Guided 4-unit ceramic rehabilitation over two ceramic implants

Andre Chen[1]

Introduction

Patients nowadays are more self-conscious than ever about their appearance and overall health. From their perspective, an excellent esthetic result is often seen as a suitable end to their dental issues. However, various reports have shown that biological complications, including infections, can occur during the treatment with dental implants. These clinical scenarios may call for a challenging, time-consuming, and expensive peri-implant infection treatment.

On this subject, the rise in recent patient-reported outcome measures (PROMs) publications demonstrates the importance of also considering patients' perspectives and psychological factors when it comes to 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 to titanium surfaces, zirconia (yttria-stabilized tetragonal zirconia polycrystal, Y-TZP) exhibits favorable epithelial attachment and has shown lower bacterial concentrations in various clinical studies.[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 characterized by a macro- and micro-roughness similar to that of the proven Straumann® SLA® surface.

The following clinical case report describes a successful, fully guided four-unit ceramic rehabilitation over two Straumann® PURE Ceramic Implants (two-piece design). The soft and hard tissue behavior and the patient's fulfilled expectations demonstrated the excellent reliability of this system.

Initial situation

A 71-year-old female presented to our clinic seeking a smile makeover. Her medical history was unremarkable; she was a non-smoker with no systemic diseases (ASA I). Furthermore, she was not taking any medications and had no allergies.

The clinical assessment included the presence of an unesthetic rehabilitation in the second sextant that showed extruded and tilted teeth in the vestibular area. In addition, the cervical edges of the crowns of #12 and #22 were visible, and there were dark spaces between the teeth, which the patient did not like (Fig. 1).

She explicitly stated her wish for a predictable, minimally invasive, metal-free solution to recover the favorable esthetics of her smile.

[1] Andre Chen, DDS, MSc, PHD
Co-Founder International Advanced Dentistry, Director, Oral Surgery and Implantology, Director Research and Development, Lisbon, Portugal

