Maxillary molar replacement with an implant and immediate restoration

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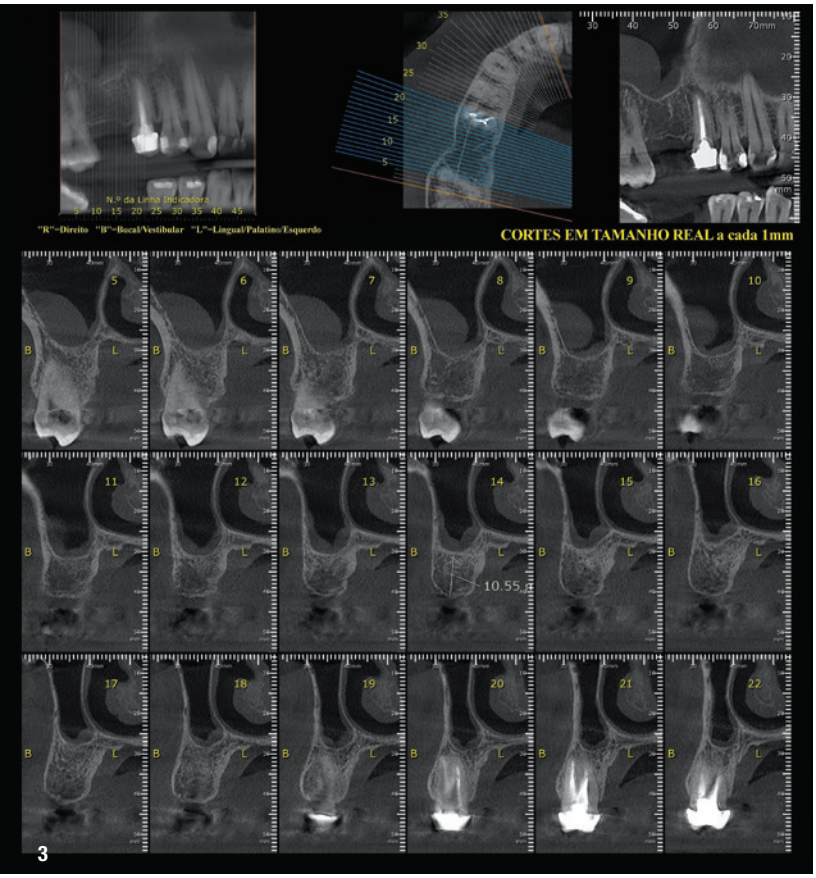
Figs. 1 & 2: The periodontal condition of the patient, showing the missing maxillary right first molar. **Fig. 3:** Pre-op CBCT scan revealing sufficient vertical and horizontal bone availability.

The introduction of dental implants for the replacement of missing teeth disrupted the era of dental prosthetic dentistry by providing the possibility of replacing a missing tooth with a fixed restoration without affecting the adjacent teeth to perform a tooth-supported restoration. During the beginning of the era of implant dentistry, two-stage procedures were followed by a waiting period of three to six months from the day of the surgery to the loading.[1] The attempts to provide a better patient experience have led to the development of improved manufacturing technology, innovative techniques and a better understanding of biology through clinical and preclinical studies. The immediate loading of implants is today a reality, and these protocols are frequently used in the anterior maxillary area. However, the placement of dental implants simultaneously with provisional restorations can also provide benefits in the posterior area, including a reduction in time to recovery of the masticatory function.[1] For this, the estimation of the risk of treatment and effective treatment planning are crucial. It is essential to perform an analysis of the medical condition of the patient, the bone availability, the soft tissue and the desired tooth shape and to take into consideration the patient's needs and expectations. The following case report describes the replacement of a single maxillary molar with the new Straumann TLX implant into a fully healed site (International Team for Implantology Type 4 implant placement) and immediate provisional restoration.



Initial situation

A healthy, non-smoker, 40-year-old female patient presented to our clinic with a missing maxillary molar. Her chief complaint was that her condition did not allow her to eat properly and was affecting her quality of life, and she desired to recover masticatory function as soon as possible. Her dental history revealed that the tooth was lost owing to a vertical fracture several months before. This incident happened during the COVID-19 lockdown; therefore, she had not been able to receive complete treatment of the site. The intra-oral examination confirmed that the maxillary right first molar was missing. The periodontal condition of the patient was healthy, and her oral hygiene was classified as good (Figs. 1 & 2). The preoperative CBCT scan revealed sufficient vertical and horizontal bone availability for implant placement in site #16 and no risk of damage to surrounding anatomical structures (Fig. 3).

