Restoring an aesthetic smile

Case study on planning, surgical procedure and aesthetic prosthetic anterior reconstruction

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_Targeted advertising on television and in magazines has given rise to constantly growing patient demand for best possible aesthetics. Consequently, complete restoration of both implant-based and prosthetic reconstructions is expected, and in many cases patients are even looking for the implant-prosthetic treatment to actually be a substantial improvement on their original situation.

_Case history

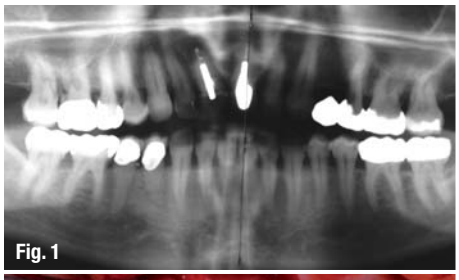
A 60-year-old patient presented at our practice with acute pain in the upper anterior tooth region 11 (upper right central incisor). Moderate submucosal swelling was detected by intraoral palpation. The patient's general history contained no peculiarities.

_Clinical findings

Clinical examination revealed insufficiently fixed restorations in all four quadrants, which according to the patient were at least 20 years old.

Teeth 11 and 21 (upper centrals) had previously been treated endodontically, restored with cast posts and cores and with porcelain-fused-to-metal crowns.

The periodontal findings were normal (PSI [periodontal screening index] 1–2); only in the posterior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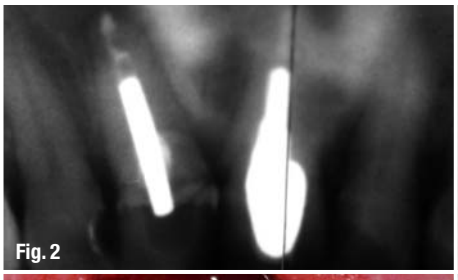
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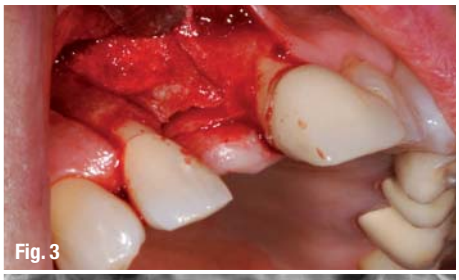
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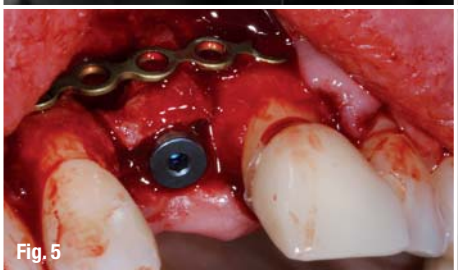
Fig. 4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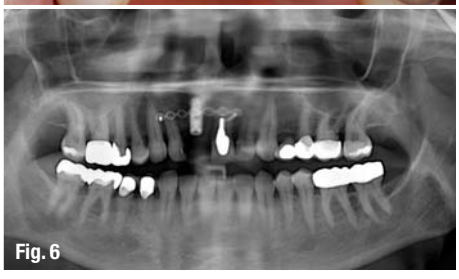
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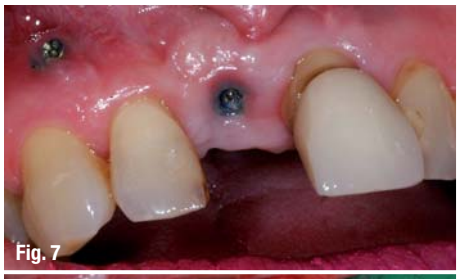
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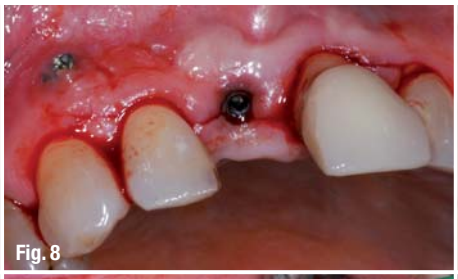
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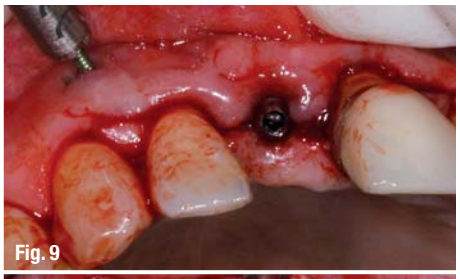
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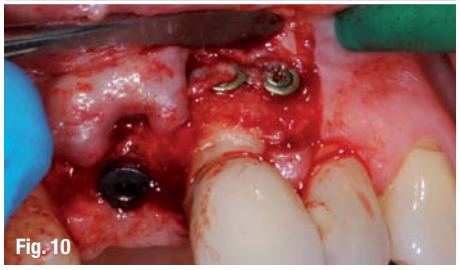
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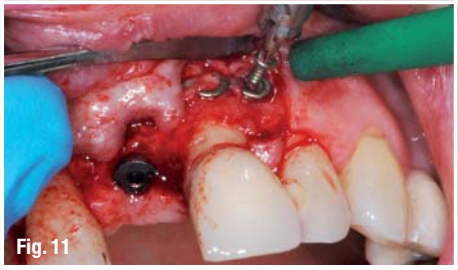