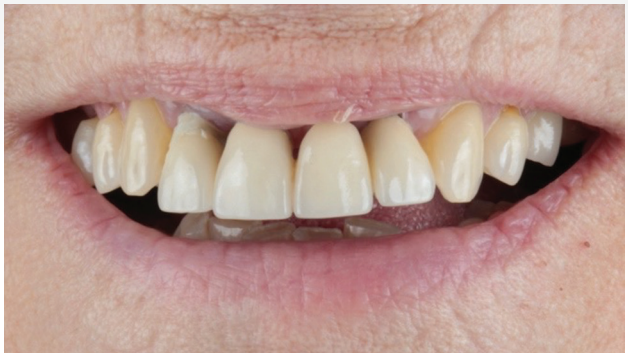

Fig 1

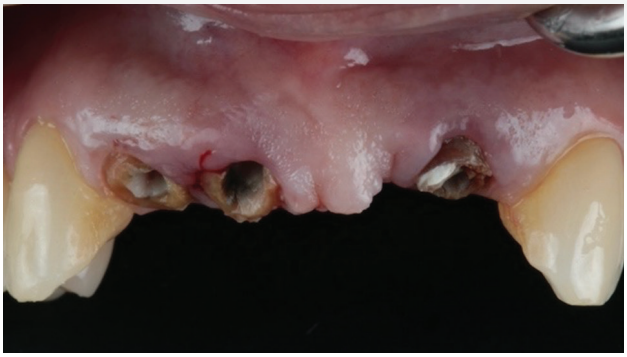

Fig 2

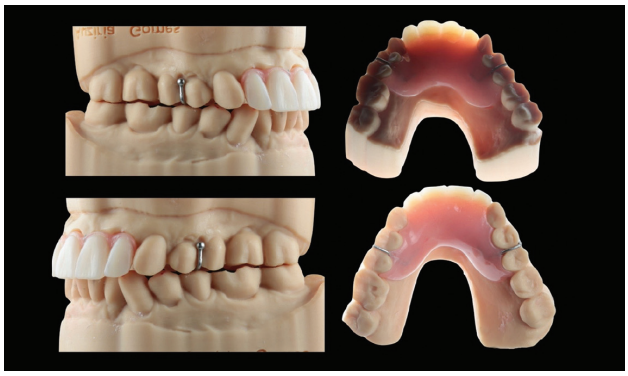

Fig 3

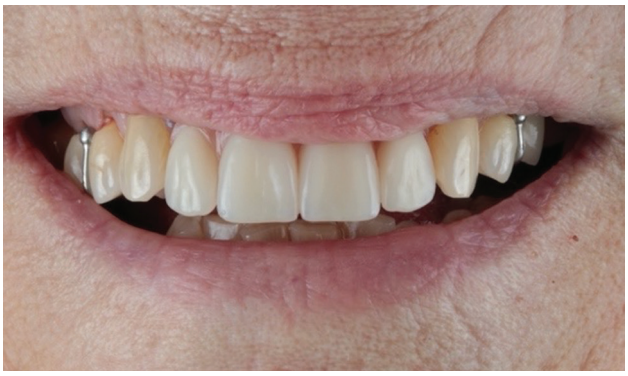

Fig 4

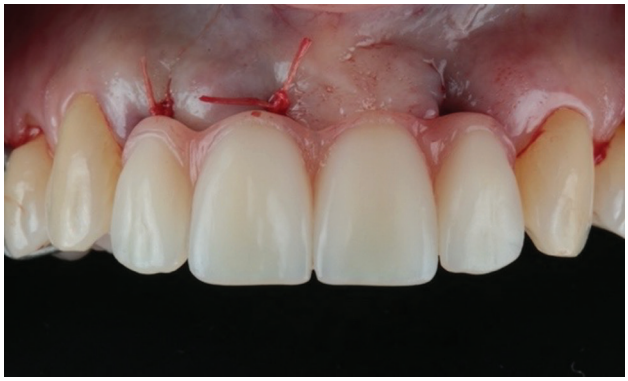

Fig 5

Treatment planning

The clinical intraoral and radiographic examination after removal of the bridge revealed the presence of a hopeless dentition with vertical root fractures on teeth #12, #11, and #22, with an active infection and loss of the buccal plate in all of them (Fig. 2).

After a thorough discussion of the various treatment options with the patient, delayed implant placement was decided due to the active infection in the zone.

As a first step, the root remnants were extracted with minimal trauma, with the intention of preserving the remaining bone. Since the esthetic appearance was an essential factor for the patient, a removable prosthesis replacing #12, #11, #21, and #22 was prepared and placed on the same day after the surgical treatment (Figs. 3-5).

12 weeks later, during the follow-up visit, uneventful healing was observed (Figs. 6,7).

Following the clinical examination, a CBCT scan was recorded to determine the amount of bone in the edentulous area. The CBCT scan (Planmeca Romexis®) confirmed sufficient bone availability for implant placement in combination with bone augmentation. Therefore, an intraoral scanner (3shape) was used for STL acquisition, and this information was sent to the lab (Fig. 8).

The DICOM and STL files were merged for implant planning and production of the static guided pilot drilling digital workflow surgical guide (Straumann® P20+). The plan was to insert two Straumann® PURE ceramic implants in locations #12 (Ø4.1x10 mm) and #22 (Ø4.1x10 mm) for a 4-unit (#12, #22) screw-retained bridge. In addition, PEEK temporary abutments for the provisional bridge were also considered for the post-implant healing phase.

