Single-tooth restoration with a two-piece Patent™ Implant

Immediate implant placement and loading in the aesthetic zone

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Introduction

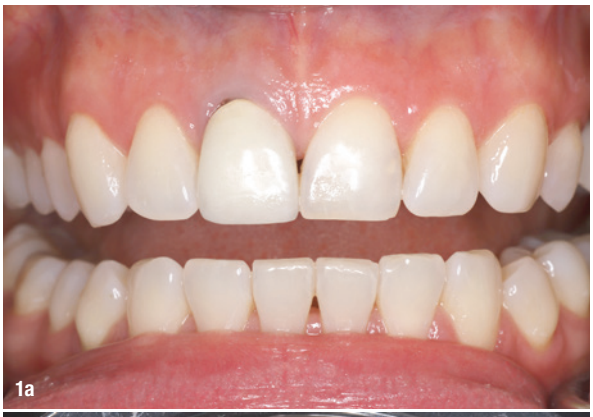
Today, practitioners have to meet growing patient demand for aesthetic tooth replacements that remain healthy in the long term, often involving immediate implant placement and loading. In the following article, a case is presented in which the patient's aesthetic zone was restored using a two-piece zirconia implant system which has been an integral part of the author's clinical armamentarium for over fifteen years. In clinical studies, this implant system has shown high survival rates, stable marginal bone levels and a favourable soft-tissue reaction.[1,2] Additionally, in an independent nine-year study—the first long-term study on two-piece zirconia implants—it demonstrated healthy and stable hard and soft tissue, excellent aesthetics with a visible increase in keratinised gingiva volume around all implants investigated, no fractures, and no peri-implantitis.[3] It is therefore ideally suited for the indication described.

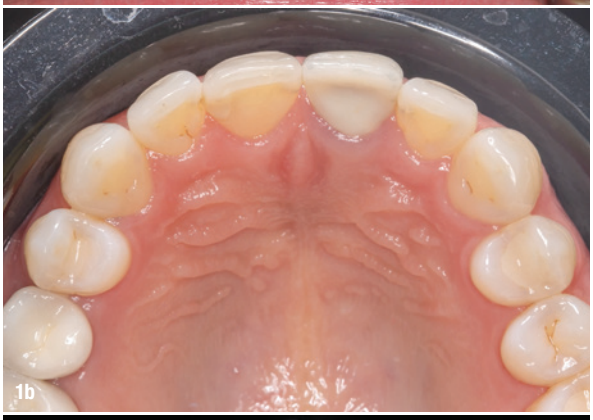
Initial situation

The 41-year-old female patient presented to the author's practice in October 2021. Owing to a failing post and core restoration of an endodontically treated tooth #11, she expressed the desire for a fixed tooth replacement solution (Figs. 1a & b). The radiographic evaluation by means of CBCT revealed that there was sufficient bone volume in the site for the planned implant placement (Fig. 1c).

Treatment planning

As part of the surgical procedure, it was planned to remove the failing restoration, extract the remaining tooth root and immediately insert a two-piece zirconia implant (Patent™ Dental Implant System, Zircon Medical Management) into the extraction socket. Furthermore, it was planned to prepare the glass fiber post and core assembly, which serves as the prosthetic build-up of the implant system used, chairside in the same treatment session, to





