Case-based insights into versatile implant systems for modern dental practice

Clinical validation of prosthetic-driven implantology

Prosthetic-driven implantology integrates surgical, restorative and digital disciplines to optimise implant positioning and long-term peri-implant stability. Recent advances in digital planning, implant macro-design and scannable components have further enabled a crown-down approach that prioritises soft-tissue preservation, restorative space and biomechanical requirements.

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This case series presents two clinical scenarios illustrating how digital workflows and versatile implant designs can be applied to complex aesthetic and posterior maxillary rehabilitation.

The first case describes the replacement of an upper lateral incisor and posterior site using a bone-level implant system combined with a scannable anatomic healing abutment to control soft-tissue maturation without provisionalisation. A palatal roll-flap technique was incorporated to enhance buccal tissue thickness in a high-risk aesthetic area. The second case demonstrates the use of a short tissue-level implant in the posterior maxilla with limited residual bone height, allowing rehabilitation without a sinus augmentation. Treatment was facilitated by guided surgery and use of tapered macro-design implants, enabling high primary stability in low-density bone.

Both cases highlight the importance of integrating digital planning, appropriate implant selection and individualised soft-tissue management. Together, they demonstrate how biologically informed and digitally assisted protocols can improve predictability, reduce chair-time and deliver patient-centred outcomes in modern implant dentistry.

Introduction

Prosthetic-driven implantology has become central to contemporary implant dentistry, redefining how clinicians plan implant positioning and deliver restorations with long-term functional and aesthetic stability.[1] This approach requires an interdisciplinary mindset combining surgical, restorative, periodontal and digital expertise to tailor treatment to individual patient needs. The process begins with the final restoration in mind—emergence profile, soft-tissue architecture, occlusion and biomechanics—and works backwards to determine optimal implant placement. Successful outcomes therefore rely on integrating patient-specific anatomical factors, bone density and volume, soft-tissue phenotype, aesthetic expectations and occlusal considerations into a coordinated treatment plan.[1]

Parallel to these clinical principles, the implant industry has undergone significant transformation. Advances in implant geometry, implant–abutment connections and materials—such high-strength Grade V titanium alloys and versatile designs suited for soft bone—have enhanced primary stability and crestal bone preservation.[2,3] Digital innovations, including CBCT imaging, intra-oral scanning and 3D planning software, now allow clinicians to merge diagnostic information seamlessly.[3–5] This not only improves the accuracy of presurgical planning but also enhances communication and consent by enabling patients to visualise treatment outcomes. Fully guided surgery supports minimally invasive protocols and reduces operative time by transferring the prosthetic plan accurately to the surgical field.[5]

Implant systems that facilitate a prosthetic-driven "crown-down" approach have markedly transformed workflow efficiency. Digital components—such as anatomically shaped scannable healing abutments—allow the emergence profile to be established and captured without provisionalisation, reducing the risk of soft-tissue collapse during impressions.[6–8] These tools streamline clinical workflow, minimise chair-time, protect maturing peri-implant tissues and enhance collaboration between clinician and laboratory, improving overall predictability and patient experience.

01a–d
Preoperative assessment UR2 and UR5. Baseline frontal smile **(a)**. Baseline retracted occlusal view **(b)**. Baseline retracted frontal view **(c)**. Baseline retracted right lateral view **(d)**.