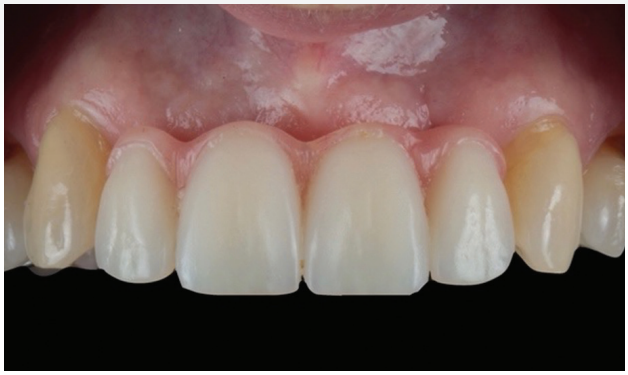

Fig 6

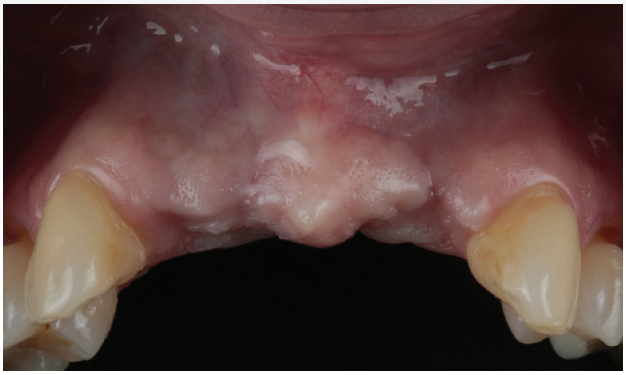

Fig 7

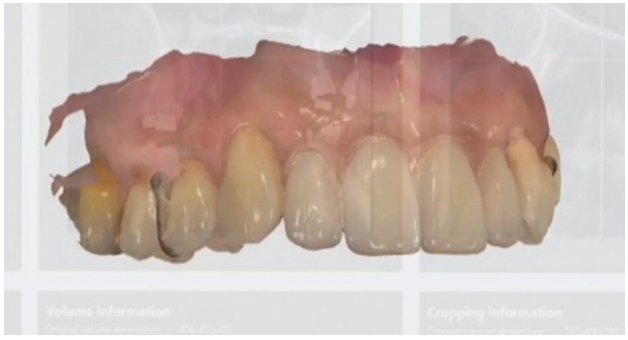

Fig 8

The surgical guide contained the information on the ideal prosthetic-driven implant position (Figs. 9,10).

Surgical procedure

Before surgery, the surgical guide was evaluated to ensure the proper fit (Fig. 11). Local anesthesia with lidocaine 2% and epinephrine 1:100k was administered. A mucoperiosteal flap was raised with a crestal incision. To prepare the implant beds, the Straumann® Surgical Cassette was used following the manufacturer's drilling protocol. The implant beds were prepared to Ø2.2 mm, then widened to Ø2.8 mm, and continued with the Ø3.5 mm Straumann® Twist Drill PRO, and the final preparation depth was checked with the Ø3.5 mm depth gauge. Profile drilling and subsequent tapping were part of the final implant bed preparation (Fig. 12).

Afterward, the implant package blisters were opened immediately before implant placement, and the implant carriers were carefully removed. Next, the implants were held by a ceramic pin and placed with the aid of the handpiece in a clockwise direction at a speed of 15 rpm and torqued to 35 Ncm (Figs. 13,14).

Two Straumann® PURE cover screws were used to allow optimal submucosal healing.

In addition, as planned, guided bone regeneration with xenograft and a resorbable membrane was performed, and the mucoperiosteal flap was carefully adapted and sutured with GORE-TEX® 4.0. First intention closure was achieved (Figs. 15,16).

A follow-up visit was scheduled after 14 days, and the healing was uneventful.

Prosthetic procedure

Three months after healing of the peri-implant tissues, the implants were located, and a conservative horizontal crestal incision was made to access the closure screw. Next, the caps were removed with the SCS Screwdriver, and an open-tray impression was taken for the Straumann® PURE Ceramic Implant system.

A screw-retained provisional with a Straumann® Temporary Abutment VITA CAD-Temp® was prepared. The temporary abutment was individualized and polished on an implant analog according to the clinical situation. The provisional restoration was placed on the implants, and the screw was tightened to between 15 and 35 Ncm. Finally, occlusion was assessed (Figs. 17-22).

For the final restoration, the Straumann® PURE Ceramic Abutments were used for the restoration of RD Straumann® PURE Ceramic Implants. A 4-unit zirconia-ceramic prosthesis was made to fulfill the patient's esthetic and functional requirements (zirconia framework with feldspathic veneering). Once loaded, the access holes were filled with composite restoration and Teflon, occlusion was checked, and periapical radiographs were taken.

Finally, the patient received detailed oral hygiene instructions and was enrolled in a yearly maintenance program.

