Online Only | Implantology



# Simplifying Immediate Implant Placement and Restoration in the Maxillary Anterior

The case illustrated in this article highlights a simplified approach to immediate implant placement and its restoration for a failing maxillary single anterior tooth.

By Rami Salloum, DDS, Gregori M. Kurtzman, DDS

May 1, 2025 | Volume 46 , Issue 5 , May 2025

## ABSTRACT

Immediate implant placement is a commonly utilized treatment in the maxillary anterior when a natural tooth fails. This method of treatment can pose challenges related to the available anatomy and adjacent teeth when placing the implant in an extraction socket. Virtual planning and the use of a surgical guide allows for implant placement in a more ideal position relative to the contour of the facial plate so as to avoid dehiscence of the implant at placement and enable prosthetic considerations to be followed for the planned restoration. The case illustrated in this article highlights a simplified approach to immediate implant placement and its restoration for a failing maxillary single anterior tooth.

Clinicians frequently encounter cases involving a single tooth that has broken due to either restorative, endodontic, periodontal, or a combination of these factors. The tooth may be deemed unsalvageable, or the patient may choose not to invest in attempts to save the damaged tooth and instead prefer to consider an implant as a replacement option.

Success with immediate implant placement requires achieving adequate bone-to-implant contact (BIC) to attain initial stability.[1] Bone density affects initial implant stability, as does the implant's thread design. Site preparation also influences the initial stability of the implant[2] and is especially critical in the maxillary anterior because of this region's typically lower-density bone. Increasing the bone density during preparation has shown to improve initial implant stability and accelerate site healing around the implant.[3,4] Osseodensification provides effective primary stability in low-density bone while maintaining marginal bone integrity following loading. Use of specialized osseodensification burs during osteotomy preparation improves density around the implants.[5]

The implant's thread design plays a factor in initial stability. Implants with deeper threads (macrogeometry) are able to engage the surrounding bone with higher BIC at placement providing good initial stability.[6,7] To maximize initial implant stability, engagement of bone apical to the terminus of the tooth's root allows greater BIC that may not be initially available in the crestal portion of the extraction socket at immediate placement. Maximizing implant length to take advantage of the available anatomy aids in improving initial stability. Additionally, underpreparation of the apical area allows osseodensification to increase bone density and achieve greater BIC results. A spiral implant with a tapered design with deep threads, as described in this case report, allows additional osseodensification during placement with improved initial stability compared to implant designs with shallow thread designs or non-tapered bodies. A recent study reported high success with maintenance of crestal bone over time with this implant design.[8]

Immediate implant placement presents challenges when the osteotomy is performed freehand. The shape of the extraction socket may lead to the osteotomy bur being diverted to the facial aspect, which could lead to dehiscence of the implant upon placement. Guided surgery can be used to avoid this potential problem. Additionally, virtual planning can be utilized to aid in the development of a surgical guide that is based on the patient's anatomy and enable prosthetically driven implant placement to minimize restorative problems. This approach also permits flapless surgery to improve patient comfort during and after the surgery while decreasing practitioner time during surgery. The following case is presented that utilizes virtual planning for an immediate implant placement; the restorative phase was delayed because of the need for grafting at implant placement and insufficient insertion torque, which prohibited immediate provisionalization.

## Case Presentation

A 78-year-old male patient presented for consultation with a fractured maxillary right central incisor (tooth No. 8) **(Figure 1)**. He was currently using a temporary partial denture for the missing crown of the tooth. The patient expressed interest in replacing the tooth with an implant. A review of his medical history revealed no significant medical issues.

A periapical radiograph of tooth No. 8 was taken to evaluate the remaining portion of the tooth at the gingiva and the adjacent anatomy **(Figure 2, left)**; a cone-beam computed tomography (CBCT) panoramic radiograph was recorded **(Figure 2, right)** to assess the dentition. A periodontal examination was performed, and the rest of the dentition was found to be healthy with no issues noted. Tooth No. 8 had slight bone loss on the distal aspect, and no periapical pathology was noted radiographically. Sufficient anatomy was present apical to the root of tooth No. 8 and adjacent to it on the mesial and distal aspects to permit implant placement.

## Treatment Plan Formulation

Due to the extensive loss of tooth structure of tooth No. 8, endodontic treatment was deemed a non-viable option and, therefore, was not recommended. The remaining treatment alternatives included extraction of tooth No. 8 followed by either: placement of a fixed bridge involving teeth Nos. 7 through [9]; fabrication of a removable partial denture; or placement of a dental implant. After reviewing the benefits and limitations of each option with the clinician, the patient expressed a clear preference for implant therapy because of its long-term predictability, the ability to preserve adjacent natural teeth, and the potential for an esthetic, natural-looking result. A treatment plan was formulated for immediate implant placement at the site of tooth No. 8 with crestal osseous grafting and delayed restoration of the implant. The treatment plan was reviewed with the patient, who accepted the recommendations.