Fig. 11


Fig. 12

region were probing depths of 3 mm to 4 mm and a positive BOP recorded, which was attributable to the insufficient crown margins.

The patient's oral hygiene and compliance were exceptionally good.

_Radiographic findings

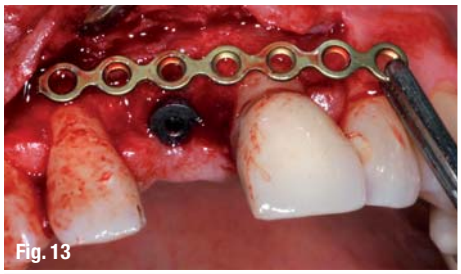
The radiographic findings obtained with an orthopantomogram showed prosthetic restorations in the posterior region (Fig. 1) and endodontically treated teeth 11 and 21. Tooth 21 (upper left central incisor) appeared normal, whereas the root filling in tooth 11 (upper right central incisor) was insufficient and an apical cystic brightening was recognisable. A prior apicectomy was visible on the image (Fig. 2).

1. Surgical planning, extraction and augmentation

First of all, the various treatment options, such as renewed apicectomy or extraction followed by implantation, were explained to the patient. The patient initially chose apicectomy, but this proved intraoperatively to be impossible due to a longitudinal fracture of the root, and consequently the tooth was extracted. Following removal of the cystic tissue, the apical vestibular defect was restored by augmentation with a mixture of NanoBone® (0.6 ml) (supplied by BEGO Implant Systems) and autogenous bone harvested from the retromolar region of the fourth (lower right) quadrant. The alveolus was covered with a non-resorbable membrane (TefGen, manufactured by Curasan), which was removed after six weeks. During this period, the patient cleaned the site of the operation with a CHX mouthwash and a soft toothbrush several times a day. Throughout the entire healing phase, the patient wore a temporary prosthesis with simple curved clips.

2. Prosthetic planning

After explaining the various possible prosthetic treatments, the patient chose a single-tooth implant in region 11 and a new restoration for tooth 21.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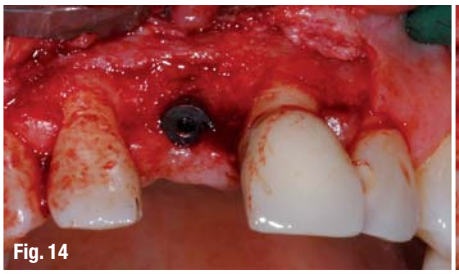
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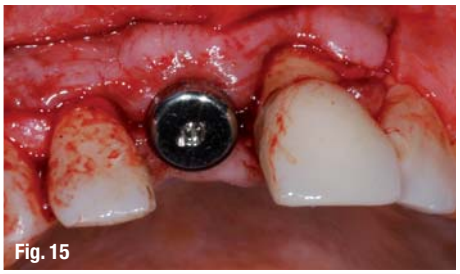
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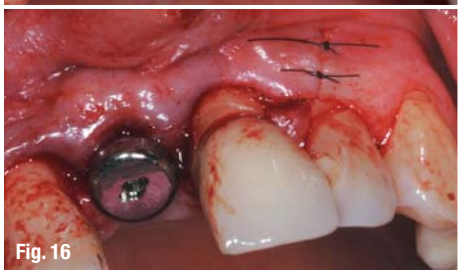
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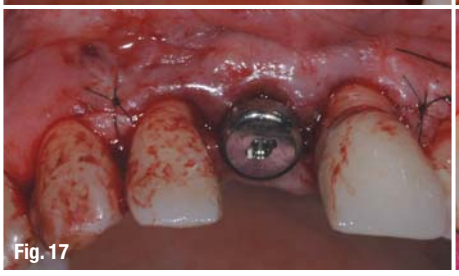
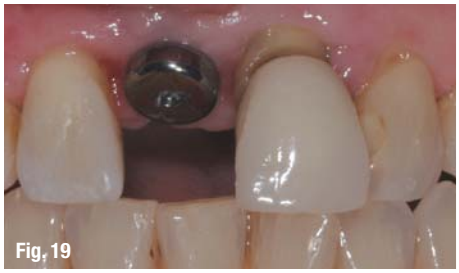