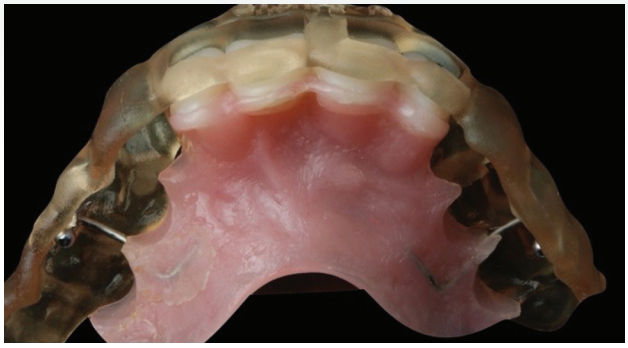

Fig 9

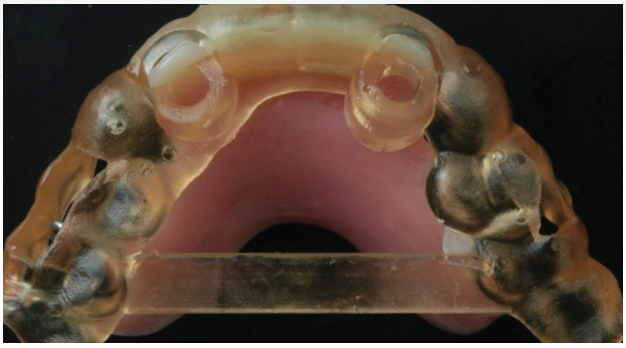

Fig 10

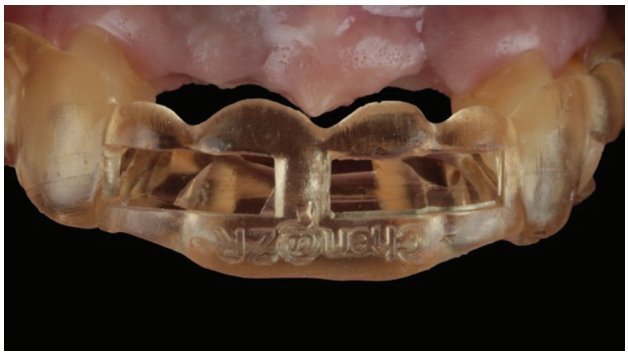

Fig 11

Fig 12

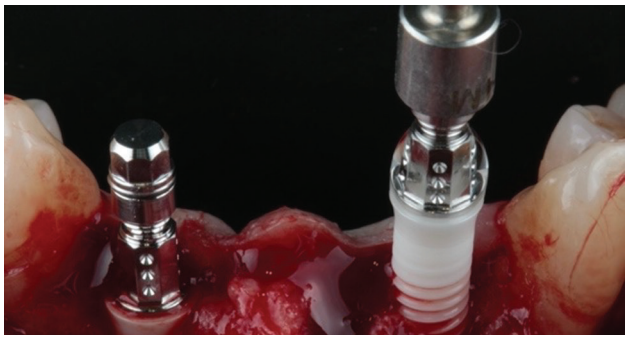

Fig 13

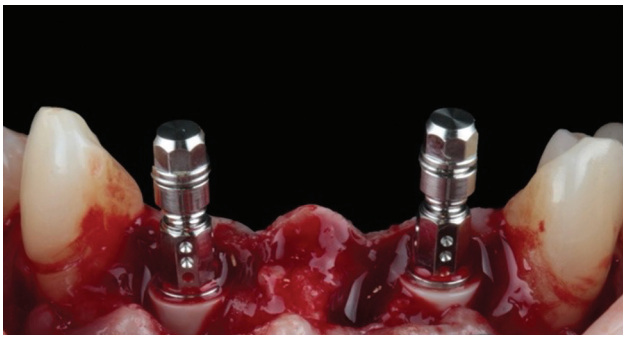

Fig 14

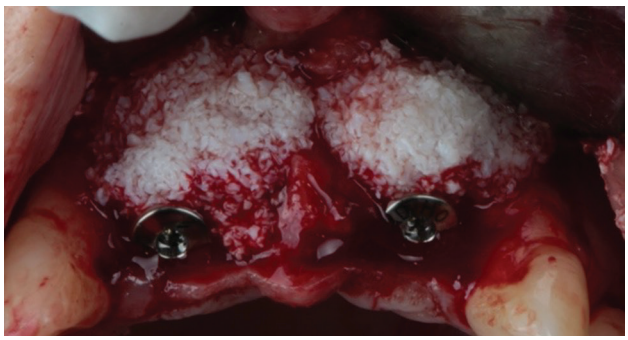

Fig 15

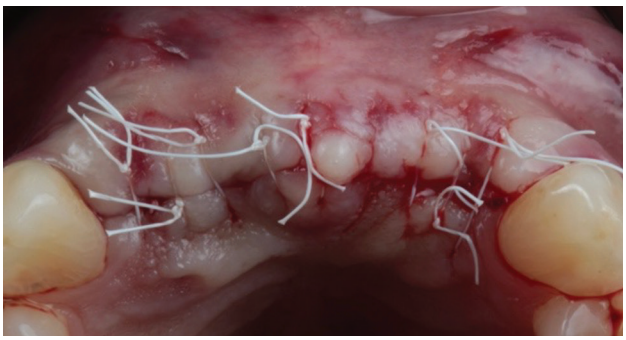

Fig 16

Treatment outcomes

The final esthetic and functional outcomes and the health of both hard and soft tissues fulfilled the patient's requirements. In addition, they improved her quality of life, as she was able to