A CBCT scan was performed, and both arches were intraorally scanned with an intraoral scanner (Primescan, Dentsply Sirona, dentsplysirona.com) for implant planning **(Figure 3)**. A full-arch impression was taken for fabrication of an Essix temporary retainer to be utilized during the healing phase of treatment after implant placement. The patient was then dismissed.

The CBCT and intraoral data was imported into inLab and SICAT softwares (Dentsply Sirona) to plan the implant placement. A virtual coronal portion of tooth No. 8 was placed onto the virtual arch in the software to facilitate implant placement based on the prosthetic positioning of the final restoration in coordination with the present anatomy **(Figure 4)**. The implant position was then created virtually to accommodate a 4.2 mm x 13 mm implant (Spiral SB/LA Implant, Ritter Implants, ritterimplants.com). A surgical stent was created virtually in the software **(Figure 5)**. The surgical guide was then milled with clear polymethyl methacrylate (PMMA) on an inLab MC X5 milling machine (Dentsply Sirona). The Essix temporary retainer was created using the model from the 3D-printed digital wax-up made at the prior appointment.

## Surgical Appointment

The patient presented for the surgical appointment at which time the consent form was reviewed and signed by the patient after any questions were answered. The patient was given 1,000 mg of amoxicillin and 500 mg of Tylenol, then asked to rinse with a 1.2% chlorhexidine oral rinse (PerioGard®, Colgate-Palmolive, colgateprofessional.com) prior to the procedure.

Blood was drawn from the patient to fabricate leukocyte platelet-rich fibrin (L-PRF). Local anesthetic was placed buccally and palatally to the tooth to be extracted. A periotome was used to detach the gingival attachment from the tooth. Elevators were used to luxate the root of tooth No. 8, and the root was atraumatically extracted with a universal forcep. The extraction socket was curetted and debrided to remove any granulation tissue. The socket was then irrigated with sterile saline. A probewas then used to examine the socket walls for any dehiscence; none was noted, indicating the socket remained intact.

The surgical guide was inserted intraorally to verify its fit in relation to the adjacent teeth and its stability on the arch. The osteotomy was created using a guided surgical kit (Ritter Guided Kit, Ritter Implants) and the surgical guide for immediate implant placement at site No. 8. The initial osteotomy was started using a 2.8 mm pilot drill from the guided surgical kit (Ritter Implants), placed through the surgical guide to ensure accurate angulation and positioning. This was followed by osseodensification using Densah® burs (Versah, versah.com), specifically the 3.0 mm and 3.5 mm burs, operated in reverse (counterclockwise) mode, in accordance with the osseodensification protocol established by the bur manufacturer, at 1,200 RPM with copious saline irrigation. The implant (Spiral SB/LA Implant, 4.2 mm x 13 mm, Ritter Implants) was placed through the surgical guide intraorally and into the site 3 mm subcrestally. Implant insertion was achieved at 25 Ncm torque. A custom healing abutment was prepared and kept on the side.

MinerOss® allograft (BioHorizons, biohorizons.com) was combined with PRF from the blood that was drawn at the start of the appointment to create a „sticky bone" mixture. This mixture was then placed to graft any voids crestally between the socket walls and implant. The custom healing abutment was then placed on the implant.

A periapical radiograph was taken to verify seating of the healing abutment and document the implant position relative to the anatomy **(Figure 6)**. Pressure was applied to the gingival tissue to aid in clot formation between the soft tissue and sticky bone. Sutures were placed to keep the soft tissue in contact with the custom healing abutment using 4-0 chromic gut sutures. An Essix provisional was inserted intraorally, and the patient was instructed to keep it in place 24 hours a day except only to remove it to perform oral hygiene until the next appointment in 2 weeks **(Figure 7)**.

## Restorative Phase

At 2 weeks post-immediate implant placement the patent returned for assessment of site healing and removal of any sutures that remained. On examination it was noted that the site was healing well and the patient expressed that he was comfortable. The patient was instructed to continue to wear the Essix provisional during the day but could leave it out when sleeping. He was scheduled to return in 4 months to check osseointegration and initiate the restorative phase of treatment.

At 4 months post-implant placement the patient presented to have the site healing checked and to assess implant osseointegration. Upon removal of the Essix provisional, the soft tissues presented without inflammation around the custom healing abutment **(Figure 8)**. The healing abutment was removed, revealing a well-formed gingival cuff with no signs of inflammation **(Figure 9)**. An implant stability quotient (ISQ) reading of 72 confirmed successful osseointegration of the implant, indicating that it was ready for restoration.