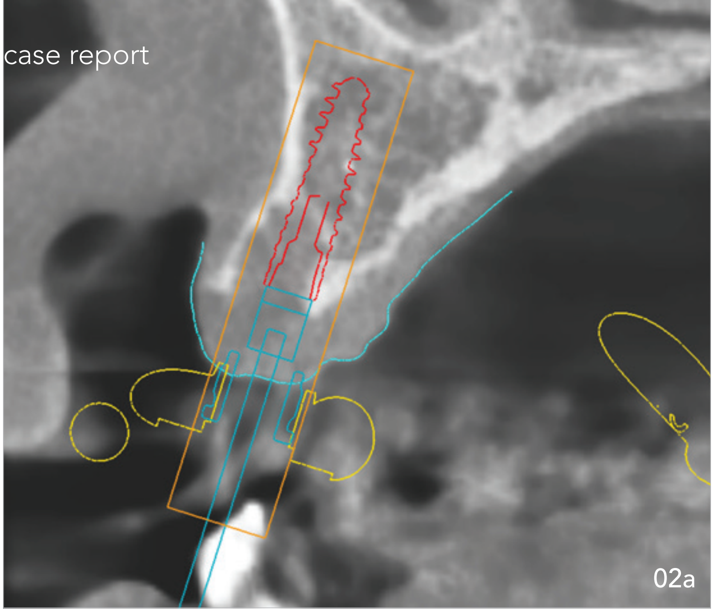
In this case series, two common clinical situations are presented to illustrate how these principles work in everyday practice. The first case focuses on aesthetic-zone management, where soft-tissue control is critical, using a digital workflow and a scannable anatomic healing abutment to guide tissue maturation. The second case addresses the challenge of limited bone height in the posterior maxilla, managed successfully with a short tissue-level implant designed to optimise primary stability in soft bone and avoid sinus augmentation. Together, these cases demonstrate how biological understanding and technological innovation complement one another to deliver predictable, patient-centred implant rehabilitation.

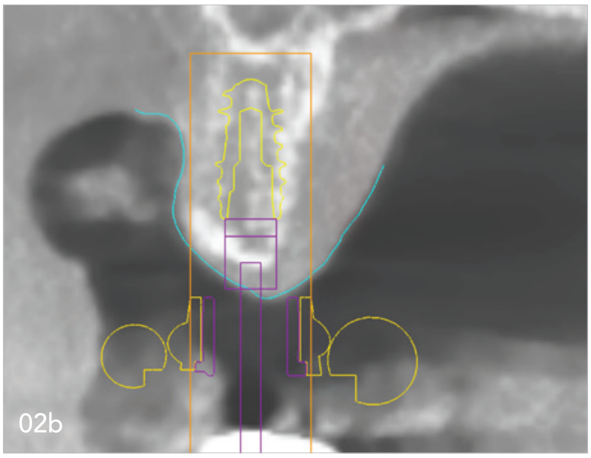
Materials and methods

All cases were planned and executed using a prosthetic-driven digital workflow. Diagnostic data—including CBCT imaging and digital impressions—were merged within SMOP® (Swissmeda) software to enable virtual planning and guide design.[9] Tooth-supported surgical guides were fabricated incorporating specific fully guided sleeves: Ø3.6mm and Ø4.2mm for the bone-level implants, and Ø5.0mm for the tissue-level implant (Integral, Anthogyr).

Two implant configurations of the Axiom® X3 (Anthogyr) system were employed: a boneLevel (BL) design for both the aesthetic-zone and posterior sites, and a Axiom® Tissue-Level (TL) design for a posterior site in a periodontally susceptible patient. Both feature a 6° Morse-taper conical connection with platform switching to enhance interface stability and minimise micro-movement.[10,11]

The implants are manufactured from high strength titanium alloy with a tapered macro-design and progressive thread geometry that compact surrounding bone during insertion, integrating the principles of osseodensification without the need for reverse-rotation burs.[11,12]





02a+b
Digital planning using SMOP® (Swissmeda) software. UR2 3D implant planning **(a)**. UR5 3D implant planning **(b)**.

Surgical preparation followed the recommended guided protocol, using an under-preparation sequence in low-density bone. In the aesthetic zone, soft-tissue management included a palatal roll-flap technique and the use of an anatomic healing abutment (HealFit® SH, Anthogyr) to shape the emergence profile.[13] Posterior sites received standard cylindrical or tissue-level healing abutments according to implant design.

Digital impressions were taken using the TRIOS 3 (3Shape) scanner with the appropriate Axiom® BL and TL metal scan bodies, as well as the scannable anatomic healing abutment.[14–16] Definitive restorations consisted of screw-retained monolithic CAD/CAM zirconia crowns on titanium bases (X-Base, Anthogyr), torqued to manufacturer-recommended values (25 Ncm). Periapical radiographs were used to verify complete seating and stable crestal bone levels at delivery and follow-up.

