. Teeth had been extracted more than one year prior to implant placement due to periodontitis. Implants were planned in regions 15, 24, 25, 26 and 36. Bone quality was D3 in region 24–26 and D2/D3 in region 15 and 36. The implant selection is presented in Table 1.

Pretreatment

Teeth were extracted and socket preservations with PRGF (plasma rich in-growth factors) were carried out. No further bone augmentation procedures were performed. Gentle periodontal treatment was performed successfully on the remaining teeth. A titanium stimulation test was done, which revealed significant inflammatory values with regard to titanium particles. As a result, a metal-free solution (Patent™, Zircon Medical) was selected for the patient. A treatment plan was then developed and surgical guides were fabricated to allow precise flapless surgery.

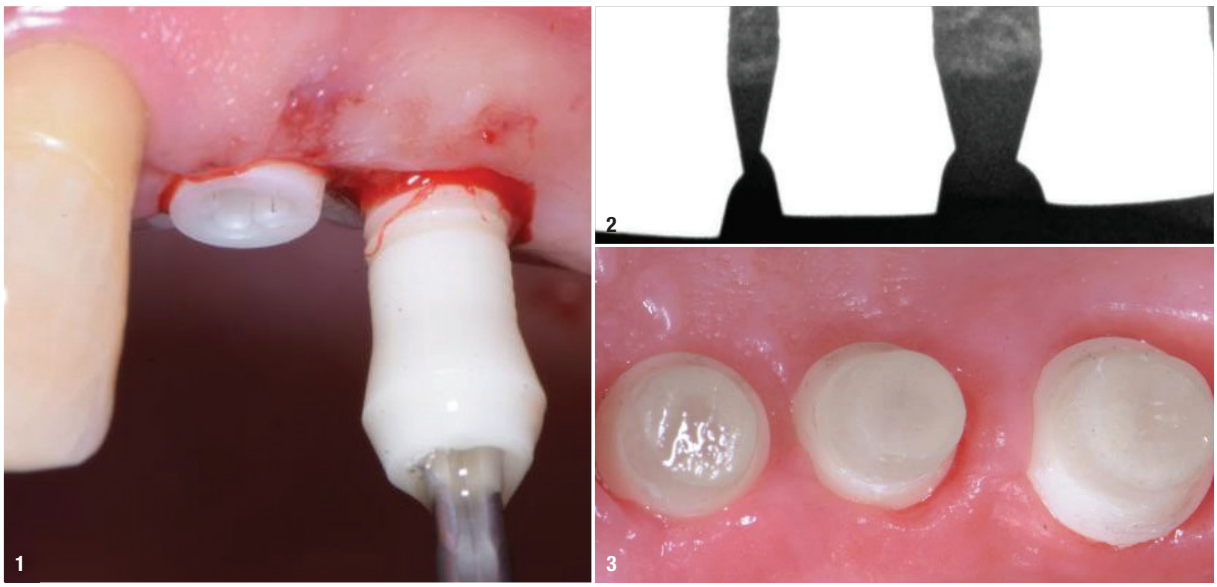


Fig. 1: Implant insertion. The Patent™ implant has a hydrophilic surface. **Fig. 2:** Control radiograph at the time of surgery. **Fig. 3:** Glass fibre posts cemented and prepared after a healing period of three months. Note the healthy soft tissues.

Position	Implant diameter (mm)	Prosthetic platform diameter (mm)	Implant length (mm)
4	4.1	5.2	11
24	4.1	5.2	13
25	4.1	5.2	13
26	4.5	6.2	9
36	4.5	6.2	13

Table 1: Implant sizes for the different positions.

Surgical procedure

With the help of surgical guides, flapless surgery could be performed. First, osteotomies were prepared, in which the implants were then inserted without complications. Insertion torques were between 22 and 35 Ncm. The surface of the implant shows high hydrophilicity (Fig. 1). It is crucial to place the implant in the right vertical position in relation to the soft tissue (equigingival) to facilitate the prosthetic procedure. A control radiograph was taken at the time of surgery (Fig. 2).