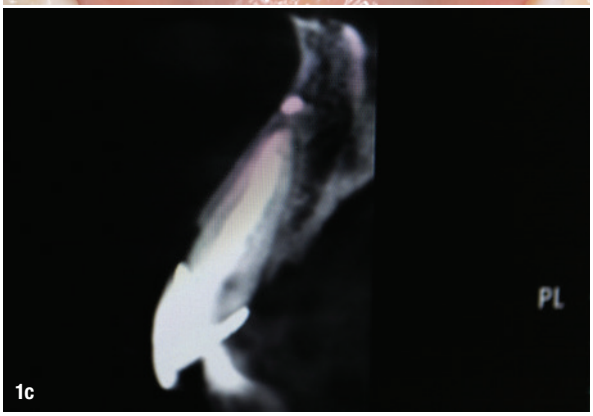
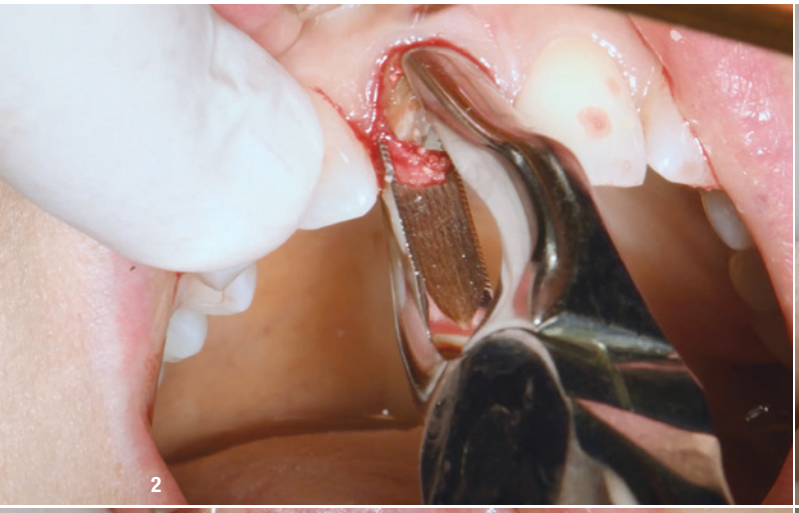
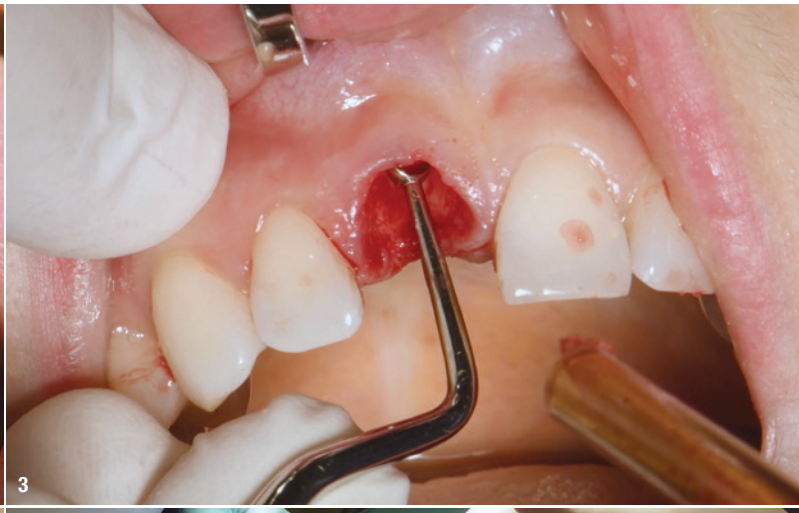
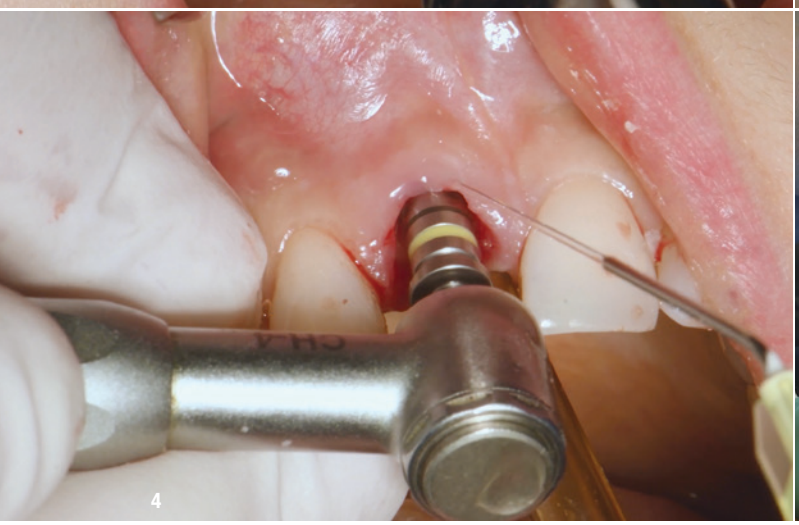


Fig. 1: Frontal **(a)**, occlusal **(b)** and radiographic **(c)** views of the initial situation.







