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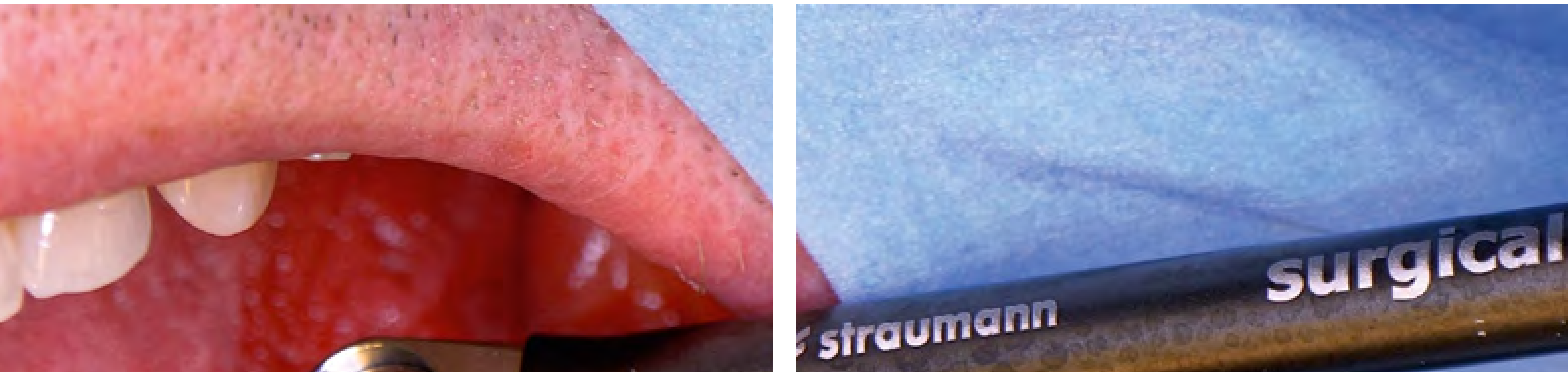

Reprint

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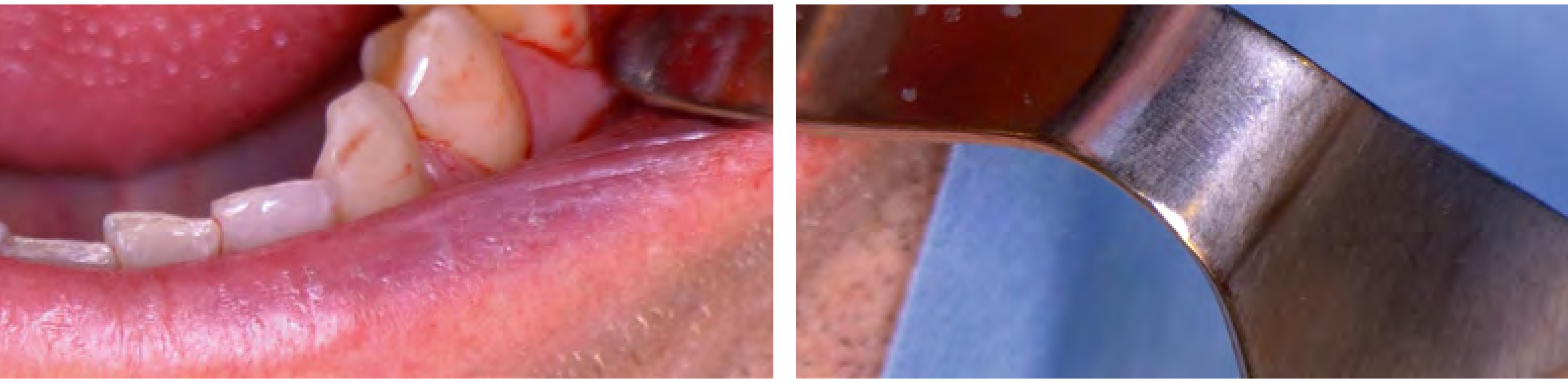

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One-year follow-up of molar replacement with a new fully tapered implant system

Pristine function and aesthetics

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For many years, conventional fixed bridges were considered a routine treatment when replacing a missing single tooth. However, this treatment increased the risk of iatrogenic endodontic damage during the invasive preparation of otherwise healthy and undisturbed teeth, which decreased the survival of these teeth over time [1,2]. The use and success of dental implants for the rehabilitation of posterior partially edentulous jaws has been well established in the literature. In addition to its high success rate, this approach leaves the adjacent teeth undisturbed. The successful use of dental implants depends on optimal conditions of the peri-implant tissues. A three-dimensional evaluation of condition and availability to determine the dimensions of the planned implant is the standard of care and the key to long-term stability of hard and soft tissues [3,4].