Prosthetic reconstruction

After a healing period of three months, the prosthetic work commenced. The glass fibre posts were cemented and prepared in the same way that conventional crown and bridge preparations are (Fig. 3). A conventional impression was taken and sent to the dental laboratory, which prepared the models in the same way they would for any conventional crown and bridge works (Fig. 4). No impression posts or replicas are needed. All restorations were made of zirconia and the occlusal table was made of acrylic. The flexibility of the acrylic allows for a more favourable stress absorption of the masticatory forces (Fig. 5). Instead of three individual crowns, a bridge on three implants in region 24–26 was fabricated to distribute the occlusal loads more evenly. The antagonist to the implant in position 26 is an implant as well. Since the implant in position 26 was only 9 mm in length and 4.5 mm in diameter, it was decided to realise a bridge restoration in order to distribute the load over the three implants (Figs. 6–9). A control radiograph was taken after the final cementation (Fig. 10). The single-tooth implant in position 15 can

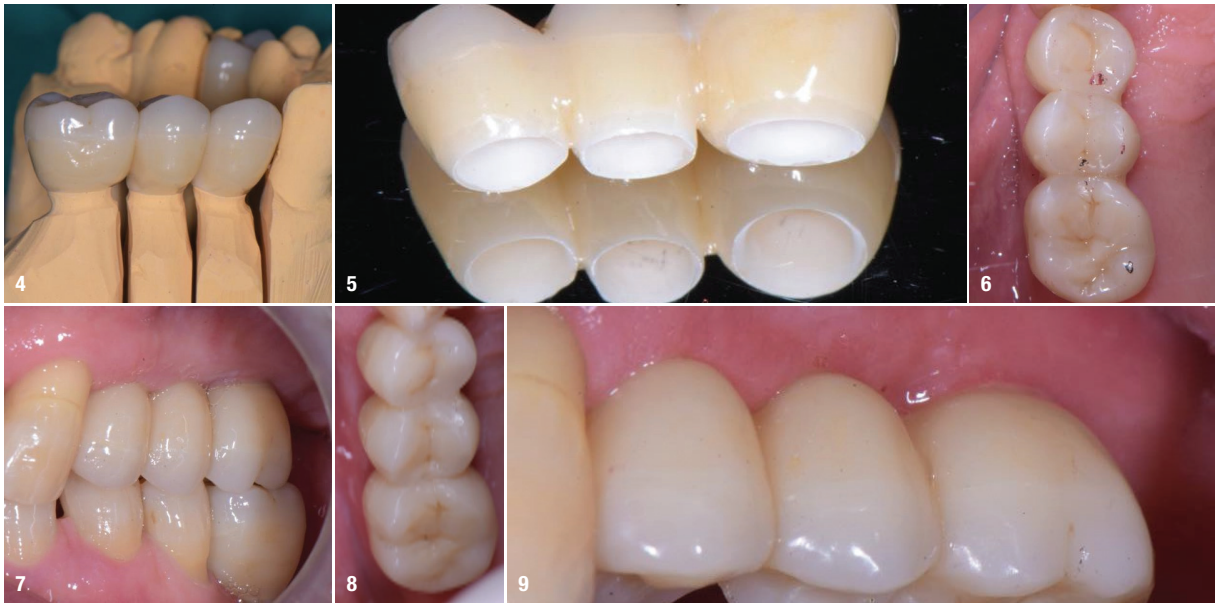
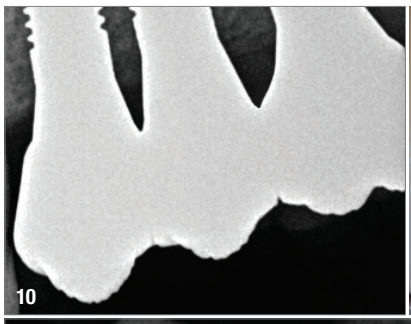
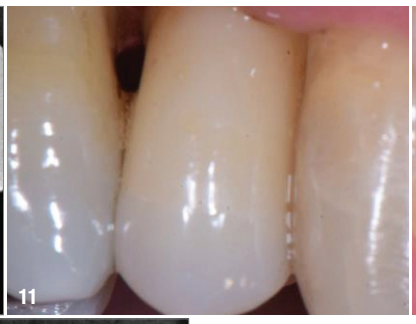
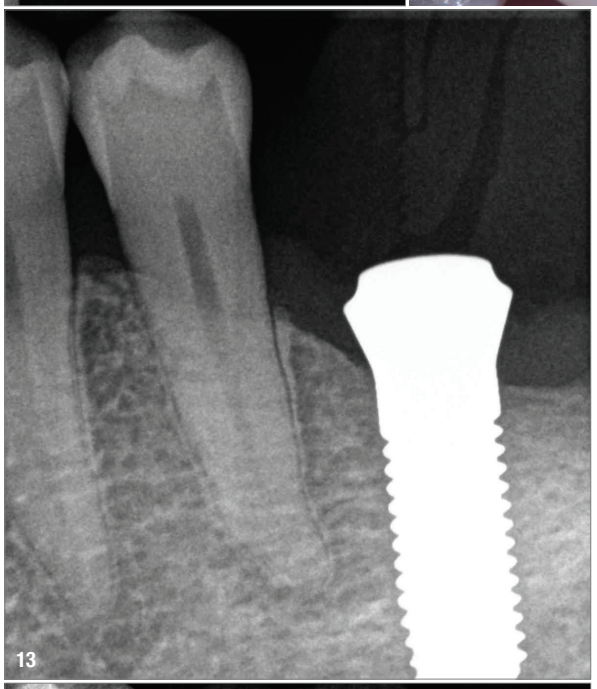