A scan body (5 Axis Dental, 5axisdental.com) designed to be compatible with the Ritter 3.5 platform was placed into the implant **(Figure 10)**. The maxillary arch was then scanned with the intraoral scanner (Primescan). The custom healing abutment was reinserted intraorally, and the patient was dismissed. Shade A3.5 was selected to match the adjacent teeth. The scan data was transmitted to the dental laboratory (5 Axis Dental lab) for fabrication of a custom implant abutment and cementable crown.

The implant custom abutment and crown were returned from the laboratory and the patient presented for insertion. The healing abutment was removed, and the custom restorative abutment was inserted into the implant and the screw was hand-tightened **(Figure 11)**. A periapical radiograph was taken to verify complete mating of the implant and abutment connector **(Figure 12)**. The crown was tried in intraorally and marginal fit was verified. The patient was handed a mirror and approved the esthetics of the restoration.

The crown was removed and the screw access on the abutment was sealed with Teflon tape. The crown was then cemented to the abutment using a glass-ionomer cement (GC FujiCEM® 2, GC America, gc.dental/america). Upon cement setting, any marginal cement was removed with an explorer. The occlusion was checked and adjusted as needed **(Figure 13)**. A periapical radiograph was recorded to document the completed restoration **(Figure 14)**, and an impression was taken with the intraoral scanner (Primescan) for production of a nightguard.

## Follow-up Period

One week later the patient presented for an evaluation of the implant restoration and delivery of the nightguard. An absence of inflammation was noted at the gingival margins and the patient indicated he had been comfortable since restoration insertion **(Figure 15)**. The mouthguard was inserted and the patient was given homecare instructions on the use of the appliance **(Figure 16)**. The patient was scheduled for routine prophylaxis appointments.
At the 1-year prophy recall appointment the gingival tissue around the implant restoration presented with a lack of inflammation and healthy soft tissue **(Figure 17)**. A periapical radiograph was taken to check crestal bone levels (Figure 18). The grafted bone that had been placed crestally remained at proper levels demonstrating that healthy bone was being maintained to the implant‘s crestal portion.

## Conclusion

Immediate implant placement is a common treatment modality when a single tooth is damaged structurally, whether restoratively, endodontically, periodontally, or a combination of these. The use of osseodensification and an implant design with deep threads increases an implant‘s primary stability allowing for either immediate provisionalization or a shortened healing time before placement of a provisional restoration on the implant. Virtual planning and a surgical guide based on that planning aids in the process and helps eliminate problems that may arise when using freehand surgical placement. In the present case, the patient expressed that the restoration process-from extraction, implant placement, and provisionalization to the final prosthesis-was relatively painless and that he was satisfied with the esthetic and functional results.

## ABOUT THE AUTHORS

**Rami Salloum, DDS**
Attending Faculty, Dental Department, Lehigh Valley Health Network, Bethlehem, Pennsylvania; Private Practice, Bethlehem, Pennsylvania; Diplomate, American Board of Oral Implantology/Implant Dentistry; Fellow, American Academy of Implant Dentistry

**Gregori M. Kurtzman, DDS, MAGD**
Former Assistant Clinical Professor, University of Maryland School of Dentistry, Baltimore, Maryland; Private Practice, Silver Spring, Maryland; Diplomate, International Congress of Oral Implantologists

## REFERENCES

1. Huang YC, Huang YC, Ding SJ. Primary stability of implant placement and loading related to dental implant materials and designs: a literature review. J Dent Sci. 2023;18(4):1467-1476.

2. Sheikh Ibrahim A, Jaafo MH. A comparison of different implant site preparation techniques in low-density bone: an ex-vivo study. Cureus. 2024;16(9):e70318.

3. Palaskar JN, Joshi N, Shah PM, et al. Influence of different implant placement techniques to improve primary implant stability in low-density bone: a systematic review. J Indian Prosthodont Soc. 2020;20(1):11-16.

4. Stacchi C, Troiano G, Montaruli G, et al. Changes in implant stability using different site preparation techniques: osseodensification drills versus piezoelectric surgery. A multi-center prospective randomized controlled clinical trial. Clin Implant Dent Relat Res. 2023;25(1):133-140.

5. Al Ahmari NM. Osseo-densification versus conventional surgical technique in low density jaw bone: a split mouth in vivo study. Technol Health Care. 2022;30(5):1117-1124.

6. Heimes D, Becker P, Pabst A, et al. How does dental implant macrogeometry affect primary implant stability? A narrative review. Int J Implant Dent. 2023;9(1):20.