Treatment planning

For a prosthetically driven planning a close communication between the patient, the prosthodontist and the dental technician is essential. After discussing, she opted for im-

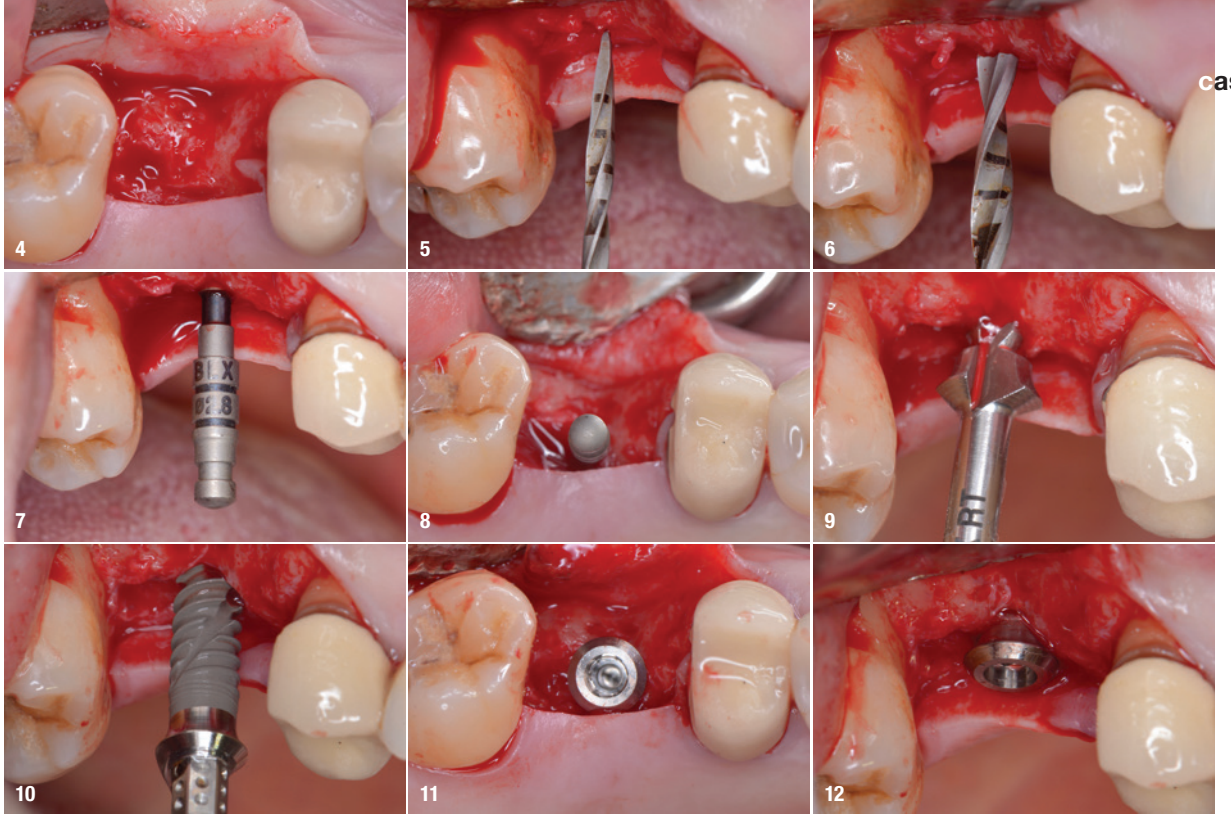


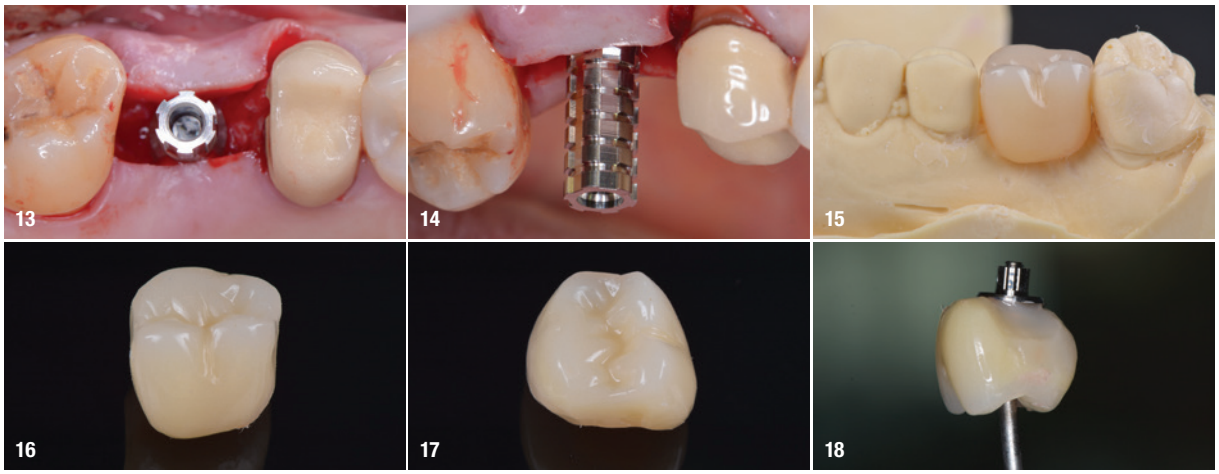
Fig. 4: Raising of the flap for exposure of the bone in the area of site #16. **Fig. 5:** Pilot drill (diameter: 2.2 mm) used to full implant length (10.0 mm). **Fig. 6:** Use of the second drill (2.8 mm). **Figs. 7 & 8:** Placement of the alignment pin. **Fig. 9:** Use of the corresponding profile drill. **Figs. 10–12:** Placement of the Straumann TLX implant to achieve optimal primary stability. **Figs. 13–18:** Straight provisional titanium abutment and preselected tooth based on the stone cast.

plant placement and provisional restoration in site #16. The clinical and radiographic evaluation showed adequate conditions for implant placement in the healed site. Furthermore, the CBCT scan for diagnosis revealed no need for bone augmentation procedures. Therefore, a Straumann TLX Regular TorcFit (RT) Standard Plus Roxolid implant (3.75 × 10.00 mm) with immediate provisionalisation, provided the desired primary stability was achieved, was planned. The implant system used offers fully tapered tissue-level implants that are designed for high primary stability and immediate treatment procedures.

Materials and method

Local anaesthetic was infiltrated using articaine (4%) with adrenaline. Mid-crestal and intrasulcular incisions were performed without vertical release. The flap was raised to expose the bone around site #16 (Fig. 4). Following the manufacturer's surgical protocol, the implant was placed in a prosthetically driven position. A minimum distance of 1.5 mm from the implant shoulder to the adjacent tooth was taken into consideration.

Owing to the self-cutting properties of the implant used, the implant bed was lightly underprepared. The drills were used in a clockwise drill rotation direction and with an intermittent drilling technique and precooled (5 °C) sterile saline solution. For this, first, the needle drill (diameter: 1.6 mm) was used to mark the implant site, and this was then followed by the pilot drill (diameter: 2.2 mm) used to full implant length (10.0 mm; Fig. 5). Then the bone density was determined through a pilot hole, and the second drill (diameter: 2.8 mm) was used (Fig. 6). Afterwards, an alignment pin was placed to check the 3D position of the osteotomy and preparation depth (Figs. 7 & 8). Additionally, since the placement of the implant was planned to be deeper than the shoulder mark on the mesial site, the corresponding