Fig. 4: The laboratory works with a plaster model for crowns and bridges. No impression posts or replicas are needed. **Fig. 5:** The restoration is made from zirconia with the occlusal table made in acrylic to absorb the masticatory loads in a favourable way. **Fig. 6:** Occlusion is checked. **Fig. 7:** Vestibular view. **Fig. 8:** Occlusal view. **Fig. 9:** Final result at the time of delivery.







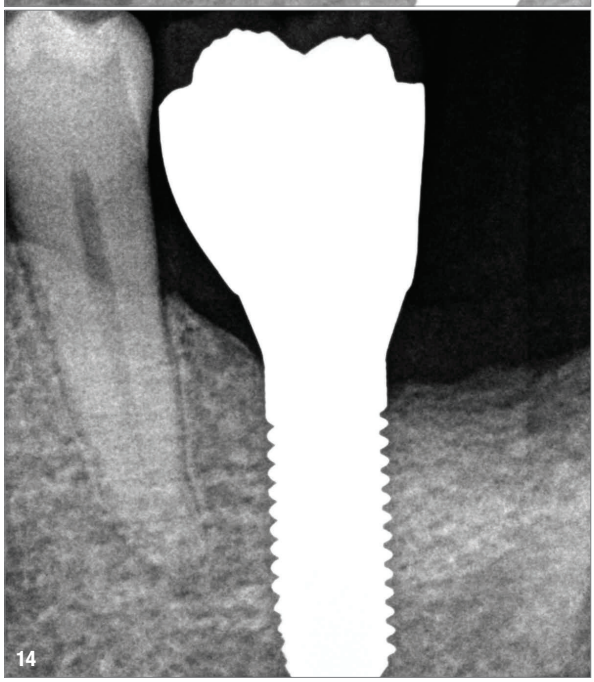


Fig. 10: Control radiograph after prosthetic delivery. Note the stable marginal bone levels. **Fig. 11:** Single-tooth implant in position 15. **Fig. 12:** Single-tooth implant in position 36. **Figs. 13&14:** Control radiograph at the time of implant placement and at the time of prosthetic delivery. Very stable marginal bone levels.

be seen in Figure 11. In region 36, another single-tooth implant was placed (Fig. 12). The implant was slightly exposed after insertion. However, the soft tissue is expected to grow to some extent over time. The control radiographs show very stable marginal bone levels (Figs. 13 & 14).

Conclusion

The implant system used in the here described case offers a high degree of prosthetic flexibility in combination with the glass fibre post. Single units or bridge constructions can be realised in a very efficient way using conventional dentistry techniques. Thanks to the roughness of the implant surface, complete biointegration of the machined transmucosal part with the surrounding bone can be achieved. In combination with the microgap-less design, very stable tissue levels are achieved (Figs. 3, 10, 13 & 14). The implant system has shown survival rates that are on par with titanium, as well as a favourable soft-tissue interaction.

about the author

Dr Gernot Obermair is an Italy-based dentist who specialises in ceramic implantology and three-dimensional guided surgery. He currently runs the private practice Happy Implant – Dental Implant Center in Bozen in Italy. In addition, he is a member of the International Society of Metal Free Implantology (ISMI).