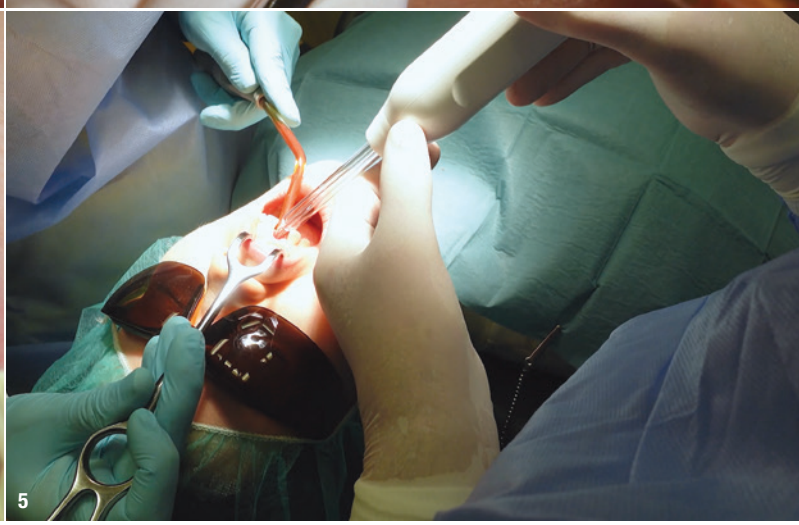


Fig. 2: Root extraction. **Fig. 3:** Thorough curettage of the extraction socket. **Fig. 4:** Osteotomy preparation according to the drilling protocol of the manufacturer. **Fig. 5:** Ozone therapy of the implant bed.

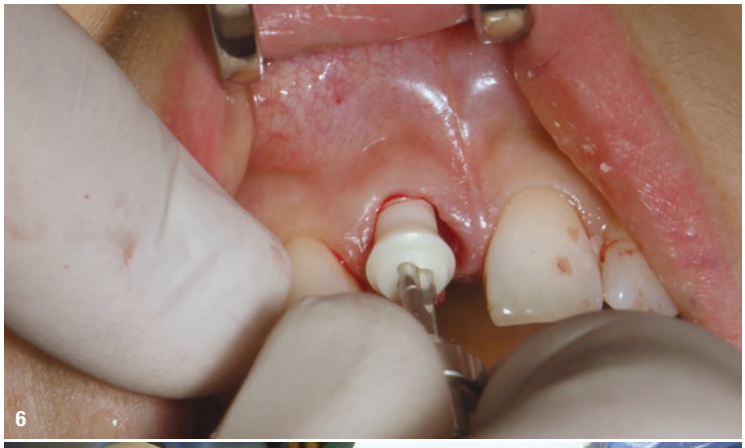
adhesively cement it on to the implant and to restore it with a provisional crown so that the patient could leave the dental practice after surgery without a missing tooth.