Fig. 17


Fig. 18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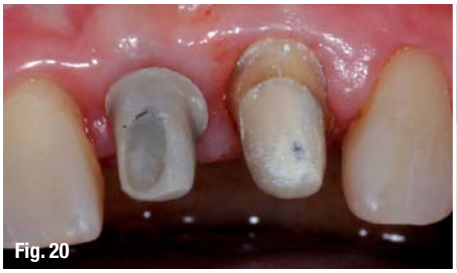
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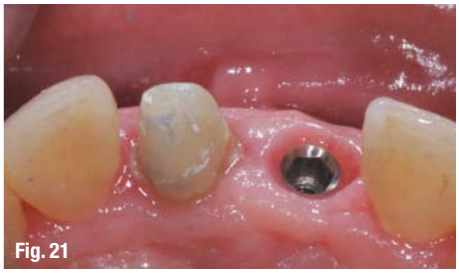
Fig. 21

In order to achieve the best possible aesthetics, the material of choice was zirconium dioxide. The operation took place six months after the consultation.

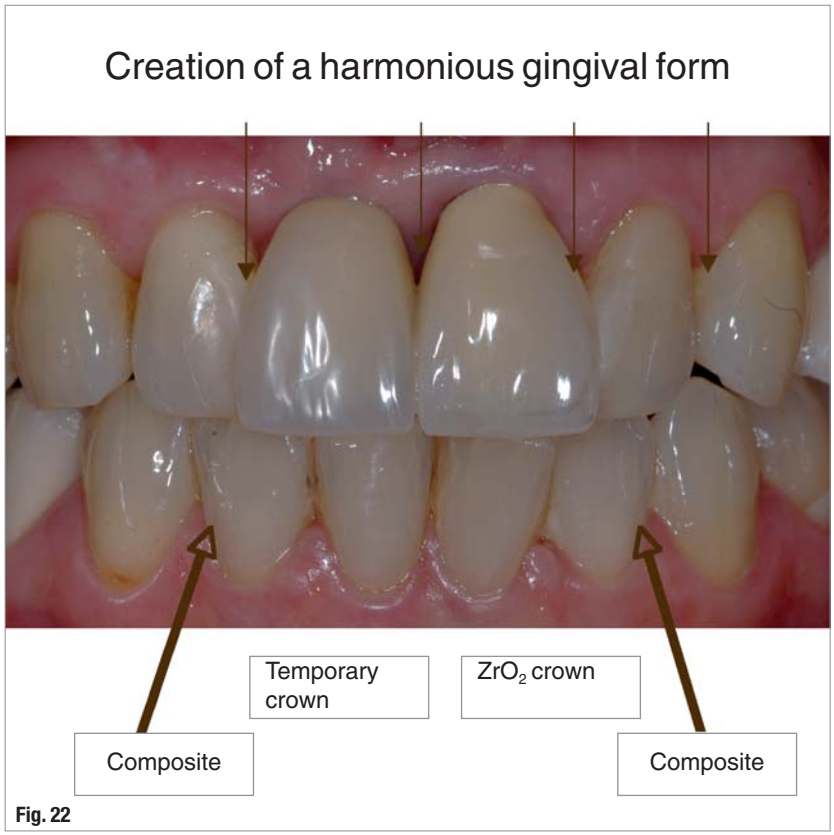

Fig. 22

3. Implant treatment planning

To ensure optimal implant positioning, a drill template with a titanium sleeve to guide the implant drills was fabricated at the laboratory. This ensured that the implant was inserted at the correct point to achieve an optimal emergence profile with the fabricated crown, and thereby optimal pink aesthetics of the soft tissue.

4. Implant insertion

A mucoperiostal flap was raised under local anaesthesia. As the orovestibular bone volume was inadequate for a highly aesthetic outcome, and also because vestibular grafting of bone substitute material is not our preferred method of treatment, we performed bone splitting (Fig. 3) before placing a BEGO Semados® S3,75 L13 implant (Fig. 4). Disposable drills are used as standard. The implant bed was prepared with a pilot drill, followed by the appropriate enlargement drills. The implant was inserted manually, following the specified protocol, with a torque spanner, applying a torque of 30 Ncm, and with adequate water cooling (isotonic saline solution). To stabilise the vestibular osseous lamella, an osteosynthesis plate was fixed with osteosynthesis screws (Fig. 5). A surgical record designed by our practice is completed for each implantation performed in order to meet all the requirements of the quality management system that we have introduced.