Case 1

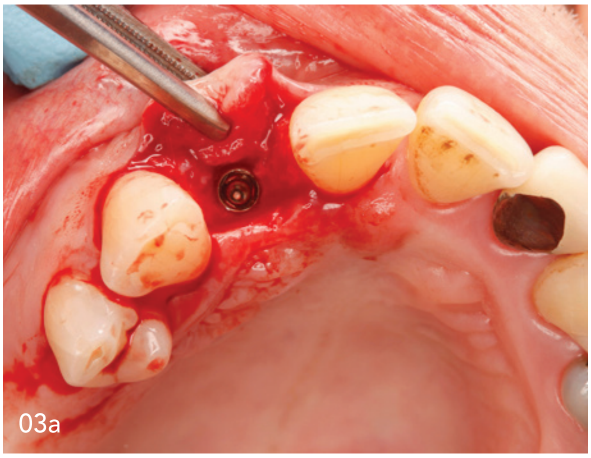
Prosthetic-driven rehabilitation in the aesthetic and posterior zones—soft-tissue management for aesthetic success using scannable healing screws

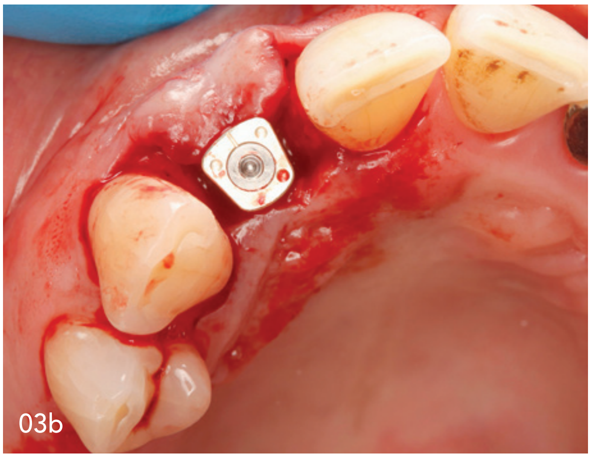
A 68-year-old male (ASA Class II) presented with a fractured post-crown on the UR2.

The non-restorable root was extracted, and an immediate removable denture was provided for aesthetics. He also had long-standing edentulism in the UR5–UR6 region and a defective PFM-crown on the UL2. After discussing all treatment options, the patient chose implant rehabilitation for the UR2 and UR5 to improve posterior support and reduce anterior loading. Replacement of the UL2 crown was also planned. Orthodontic treatment was considered but rejected by the patient.

Treatment plan

Fourteen weeks were allowed after the extraction to facilitate sufficient apical bone formation, followed





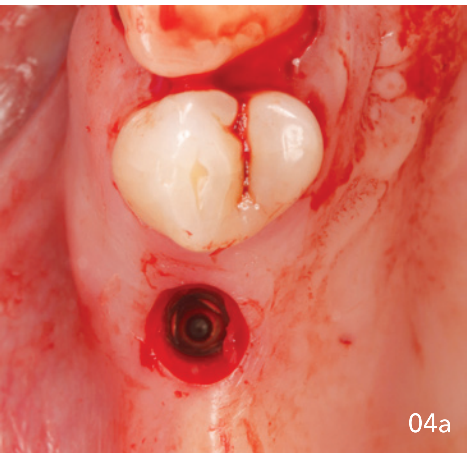
03a+b
UR2 implant placement and Healfit® SH connection. Palatal flap extension de-epithelialised and rolled buccally **(a)**. HealFit® SH shape A, 3.5 × 3.0 mm positioned 1.5 mm supra-mucosal **(b)**.

by clinical and radiographic assessment, including a CBCT scan. The findings confirmed favourable bone volume for both the UR2 and UR5/6 sites; however, the patient elected to replace only one posterior tooth despite adequate bone and restorative space for two implants. Potential challenges were discussed with the patient, including the established recession and papilla loss around his UR3, UR1 and UL1, and the low density of his bone (Class D3/D4), which could affect primary stability and lead to a two-staged approach with extended timings. The patient declined any additional surgery involving a soft-tissue graft and agreed to accept the unfavourable papilla. Having a low smile line, a thick phenotype and sufficient thickness of keratinised tissue (6 mm at UR2 and 4 mm at UR5), we decided to accept this aesthetic compromise (Figs. 1a–d). To maintain soft-tissue stability and prevent future recession, we planned to enhance buccal volume using a roll-flap technique at UR2.