7. Falco A, Berardini M, Trisi P. Correlation between implant geometry, implant surface, insertion torque, and primary stability: in vitro biomechanical analysis. Int J Oral Maxillofac Implants. 2018;33(4):824-830.

8. Ajanović M, Kamber A, Dervišević A, et al. Assessment of crestal bone loss and degree of success of Ritter spiral dental implants based on radiological measurements. Stomatološki vjesnik. 2023;12(2):12-19.

**Fig 1.** The patient presented with a fracture of the maxillary right central incisor (tooth No. 8) at the gingiva.

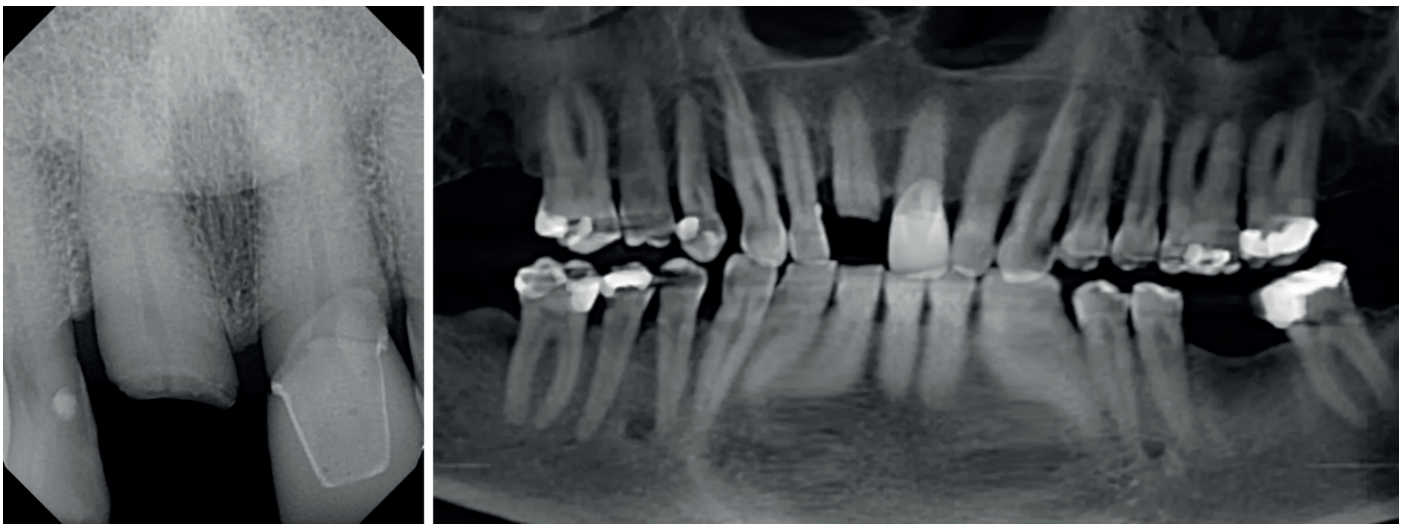

**Fig 2.** Periapical radiograph (left) and panoramic view from a CBCT scan (right) showing the fractured central incisor in relation to the surrounding anatomy.

