Fully guided four-unit ceramic restoration on two implants

Dr André Chen, Portugal

Patients nowadays are more self-conscious than ever about their appearance and overall health. From their perspective, an excellent aesthetic result is often seen as a suitable end to their dental issues. Various reports have shown that biological complications can occur during treatment with dental implants, and infections may arise. These clinical scenarios may require challenging, time-consuming and expensive peri-implant infection treatment. On this matter, the rise in recent patient-reported outcome measures publications demonstrates the importance of also considering patients' perspectives and psychological factors when evaluating implant dental treatment outcomes.[1–3]

The Straumann PURE Ceramic Implant represents an advantage for patients with a thinner mucosal biotype or a high smile line.[4] Moreover, it is biocompatible, which makes it an ideal alternative to titanium implants for patients who need or request metal-free solutions. Compared with titanium surfaces, zirconia (yttria-stabilised tetragonal zirconia polycrystals) exhibits favourable epithelial attachment and has shown less bacterial concentration in various clinical trials.[5,6] This characteristic is significant, as clinical studies have shown that bacterial adherence to implant surfaces can result in peri-implant bone loss.[7] In addition, the surface of the Straumann PURE Ceramic Implant, Straumann ZLA, features a topography characterised by a macro- and micro-roughness similar to that of the proven Straumann SLA surface. The following clinical case report describes a fully guided four-unit ceramic restoration on two Straumann PURE Ceramic Implants (two-piece design). The soft- and hard-tissue outcomes and the fulfilment of the patient's expectations demonstrate how reliable this system is.

Initial situation

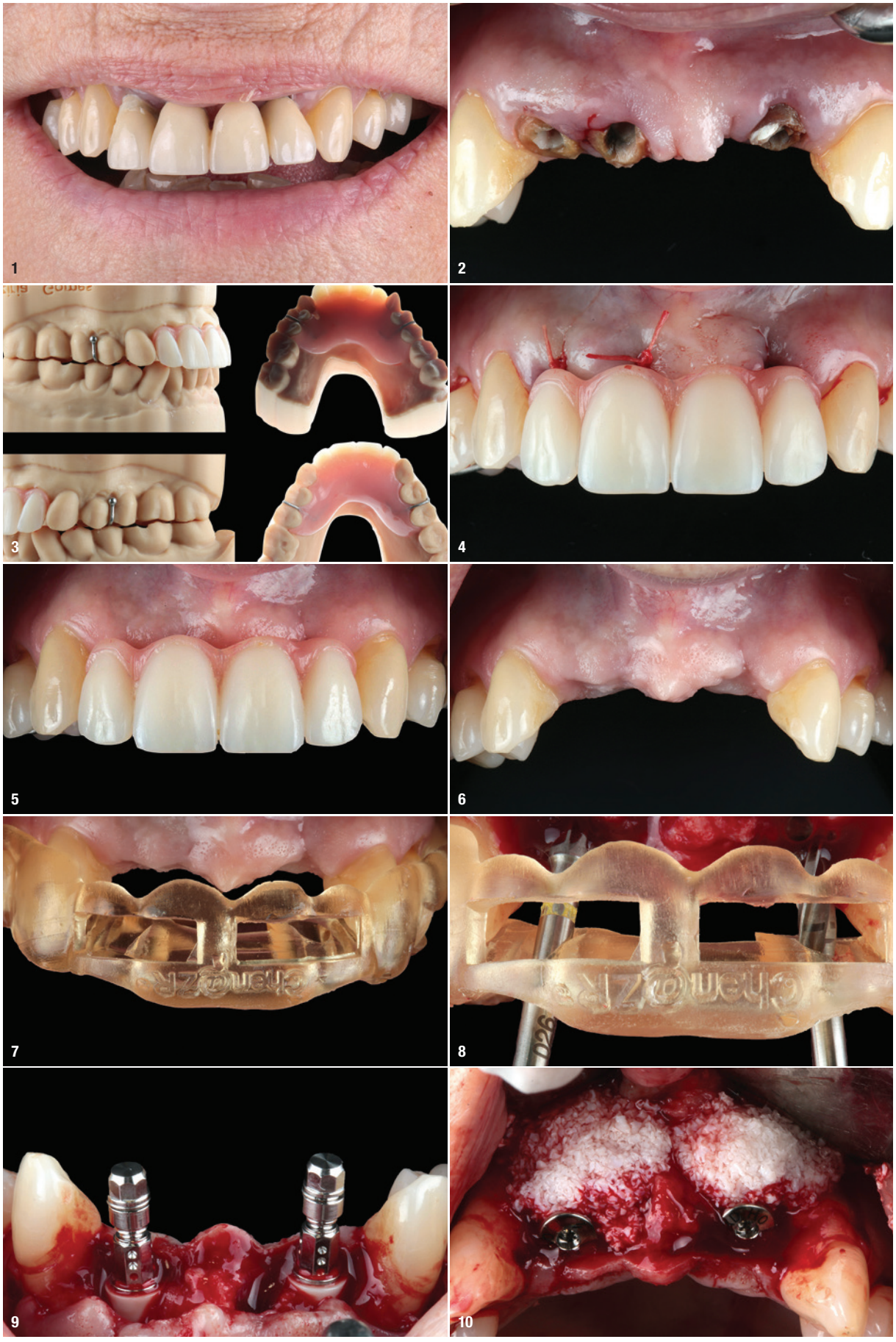
A 71-year-old female patient presented to our clinic seeking a smile makeover. Her medical history was unremarkable: she was a non-smoker with no systemic disease (ASA I). Furthermore, she reported not taking any medications or having allergies. The clinical assessment found an unaesthetic restoration in the anterior sextant that created the appearance of the teeth being extruded and tilted to the vestibular area. In addition, the cervical surfaces of the crowns of teeth #12 and 22 were visible, and there were dark spaces between the teeth, which the patient did not like (Fig. 1). She explicitly stated that she wanted a predictable, minimally invasive metal-free solution to recover the aesthetics of her smile. The clinical intra-oral and radiographic examination after removing the bridge revealed the presence of a hopeless dentition, teeth #12, 11 and 22 having vertical root fractures and an active infection and loss of the buccal plate (Fig. 2).