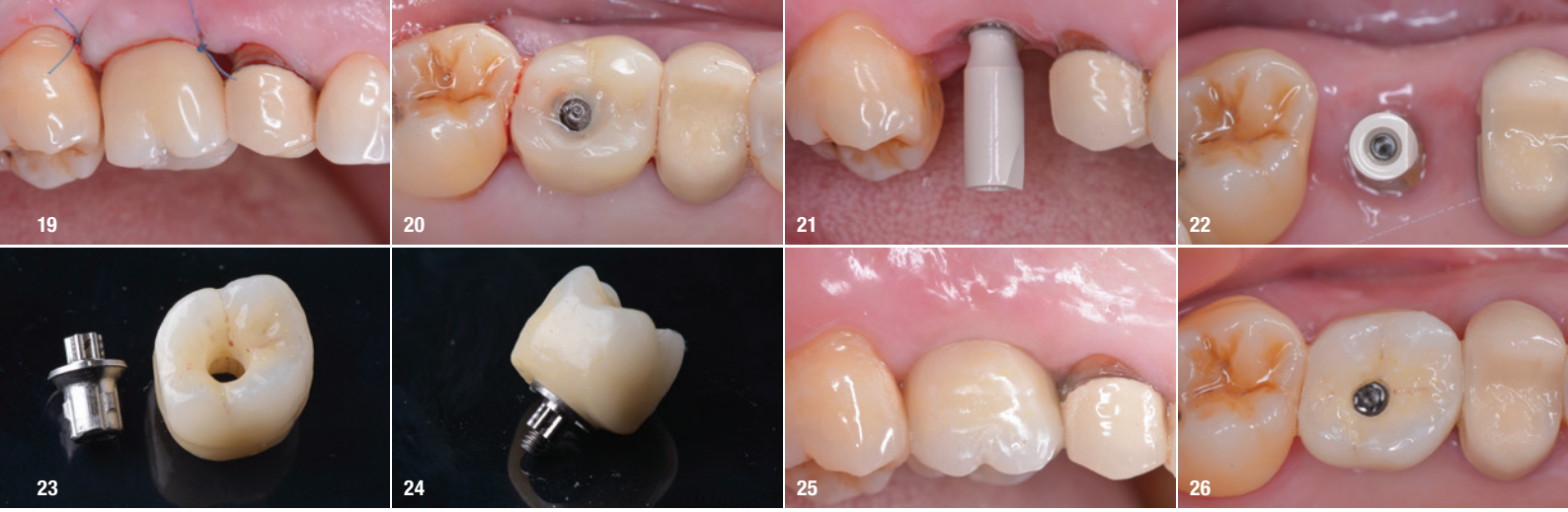


Fig. 19: Single sutures placed around the implant. **Fig. 20:** Occlusal view of the restoration. **Figs. 21 & 22:** Monotype scan body screwed into the implant. **Fig. 23:** The metal-free restoration was to be cemented on top of the RT Variobase abutment (Straumann). **Fig. 24:** Restoration cemented on to the abutment. **Figs. 25 & 26:** The restoration *in situ*. **Fig. 27:** Sealing of the screw access hole with composite material.

profile drill was used (Fig. 9). The implant was placed with a surgical ratchet to a torque value of >35 Ncm, and optimal primary stability was achieved (Figs. 10–12).

Prosthetic procedure

Since optimal primary stability had been achieved, we could proceed with the preparation of the provisional restoration as requested initially by the patient. For the provisionalisation, a straight provisional titanium abutment and a preselected tooth based on the stone cast were used (Figs. 13–18). The provisional titanium abutment was reduced with a carborundum disc to avoid occlusal contact with the antagonist. The preselected tooth was prepared for adaptation to the abutment and bonded with flowable composite. The final contour and polishing were done chairside by Dr Cristiane Juchem. Single sutures with a #5/0 nylon thread were placed around the implant (Figs. 19 & 20). Analgesics were prescribed postoperatively, and a control appointment and the suture removal were planned for one week later.

The follow-up appointments were scheduled for 30 and 60 days postoperatively. After two months of healing, a monotype scan body was screwed into the implant, and a digital impression with the Virtuo Vivo intra-oral scanner (Straumann) was taken (Figs. 21 & 22). The coDiagnostiX software (Dental Wings) was used for CAD processing, and a metal-free restoration (zirconia) was cemented (RelyX U200, 3M) on the top of an RT Variobase abutment (diameter: 5 mm, height: 6 mm; Straumann) for screw-retained restoration. The height of the abutment was adjusted accordingly (Figs. 23 & 24). According to the implant manufacturer's recommendations, the restoration was screwed in to a torque of 35 Ncm (Figs. 25 & 26). Finally, the screw access hole was sealed with composite material (Fig. 27).

Treatment outcomes

Replacing one tooth in the posterior zone and loading it immediately can represent many challenges. The key is to know in whom we can perform this type of treatment, and for this, the selection of the patient is crucial. In this case, we obtained good and predictable results in a short period as requested by the patient. The Straumann TLX implant system allows immediate loading, which in our case brought high satisfaction in terms of health, aesthetics and function.

Reference:

1. Davarpanah M, Szmukler-Moncler S. Immediate loading of dental implants: theory and clinical practice. Paris: Quintessence International; 2008. 356 p.

about the author

Dr Leandro Soeiro Nunes, MD, DMD, graduated from the Federal University of Rio Grande do Sul in Porto Alegre in Brazil and specialised in oral and maxillofacial surgery in 2006 at the Universidade Luterana do Brasil in Canoas in Brazil. During his advanced studies, he evaluated the behaviour of biomaterials in sinus lift procedures and compared the biological behaviour of several implant surfaces. He is an International Team for Implantology fellow and study club director in Porto Alegre and teaches implantology at the Associação Brasileira de Odontologia, seção Rio Grande do Sul (Rio Grande do Sul section of the Brazilian association of dentistry). He also runs his own private practice focused on oral surgery, implant therapy and bone regeneration.

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