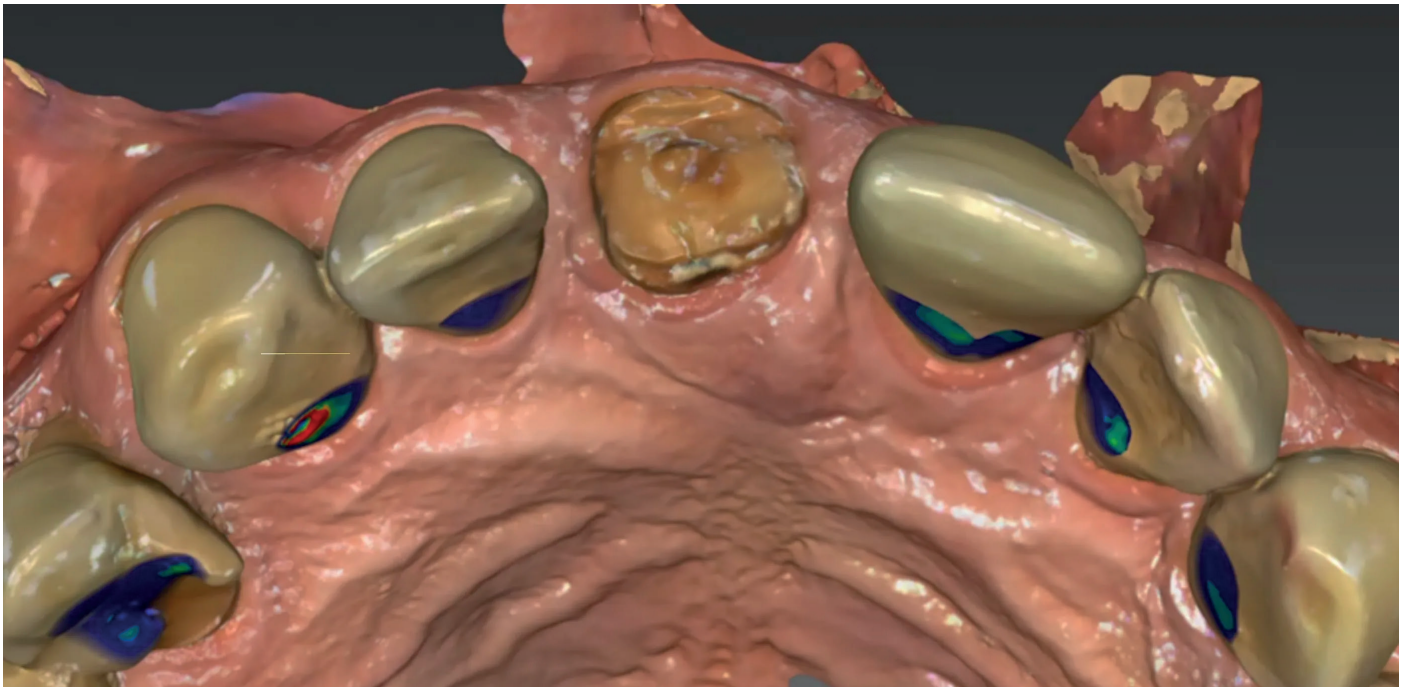

**Fig 3.** Virtual scan of the maxillary anterior region showing the fractured right central incisor (tooth No. 8).

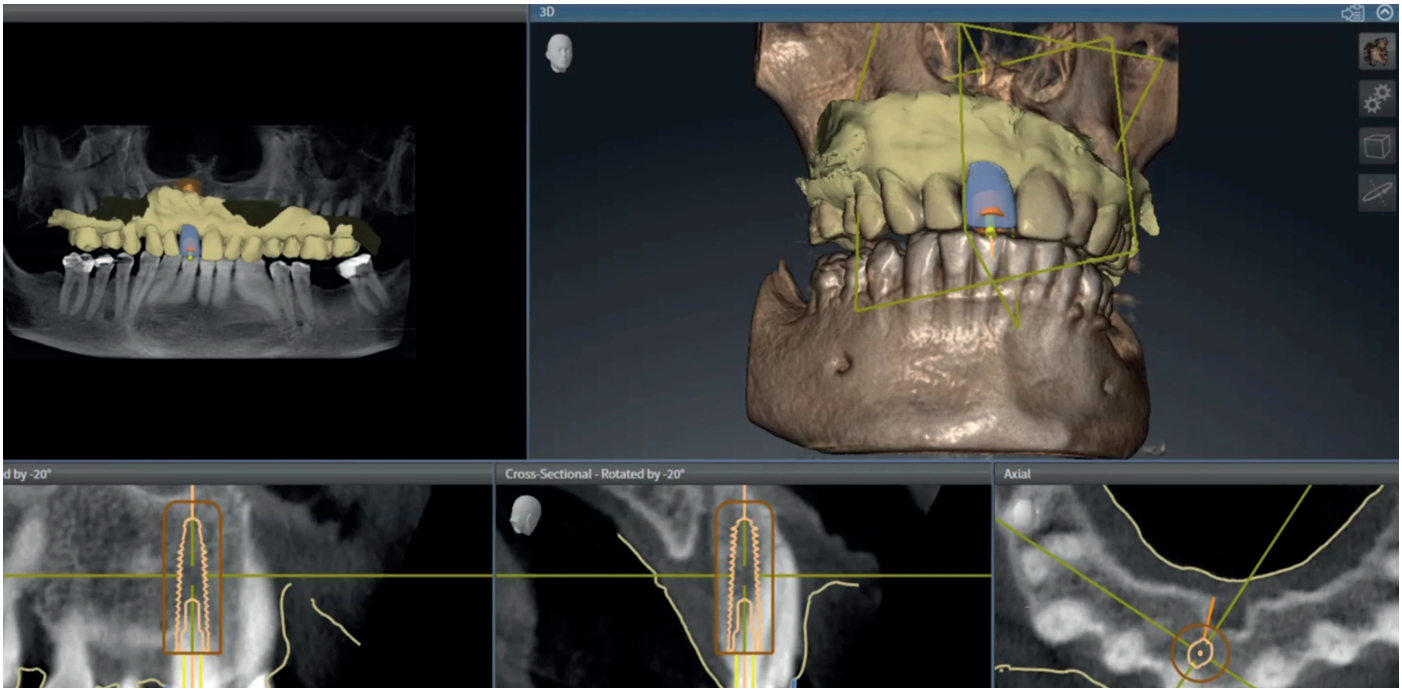


**Fig 4.** Virtual planning of the implant placement (bottom images) and design of the virtual restoration (top two images)