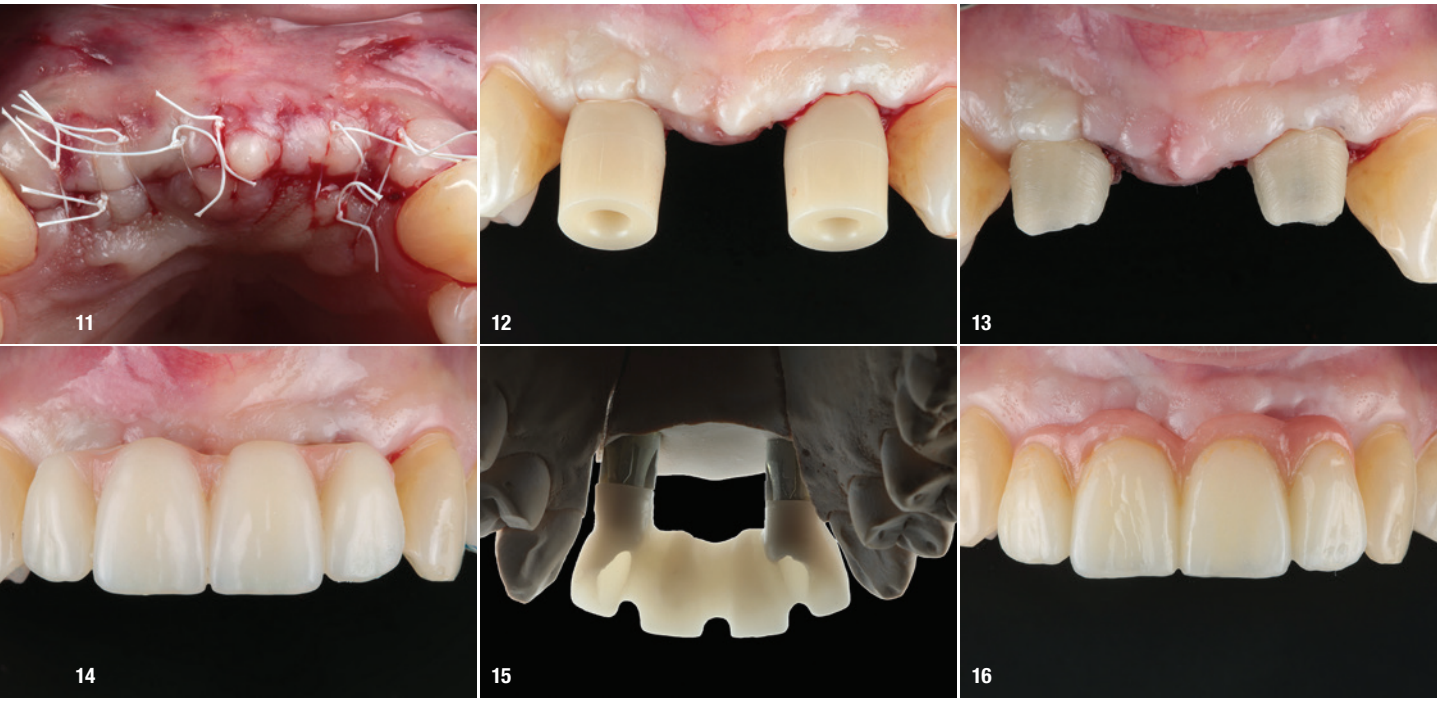
Treatment planning

After a thorough discussion of the various treatment options with the patient, delayed implant placement was decided on owing to the active infection in the area to be treated. As a first step, the root remnants were extracted with minimal trauma, intending to preserve the remaining bone, and since aesthetics was an essential factor for the patient, a removable prosthesis replacing teeth #12–22 was prepared and placed on the day of extraction (Figs. 3 & 4).

At the follow-up visit 12 weeks later, healing was found to have proceeded uneventfully (Figs. 5 & 6). After the clinical examination, a CBCT scan was used to determine the amount of bone in the edentulous area. The CBCT examination confirmed bone availability