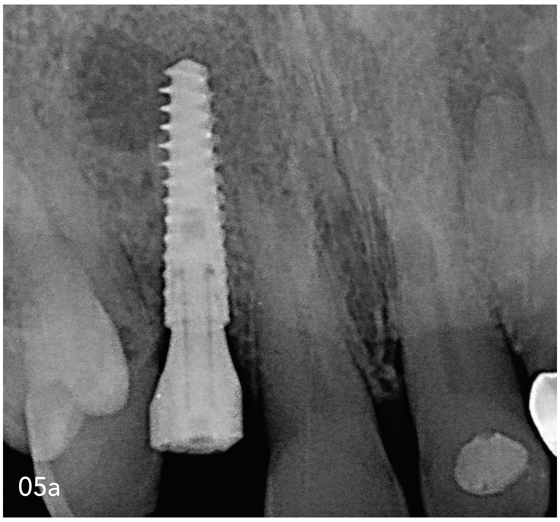
Surgical procedure

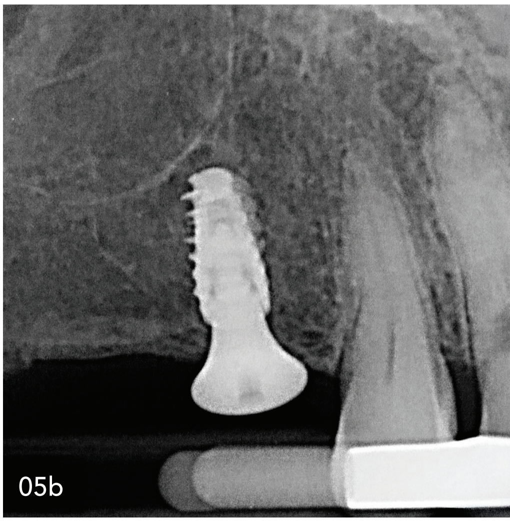
A fully digital, prosthetic-driven plan was created using SMOP (Swissmeda) software (Figs. 2a+b). This workflow allowed visualisation of the final prosthetic contours and accurate transfer of the plan to surgery via a tooth-supported guide, minimising chairside time and patient discomfort. The objective was to achieve natural emergence and long-term soft-tissue stability in the aesthetic zone at UR2 while re-establishing posterior function with a single implant in the UR5 position restored with a molar-sized crown, matching his opposing tooth.

At the UR2 site, bone sounding confirmed favourable papillary support (3 mm from both mesial and distal bony peaks), which informed the decision to include the papilla in the flap. A full-thickness envelope flap with palatal extension was raised to allow the tissue to be rolled buccally, increasing the keratinised-tissue thickness and supporting the gingival margin. Osteotomy was completed following the guided drill sequence (Integral, Anthogyr) and under-prepared by skipping the final drill according to the protocol. A bone-level Ø 3.4 × 14 mm implant (Axiom® X3) was inserted 1.5 mm sub-crestally with a recorded torque of 45 Ncm, allowing for a transmucosal approach. An anatomic scannable healing abutment (HealFit® SH, Anthogyr), shape A, 3.5 × 3.0 mm, was selected using the dedicated manufacturer's gauge and positioned 1.5 mm above the mucosa to contour the soft-tissue profile during healing.[17–19] The palatal extension of the flap was de-epithelialized and rolled buccally. A combination of non-resorbable vertical mattress sutures (5/0 Prolene®) and resorbable single-interrupted 4/0 sutures (PGA Resorba®) was used to achieve tension-free closure (Figs. 3a+b). The denture was relieved to avoid pressure on the implant during healing.



04a+b
UR5 implant placement and final suturing. Flapless implant placement of UR5 **(a)**. Suturing of the flap around UR2 and fit of a 6.0 x 4.0 mm cylindrical healing abutment on UR5 **(b)**.