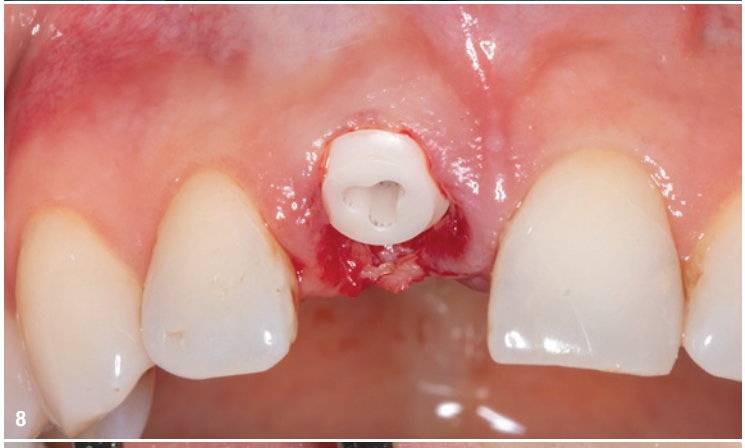
Surgical procedure

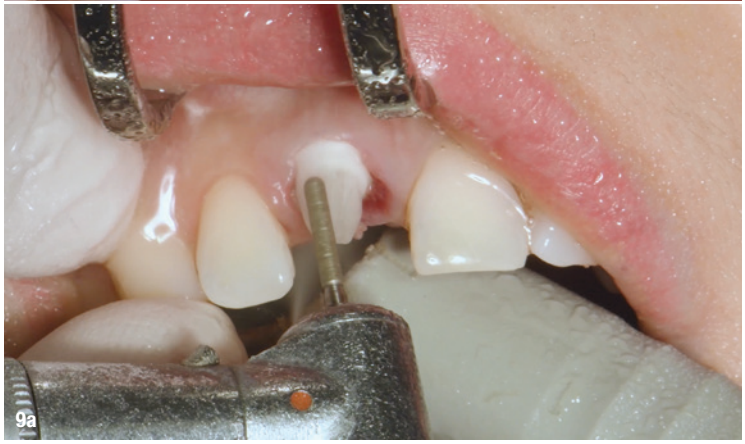
After local anaesthesia had been administered, a labial incision was made in the region of tooth #11 to facilitate the removal of the failing tooth. After the old restoration had been removed (Fig. 2), the underlying tooth root was extracted, and the extraction socket was carefully curetted to completely remove any fibrous tissue (Fig. 3). The osteotomy was prepared according to the drilling protocol of the implant manufacturer and under water cooling (Fig. 4). Once prepared, the osteotomy was treated with ozone to disinfect and sterilise the implant bed (Fig. 5). Thereafter, the two-piece zirconia implant with a diameter of 4.5 mm and a length of 13.0 mm was removed from the implant sleeve using an insertion tool and inserted into the osteotomy (Fig. 6). The implant was screwed into the bone using the torque wrench provided by the implant manufacturer (Fig. 7), up to a maximum torque of 35 Ncm. High primary stability of the inserted implant was achieved (Fig. 8).

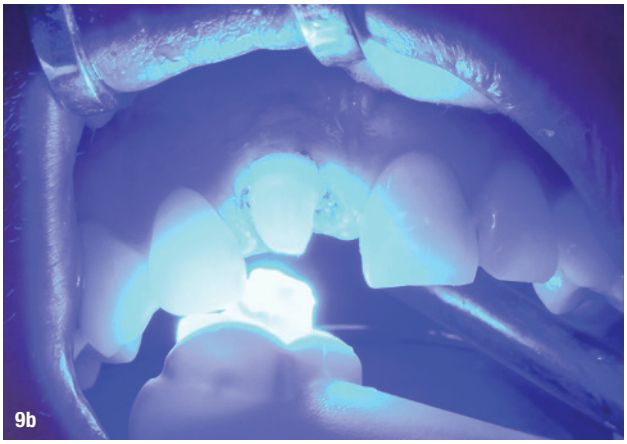
Prosthetic restoration and healing

Immediately after implant insertion, the prefabricated glass fiber post was prepared extra-orally using a diamond bur and fitted into the 3C platform of the placed implant for try-in. The final preparation of the post was carried out intra-orally (Fig. 9a). After try-in of the provisional crown, which was fitted on to the prepared glass fiber post, both the post and provisional crown were removed again. The 3C platform of the implant was filled with a dual-polymerising cement (RelyX Unicem 2, 3M ESPE), and the prepared glass fiber post was inserted into it. Excess cement was removed and the glass fiber post was light-polymerised (Fig. 9b). The glass fiber post was isolated with Vaseline oil, and the provisional crown was subsequently cemented using a temporary cement mixture (Figs. 10a & b).