for implant placement in combination with bone augmentation, and an intra-oral scan was taken, and this information was sent to the laboratory.

The DICOM files and STL were merged for implant planning, the static guided pilot drilling digital workflow and surgical guide production (P20+, Straumann). Two ceramic implants in locations #12 (4.1 × 10.0 mm) and 22 (4.1 × 10.0 mm) to support a four-unit screw-retained bridge from implant #12 to implant #22 were planned. In addition, PEEK temporary abutments for the provisional bridge were planned for the postimplant healing


1
2
3
4
5
6
7
8
9
10



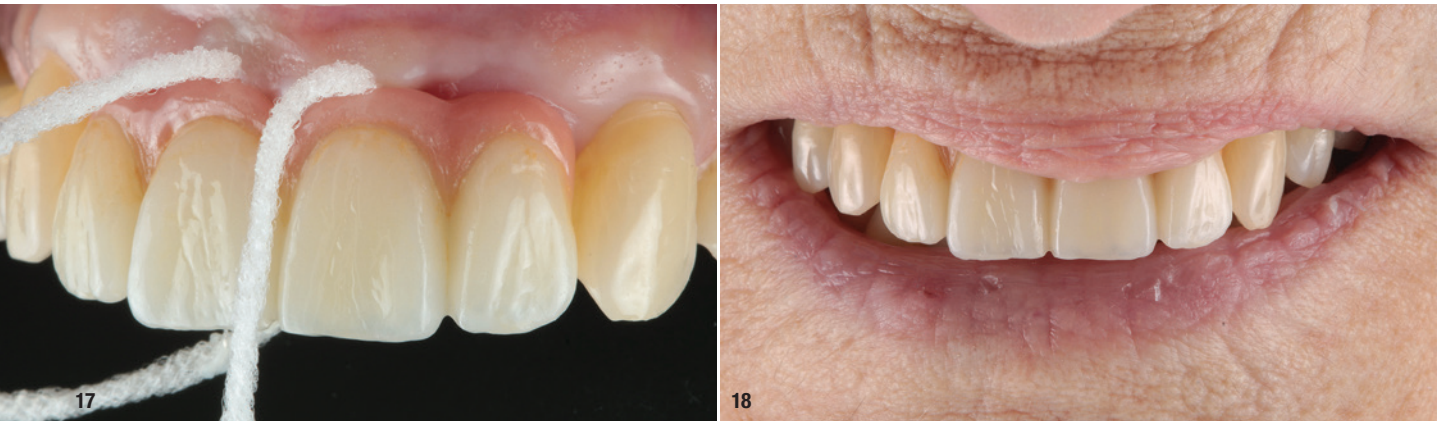
phase. The surgical guide was planned and fabricated based on the information for ideal prosthetically driven implant positioning.