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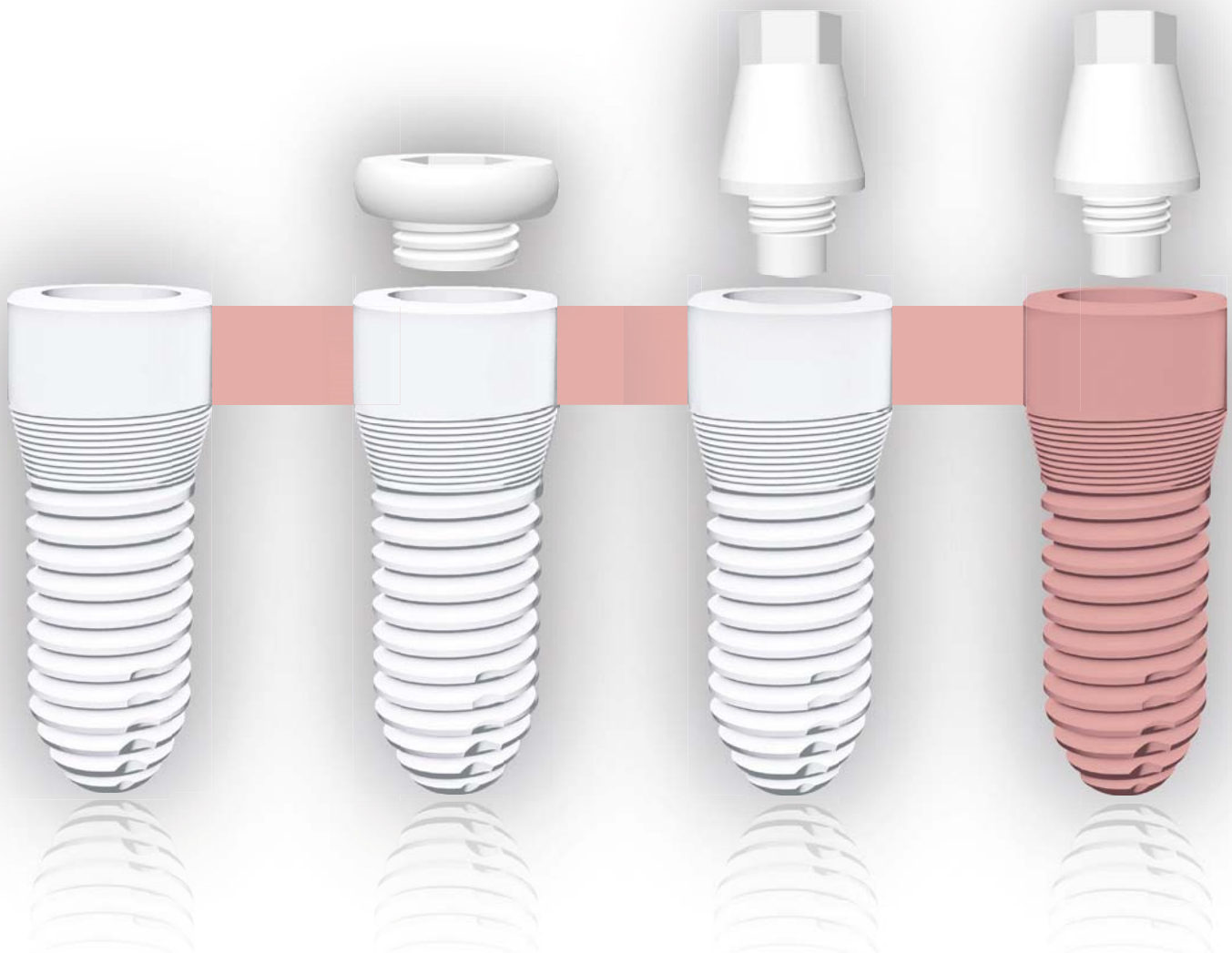

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