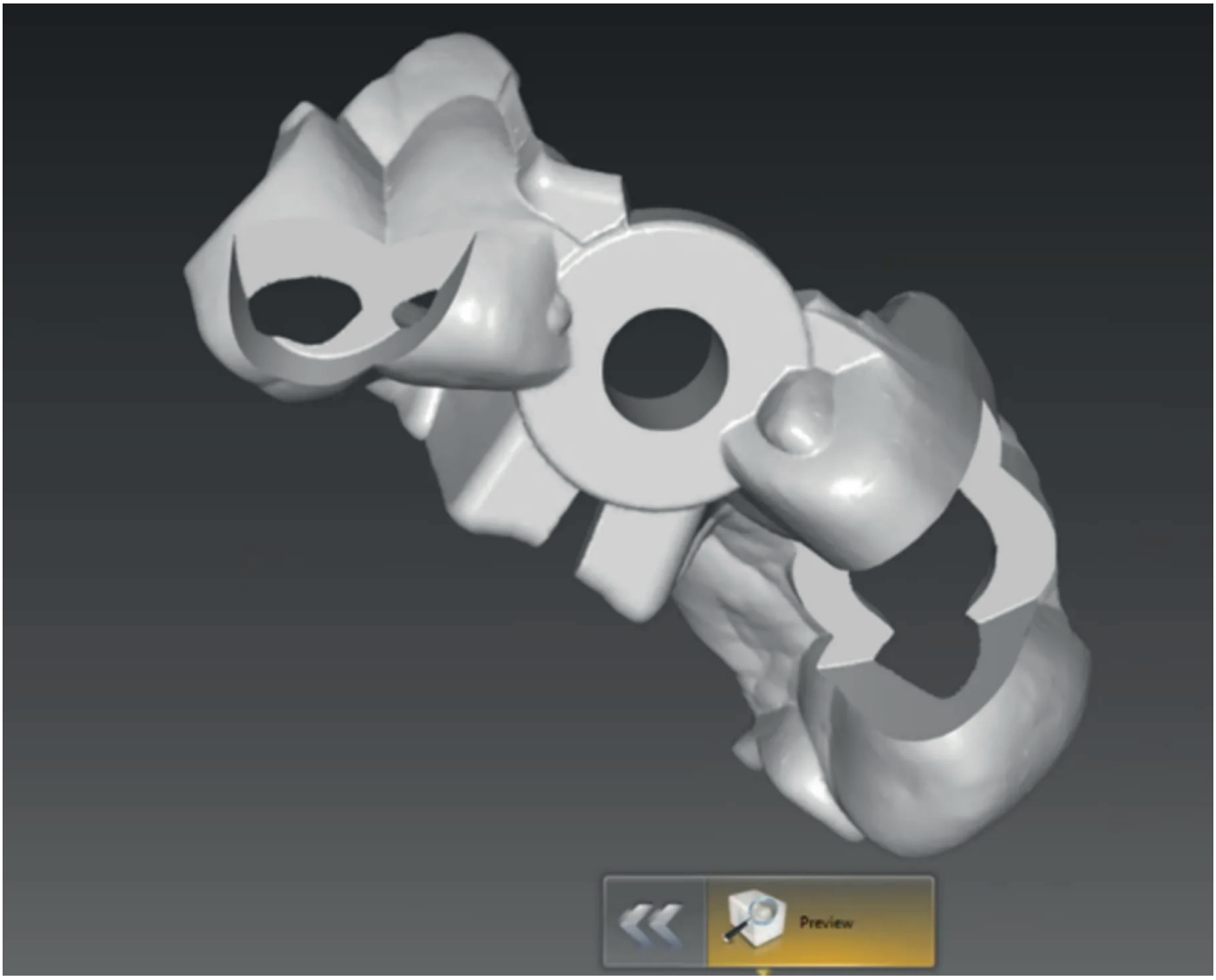


**Fig 5.** Virtual design of the surgical stent created in the software.

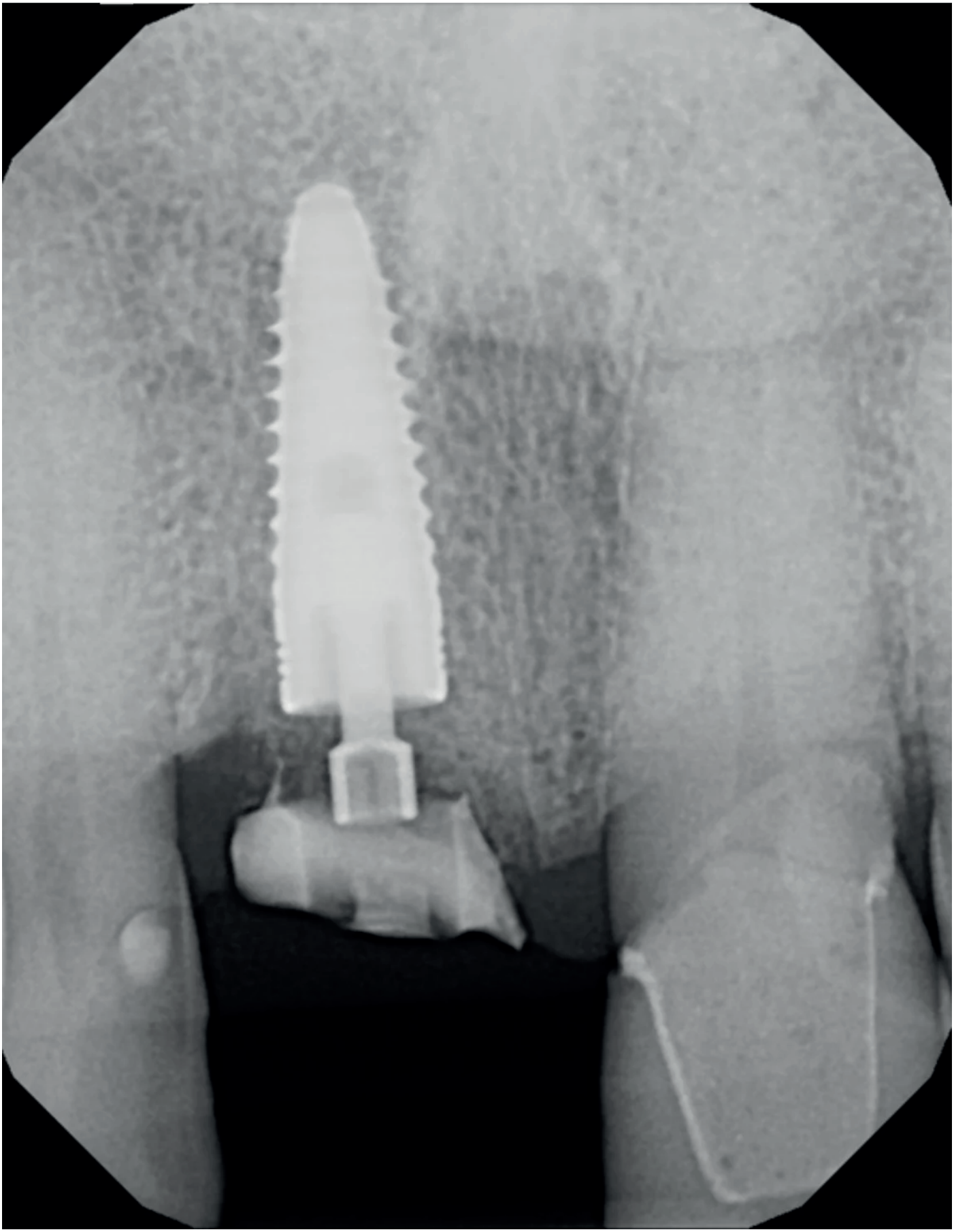

**Fig 6.** Periapical radiograph following the placement of a customized healing abutment after crestal graft placement documenting the implant position in relation to the surrounding anatomy and the crestal depth of the implant.

**Fig 7.** An Essix provisional was placed as a temporary restoration during the implant osseointegration phase of treatment.