The success of single molar restorations is influenced by factors such as the clinician's skills, arch morphology, proximity of adjacent teeth, vertical access, anatomy and patient-related limitations. Additionally, functional and parafunctional forces on molar restorations impose a high level of chronic loading forces. The use of wide implants has been proposed in the literature as a successful option, showing survival rates similar to standard-diameter implants [5,6]. While osseointegration remains the basis for success, patients' increasing expectations have redefined the meaning on the definition of success and failure. From a patient's perspective, success may not only be defined by the assessment of how functional and natural the outcome is, but also if the treatment required fewer visits to the clinic [3,7].

Computer-aided design and manufacturing (CAD/CAM) materials as well as chairside systems and digital workflows are increasingly used in dentistry, especially for single-unit restorations. They allow cost-effective and efficient treatment protocols that improve patient satisfaction [8]. This case report presents a one-year follow-up of an implant treatment in a healed mandibular first molar site with the newly launched BLX implant (Institute Straumann AG, Basel, Switzerland). The case was restored prosthetically with an analogue workflow in the temporary phase and a digital workflow for the final restoration.

1 I Panoramic X-ray shows well-maintained anatomic conditions one year after tooth extraction.

Initial situation

A 67 year-old non-smoking male patient without relevant medical history was referred to the office with a missing tooth 36 due to persistent apical periodontitis. The tooth had been extracted more than one year prior to the procedure and the site presented well maintained and healed (Fig. 1).

Treatment planning

With favourable bone availability confirmed by a CBCT scan, 19.20 mm in height and 8.56 mm in width (Fig. 2), the placement of a BLX implant 5.5 x 10 mm was planned via a one-stage approach with the placement of a healing abutment to allow proper osseointegration and transgingival soft tissue healing of six weeks prior to functional loading. To bring the gingival contours as close as

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2 I CBCT scan measurement demonstrating adequate bone availability in height and width.

3 I Implant ready to be removed from the vial cap to be inserted in the osteotomy.

4 I Implant insertion with the handpiece at 15 rpm.

5 I Surgical torque control instrument showing the implant in final position and a torque of 35 Ncm.

6 I Radiograph confirming the seating of a healing abutment 6.5 mm in diameter and 1.5 in gingival height.

possible to natural aesthetics, a temporary crown was planned after this period to start loading the implant and allow soft tissue keratinization for an optimal aesthetic outcome of the final restoration. As for the final crown, a digital impression with a 3shape IOS scanner (3shape, Copenhagen, Denmark) with a Straumann Cares Mono scanbody (Straumann) was followed by the creation of a monolithic zirconia crown to be seated passively onto the implant in a healed and pre-conditioned soft tissue environment.

Surgical procedure

Consistent with standard procedures, local infiltration was conducted using articaine with epinephrine. The site presented thick and healthy keratinized soft tissue, so a crestal incision followed by intrasulcular incisions from tooth 37 to tooth 35 was completed with a 15C blade. No releasing incisions were made.

A mucoperiostal flap was carefully elevated and the osteotomy prepared as recommended for a 5.5-mm BLX implant in medium bone type, with the use of the needle drill to initiate the osteotomy, followed by the drills 2.2 mm, 2.8 mm, 3.5 mm, 4.2 mm and a final drill indicated on the surgical cassette to be no. 7, corresponding to the diameter of 4.7 mm. The implant was directly picked up from the vial with the insertion tool engaging into the new TorcFit connection. Mouth-opening was limited, so the implant was inserted to final position in one continuous clockwise rotation of the handpiece at 15 rpm (Figs. 3 and 4).

The CBCT estimated the bone density to be medium to soft, presenting a thin crestal cortical layer. The bone was much softer than originally expected but the implant still reached the final position with a good primary stability of 35 Ncm, verified by a surgical torque control device (Straumann) (Fig. 5).

A 6.5-mm diameter healing abutment with a gingival height of 1.5 mm was placed so the gingival healing would result in an adequate molar emergence profile (Fig. 6). Two single lateral sutures finished the surgical procedure keeping the flap in close contact with the healing abutment. The sutures were removed after 15 days.