Surgical procedure

Before surgery, the surgical guide was evaluated to ensure the proper fit (Fig. 7). Local anaesthesia with 2% lidocaine and 1:100,000 adrenaline was administered. A mucoperiosteal flap with a crestal incision was raised. To prepare the osteotomy, the manufacturer's drilling protocol was followed. The osteotomy was prepared to a diameter of 2.2 mm and then widened to a diameter of 2.8 mm, and the final preparation depth was checked with the 3.5 mm diameter depth gauge. The final osteotomy preparation involved profile drilling and subsequent tapping (Fig. 8). The implants were then held by a ceramic pin and placed with the aid of the handpiece in a clockwise direction at a speed of 15 rpm and to a torque of 35 Ncm (Fig. 9).
Two cover screws were inserted to allow optimal submucosal healing. In addition, as planned, guided bone regeneration with a xenograft and a resorbable membrane was performed (Fig. 10), and the mucoperiosteal flap was carefully adapted and sutured with #4/0 suture for healing by first intention (Fig. 11). A follow-up visit was scheduled for 14 days later, and the healing was uneventful.

Prosthetic procedure

Three months after healing of the peri-implant tissue, the implants were located, and a conservative horizontal crestal incision was made to access the closure screws. These were removed, and an open-tray impression for the ceramic implant system was taken. A



screw-retained provisional restoration on temporary abutments (Straumann) was prepared. The temporary abutments were individualised and polished on implant analogues according to the clinical situation. The provisional restoration was placed on the implants and tightened to between 15 Ncm and 35 Ncm. Finally, the occlusion was assessed (Figs. 12–14).

For the final restoration, ceramic abutments were used for the restoration of the ceramic implants. A four-unit zirconia prosthesis (zirconia framework with feldspathic veneering) was made to fulfil the aesthetic and functional requirements of the patient. Once it had been loaded, the access holes were filled with composite restoration and PTFE, the occlusion was checked and periapical radiographs were taken. Finally, the patient received detailed oral hygiene instructions and was involved in a yearly maintenance programme (Figs. 15–18).

Treatment outcomes

The final aesthetic and functional outcomes and the health of both hard and soft tissue fulfilled the patient's requirements. In addition, they increased her quality of life, as she was able to chew and smile again without any limitations.

about the author

Dr André Chen graduated in 2004 from the University of Lisbon in Portugal and received his PhD in oral surgery and medicine from the same university. He currently works in oral surgery and implant dentistry at the university's Faculty of Dental Medicine. He does research in implantology, dental surgery, and oral and maxillofacial surgery, and his current project is implant aesthetic protocols. He is co-founder and director of the implantology and oral surgery department of International Advanced Dentistry in Lisbon and an oral surgery specialist at the OMD College of Portugal. He serves on the board of directors of the European Society for Ceramic Implantology.

Author details

Literature

contact

Dr André Chen
tsouchen@gmail.com