**Fig 8.** The customized healing abutment following completion of the implant integration phase of treatment.

**Fig 11.** The custom abutment was placed and the screw hand-tightened.

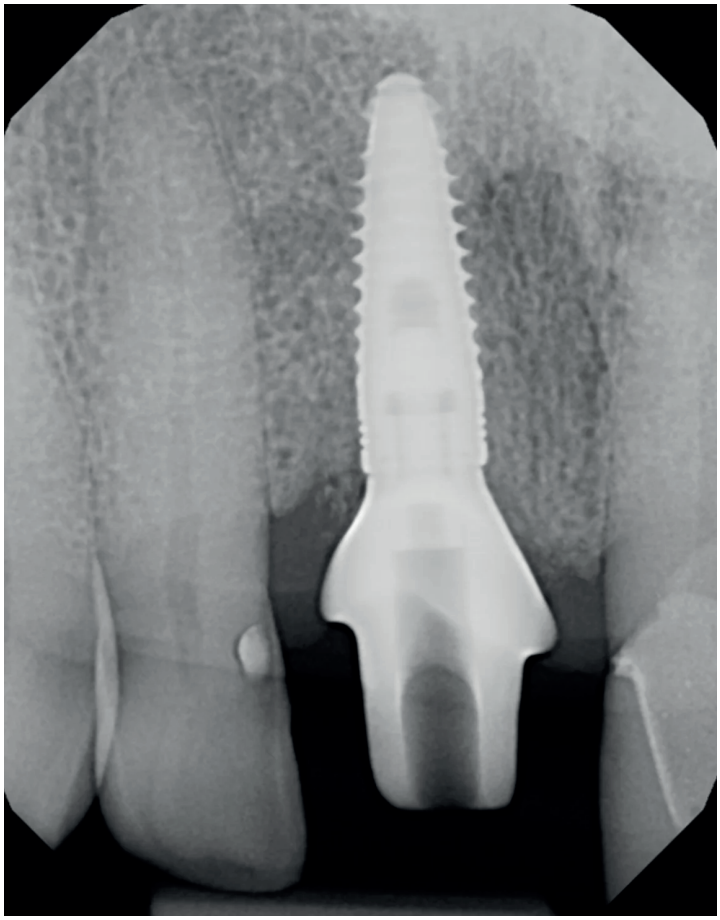

**Fig 12.** Periapical radiograph confirming proper seating of the abutment into the implant.

**Fig 13.** The final restoration was cemented on the custom abutment completing treatment at No. 8.

**Fig 14.** Periapical radiograph confirming proper seating of the abutment into the implant.

**Fig 15.** At 1-week post–crown insertion, the patient returned for delivery of the nightguard, and the gingival tissue at the implant restoration demonstrated good periodontal health with no marginal inflammation noted.

**Fig 16.** The maxillary nightguard was delivered.

**Fig 17.** At 1-year post–restoration placement, the gingival tissue at the No. 8 implant remained absent of inflammation.

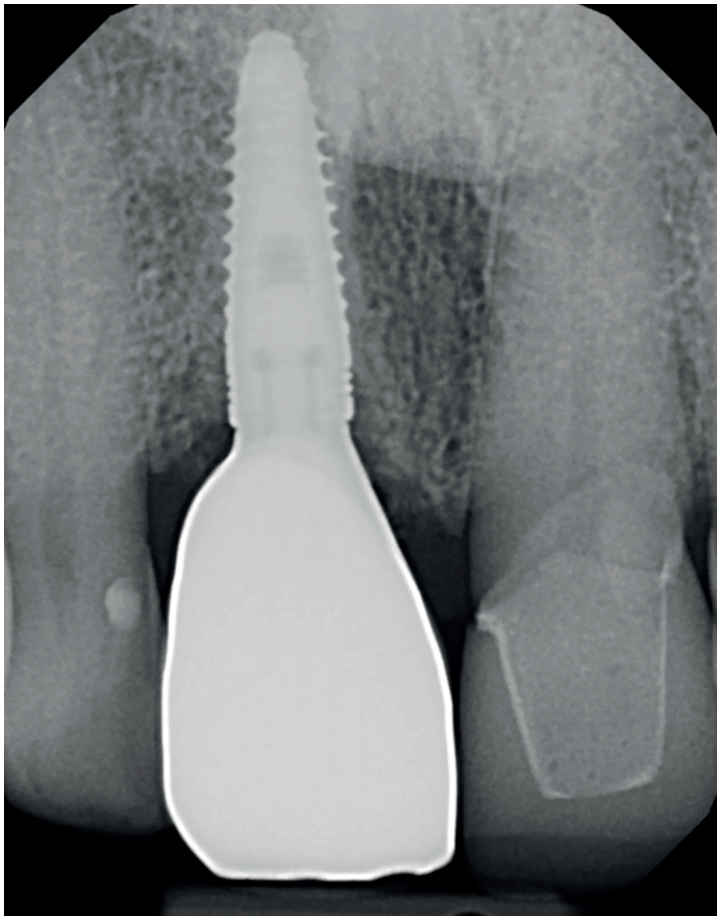

**Fig 18.** Periapical radiograph at 1-year post–restoration placement demonstrating maintenance of crestal bone.