One week after surgery, the patient presented to the author's dental office for a follow-up appointment. Already at this time, an extremely beneficial and healthy soft-tissue reaction around the neck of the inserted implant was evident. After successful osseointegration and an uneventful healing period of three months, the definitive crown was delivered (Figs. 11a & b). At the 12-month follow-up, the soft-tissue conditions were considered healthy and stable, and the treatment result was deemed satisfactory from an aesthetic point of view (Fig. 12).

Discussion

The two-piece zirconia implant system used for the clinical case described is routinely and almost exclusively used in the author's practice. Thanks to its very rough endosteal surface, reliable bone healing is to be expected.[4] One of the main challenges in cases of immediate implant placement in the anterior region, like that described here, is the preservation of the alveolar bone (and the buccal plate in particular) during extraction. Also, correct positioning of the planned implant and the direction of insertion are of great importance to prevent the implant from penetrating the buccal bone. For this reason, it is necessary to drill slightly more palatally from the alveolar direction. Also, having a soft-tissue-level design, the implant used is placed at the equigingival level, which means that its crown margin is clearly visible and accessible during the entirety of the prosthetic procedure. For the same reason, excess cement can be easily and completely removed after cementation of the glass fiber post. As a result, the risk of cementitis due to subgingival cement remnants is virtually nonexistent.

Moreover, as a result of implant positioning equigingivally, and to the proper depth, too high a compression on the cortical bone is avoided, which would otherwise adversely impact marginal bone stability.[5] Furthermore, the glass fiber post used for the core build-up of the two-piece im-

Fig. 6: Insertion of the implant into the osteotomy. **Fig. 7:** Insertion of the implant using the torque wrench of the manufacturer. **Fig. 8:** Inserted implant after achieving high primary stability. **Fig. 9:** Intra-oral preparation of the glass fiber post after try-in **(a)** and light polymerisation of the cement **(b)**.