5. Implant exposure

After five months, the osteosynthesis plate was exposed and removed, also under local anaesthesia (Figs. 9–13). One of the screws was already showing through the mucosa (Fig. 7). Wound closure was then effected via a laterally externally crossed suture tied around the healing post and, in addition, interrupted sutures at the papillae (Fig. 8). The adequate new bone formation in the vestibular and oral region is clearly recognisable. This enlargement was achieved predictably thanks to the bone splitting performed, and it is a prerequisite for a good aesthetic result in the anterior region (Fig.


Fig. 23

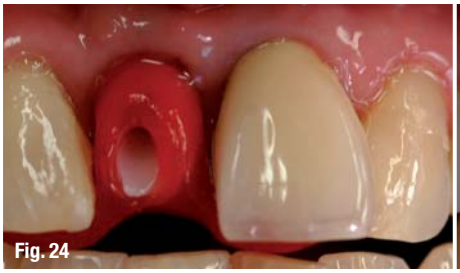
Fig. 24


Fig. 25


Fig. 26

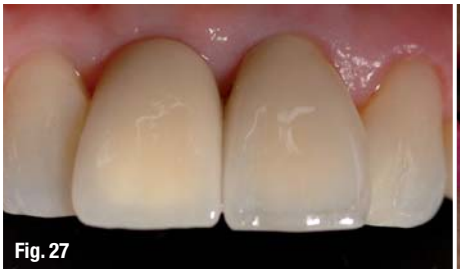
Fig. 27


Fig. 28

14). The implant cover screw was removed and the healing post with a 4.5 mm diameter was placed before closing the wound (Fig. 15). After carefully repositioning the mucoperiosteal flap, the vertical relieving incision was first of all closed with a 0.6 size suture material (Figs. 16, 17). Then a laterally externally crossed suture was tied around the healing post and, in addition, interrupted sutures at the papillae (Fig. 18). This suturing technique is used in periodontal surgery to preserve the interdental papillae.

6. Soft tissue management and temporary restoration

The patient wore her temporary prosthesis for a further two months (Fig. 19). Then the soft tissue at tooth 11 was shaped with a laboratory-made temporary crown on a temporary acrylic abutment (Fig. 20). In the following months, the restoration was modified in the cervical region by applying a flowable composite so that the desired pink aesthetics for an optimal emergence profile of the crown could be achieved (Figs. 21–23). The post abutment on tooth 21 was ground back and built up with a composite to prevent the metal from showing through later. Teeth 12 and 22 were restored using composite restorations (HFO Enamel Plus, manufactured by LOSER).

7. Prosthetic treatment

The impression is taken in the standard manner with a Sub-Dent Open tray impression (BEGO Implant Systems). The impression material of choice is a polyether (Impregum from ESPE). Immediately before taking the impression, the impression post should be customised with an acrylic resin (e.g. pattern resin) according to the soft tissue reached, in order to prevent the gingiva from collapsing.

For the final restoration, a BeCe Sub-Tec Ceramic abutment was selected. This post was fixed with a resin guide stent at each trial fitting, as it also was for final placement of the crown (Figs. 24–28). The screw channel of the abutment was sealed with a light-cured resin (Fermit from Ivoclar Vivadent). Before the final fixing, the zirconium dioxide crowns were pretreated with a silane coupling agent (Ceramic Primer, manufactured by Kuraray). The zirconium dioxide crown on implant 11 was provisionally cemented (Dentegris) and the zirconium dioxide crown on tooth 21 conventionally cemented (Panavia, manufactured by Kuraray).

8. Recall (6 months later)

As standard, all implant patients are recalled every six months and special attention is given to plaque control, freedom from soft tissue irritation and correct occlusion and articulation movements (Figs. 29–31).

Our special thanks go to our four children for understanding the amount of time we dedicate to our practice.

Furthermore, we particularly wish to thank BEGO Implant Systems for the successful collaboration._

_contact implants

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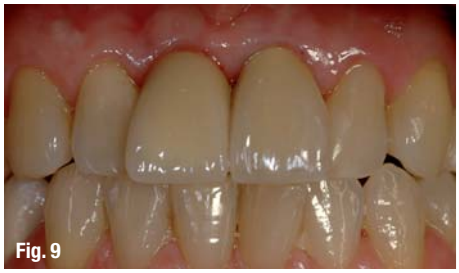
Fig. 9


Fig. 30


Fig. 31