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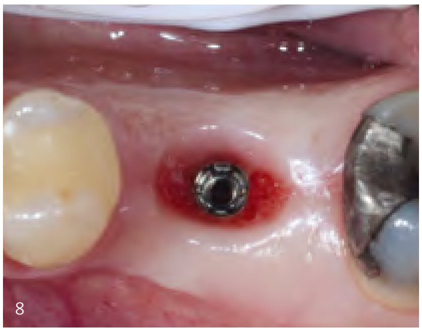
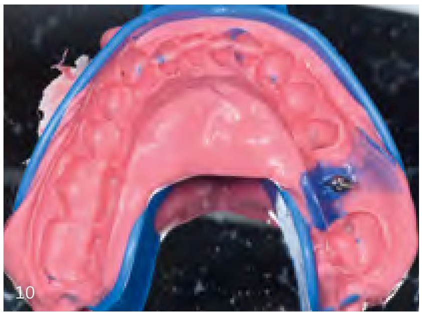


7 I Healing abutment in situ – occlusal view.

8 I Favourable soft tissue healing after six weeks.

9 I Impression post engaged on the implant correctly – no gap visible.

10 I Impression tray with captured impression post.



11 I Temporary PMMA crown on a Wide Base (WB) temporary titanium abutment.

12 I Radiograph confirming the correct seating of the temporary crown – no gap visible.

13 I Temporary crown in position with the screw access channel closed – occlusal view.

14 I Temporary crown in position with the screw access channel closed – lateral view.

Prosthetic procedures

Temporary crown

After six weeks of healthy and favourable soft tissue maturation, the healing abutment was removed to initiate the prosthetic procedures (Figs. 7 and 8). A conventional analogue workflow was selected for this phase. With an open tray technique and simultaneous application of dual-density material, soft putty was injected around the impression post to copy the emergence profile, while medium putty was added to the tray to fill it up. When the impression material was properly set, the basal screw of the impression post was rotated counterclockwise so that the impression tray could be removed (Figs. 9 and 10). In the laboratory, standard procedures to create a stone master cast were followed and a temporary screw-retained PMMA crown was manufactured on a Wide Base (WB) Variobase abutment (Straumann), diameter 5.5 mm and gingiva height 1.5 mm for a crown restoration, and placed onto the implant. Once the occlusion and contact points had been optimized, the crown was secured at a torque of 15 Ncm as recommended by the manufacturer (Figs. 11 to 14).

Final crown

After twelve weeks, the temporary crown was removed and a very good soft tissue response and maturation was seen (Fig. 15). A scanbody (Cares Mono; Straumann) for the new prosthetic connection (TorcFit) was connected to the implant to carry out an intraoral scan for the digital workflow. A Wide Base (WB) Variobase abutment (Straumann), diameter 5.5 mm and gingiva height 1.5 mm, was selected to allow a consistent and wide emergence profile while still enabling platform shifting.

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15 I Extraordinary keratinization pattern visible once the temporary crown is removed.

16 I Monolithic zirconia crown on WB vario-base ready for placement.

17 I Final crown in situ – occlusal view.

18 I Final crown in situ – lateral view.

19 I Radiograph confirming the correct seating of the final crown – no gap visible.

20 I One-year follow-up – occlusal view.

21 I One-year follow-up – lateral view.

22 I One-year follow-up radiograph.

A full-contour crown was milled in monolithic zirconia (Zirkonzahn, Gais, Italy). The subsequent laboratory steps were performed, using a primer and bond on the abutment prior to cementation of the milled crown. The screw-retained restoration was placed and torqued according to the protocol (35 Ncm). The screw access channel was closed with PTFE tape and opaque light-cured composite (Figs. 16 to 18). The patient presented harmonic occlusion and the restoration required only minimal adjustments verified by occlusion articulation carbon paper. A final radiograph was taken to confirm the crown seating (Fig. 19).

The BLX system features the new TorcFit hybrid connection, offering the option to use the inner conus or the outer shoulder of the implant as prosthetic interface. In this case, choosing a wide base abutment provided a natural emergence profile offering the patient functionality, aesthetics and a feeling similar to the natural tooth when flossing.

Conclusion

One year after finishing the treatment, the patient reported complete satisfaction with his masticatory function and aesthetics. The clinically visible stable and healthy peri-implant conditions were also confirmed radiographically (Figs. 20 to 22). The BLX implant has shown efficient and reliable performance even in soft bone under early loading conditions.

The references are available at www.teamwork-media.de/literatur

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