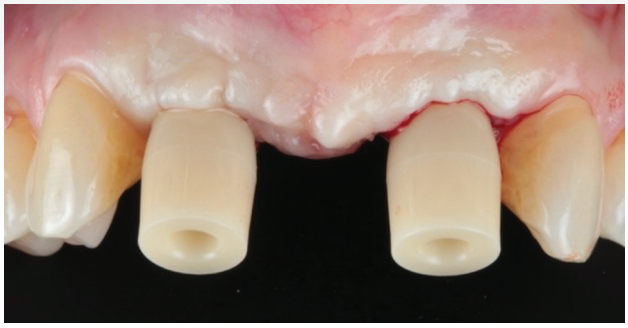

Fig 17

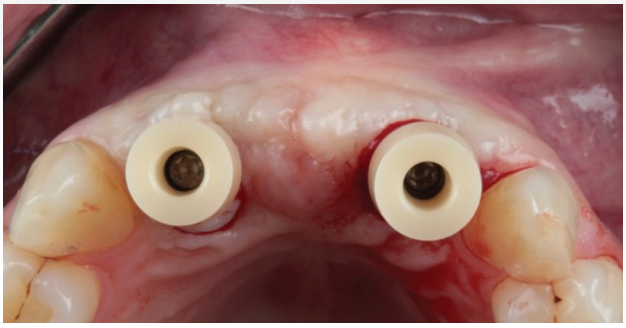

Fig 18

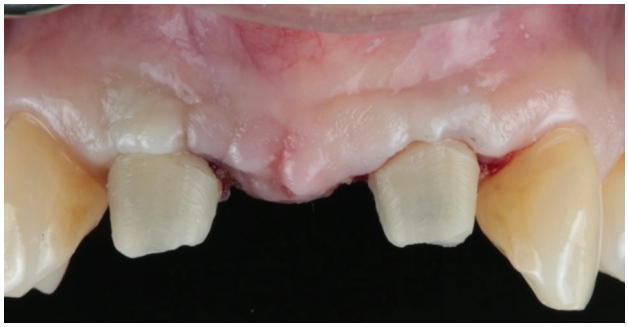

Fig 19

Fig 20

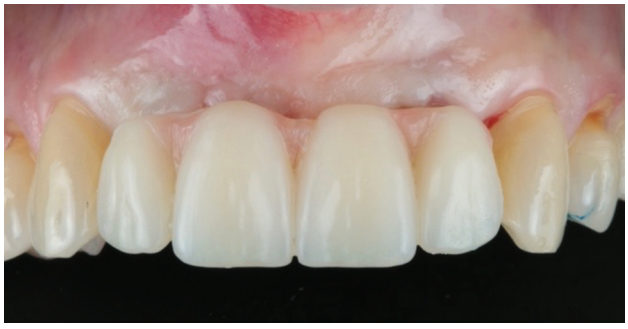

Fig 21

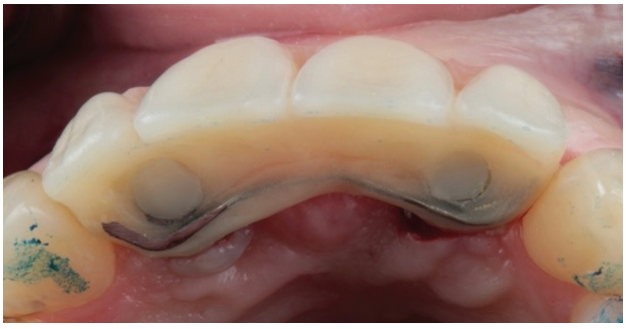

Fig 22

chew and smile again without any limitations.

Author's testimonial

Patients nowadays ask for ceramic implants and materials as a potential rehabilitation material, and the social awareness of metal-free solutions potentiates that market.

I think that ceramic implants are supported by proven data for single and small partial rehabilitations, and they will occupy a significant share of the clinic portfolio in responding to this demand.

New solutions for more complex ceramic implant rehabilitations covering all clinical possibilities will definitely arrive in the future.

References

1. Calvert M, Kyte D, Mercieca-Bebber R, et al. Guidelines for inclusion of patient-reported outcomes in clinical trial protocols: the SPIRIT-PRO extension. JAMA. 2018; 319: 483-494.

2. Wyrwich KW, Norquist JM, Lenderking WR, Acaster S. & Industry Advisory Committee of International Society for Quality of Life, R. Methods for interpreting change over time in patient-reported outcome measures. Qual Life Res. 2013; 22: 475- 483.

3. Duong HY, Roccuzzo A, Stähli A, Salvi GE, Lang NP, Sculean A. Oral health-related quality of life of patients rehabilitated with fixed and removable implant-supported dental prostheses. Periodontol 2000. 2022 Feb;88(1):201-237.)