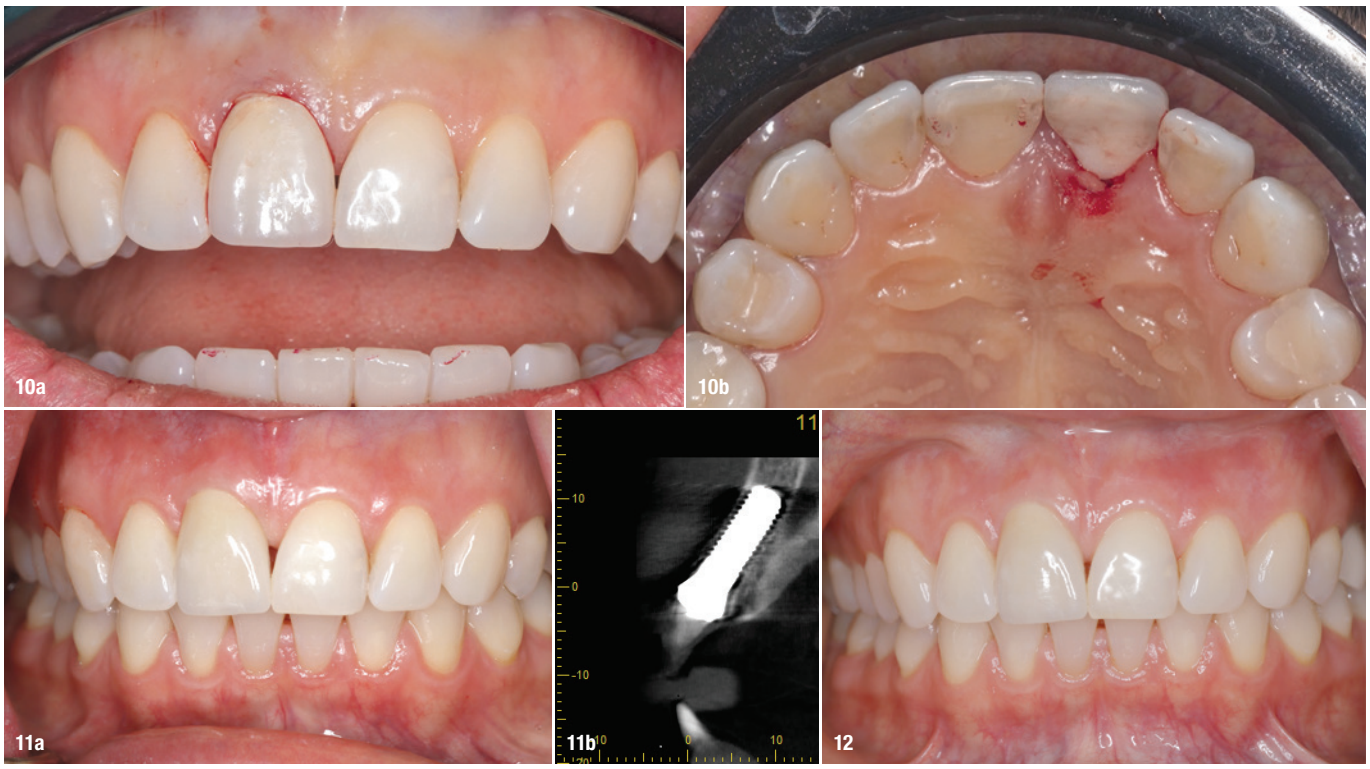


Fig. 10: Frontal **(a)** and occlusal **(b)** views of the clinical situation after delivery of the provisional restoration. **Fig. 11:** Frontal **(a)** and radiographic **(b)** views of the clinical situation after delivery of the definitive restoration after three months of healing. **Fig. 12:** Frontal clinical view of the final result after 12 months.

plant system used, offers added value regarding stability: Having a dentine-like modulus of elasticity, the glass fiber post attenuates masticatory forces transferred from the superstructure to the implant, minimising the fracture risk of the implant components as a result. Post preparation by means of a diamond bur is done in the same way a natural tooth or a post and core in endodontic dentistry would be prepared.

Conclusion

With the two-piece zirconia implant system used in the clinical case described, aesthetic restorations in the anterior area can be realised thanks to its natural-looking shade and its beneficial soft-tissue response. Also, thanks to its soft-tissue level design, which avoids a microgap at bone level, and the tissue-friendly and plaque-resistant implant material, zirconia, long-term successful treatment outcomes with minimal risk of biological late-term complications like peri-implantitis can be expected. The author has not experienced a single case of peri-implantitis in the more than fifteen years for which he has been using this implant system.

Literature

about the author

Born in Königssee, Bavaria, dental implant specialist **Dr Harald Fahrenholz** graduated from the Paul-Gerhardt-Gymnasium in Laubach in Germany before studying dentistry at the Johannes Gutenberg University in Mainz. In 1974, Dr Fahrenholz was granted his license to practice dentistry. He worked as an assistant dentist in Neumarkt-Sankt Veit and Munich between 1974 and 1978. Between 1978 and 2005, Dr Fahrenholz led his own practice in Grünwald near Munich. From 2001 to 2007, he served as deputy director of the CMF Institute in Vienna. In 2001 he obtained the certification “Tätigkeitsschwerpunkt Implantologie” of the BDIZ. Since June 2007, Dr Fahrenholz has headed the Vienna Center for Dental Aesthetics and since January 2017 the practices Zahnästhetik am Kohlmarkt in Vienna and Zahnästhetik in Stetten.

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