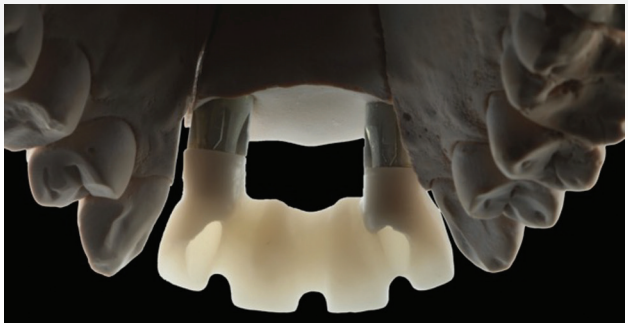

Fig 23

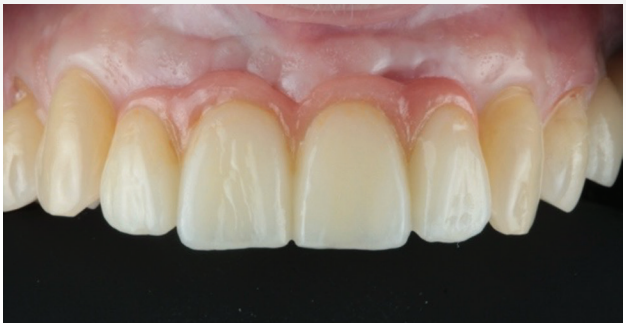

Fig 24

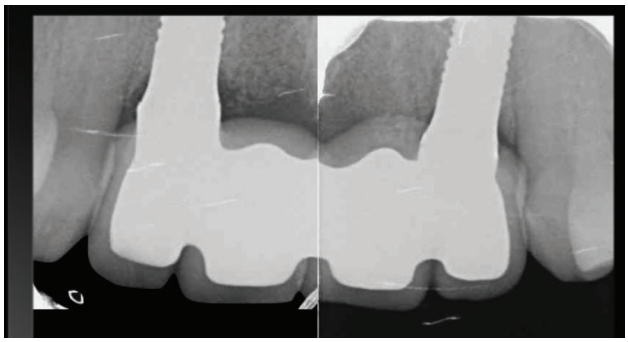

Fig 25

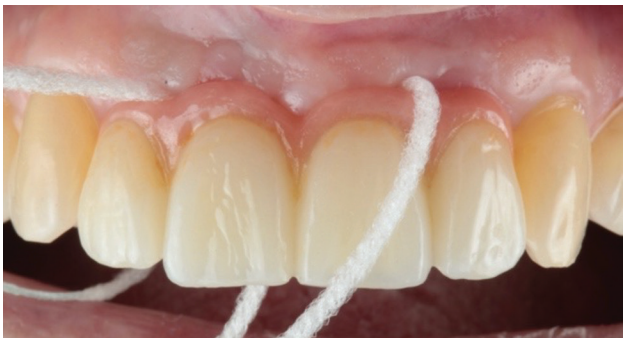

Fig 26

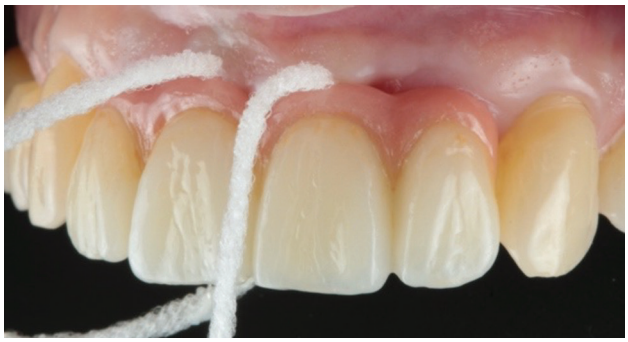

Fig 27

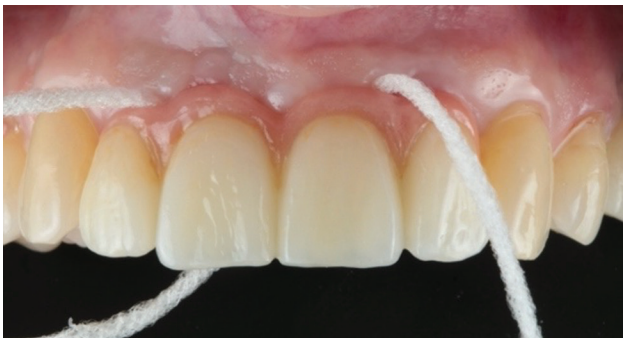

Fig 28

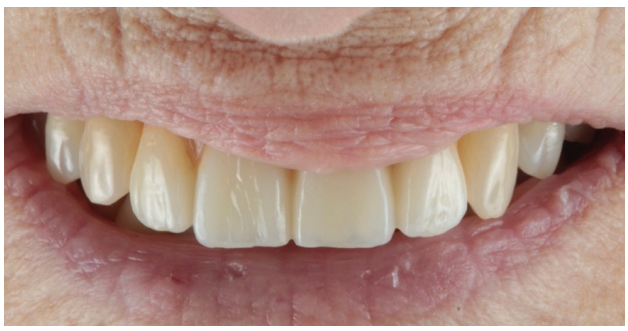

Fig 29

4. Bidra AS, et al. Clinical outcomes of implant abutments in the anterior region: a systematic review. J Esthet Restor Dent. 2013 Jun;25(3):159-76. Epub 2013 May 3.

5. Degidi M, et al. Inflammatory infiltrate, microvessel density, nitric oxide synthase expression, vascular endothelial growth factor expression, and proliferative activity in peri-implant soft tissues around titanium and zirconium oxide healing caps. J Periodontol. 2006 Jan;77(1):73-80.

6. Welander M, et al. The mucosal barrier at implant abutments of different materials. Clin Oral Implants Res. 2008 Jul;19(7):635-41. Epub 2008 May 19.

7. Lindquist LW, et al. A prospective 15-year follow-up study of mandibular fixed prostheses supported by osseointegrated implants. Clinical results and marginal bone loss. Clin Oral Implants Res. 1996 Dec;7(4):329-36.

Reprinted wirth permission by youTooth October 2022