05a+b
Implant placement radiographs with healing abutments *in situ*. UR2 Axiom® X3 bone level implant 3.4 x 14 mm **(a)**. UR5 Axiom® X3 bone level implant 4.0 x 8.00 mm **(b)**.

At the UR5 site, the implant was placed flapless to reduce surgical time and maintain the keratinised mucosa. The tooth-supported guide ensured precise positioning. Osteotomy was prepared using the same guided sequence, and a Ø 4 × 8 mm bone-level implant (Axiom® X3) was placed at a final torque of 40 Ncm. A standard cylindrical healing abutment (Ø 6.0 × 4.0 mm) was connected (Figs. 4a+b). Immediate postoperative periapical radiographs confirmed accurate three-dimensional positioning and complete seating of both abutments (Figs. 5a+b). The patient was prescribed a short course of antibiotics (Amoxicillin 500 mg for five days) and advised to use oxygen-releasing gel and mouthwash (Blue-m®) for two weeks.

Treatment outcome

Healing progressed uneventfully, and both implants demonstrated full osseointegration, stable peri-implant tissues and no inflammation (Fig. 6). Following a fully digital workflow, an intra-oral scan (TRIOS 3, 3Shape) was taken 12 weeks postsurgery. The UR2 site was scanned directly using the same HealFit® SH abutment left in place since surgery, preserving the conditioned soft tissue and eliminating the need for a temporary crown, while the UR5 site was scanned using a BL metal scan body.[16] The old PFM crown on UL2 was removed at the same appointment, and the tooth was prepared and scanned (Figs. 7a+b).

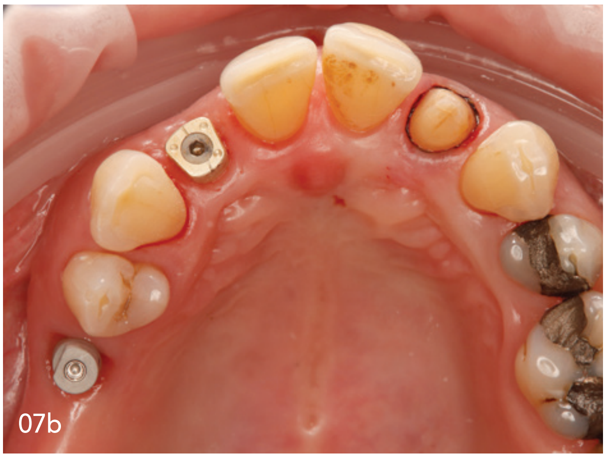
Two screw-retained monolithic zirconia crowns on titanium bases (X-Base®, Anthogyr) were fitted for UR2 and UR5 at 25 Ncm, alongside a monolithic zirconia crown for the UL2 for aesthetic symmetry. Both implant crowns seated passively with precise adaptation to the peri-implant tissues. The UR2 crown displayed a natural emergence contour consistent with the soft-tissue form created by the HealFit® SH abutment (Figs. 8a–e). Occlusion was refined for even centric contacts and light anterior guidance. Radiographs confirmed stable crestal bone levels (Figs. 9a+b). At the three-month review, the patient reported excellent comfort, function and aesthetics and continued to wear his protective nightguard as advised.

Discussion

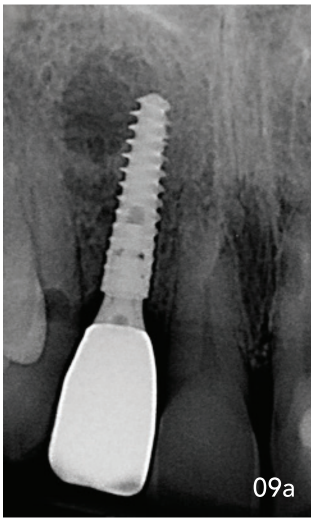
This case highlights the importance of individualised soft-tissue management in prosthetic-driven implantology, particularly in the aesthetic zone. The decision to incorporate a palatal roll flap helped enhance soft-tissue thickness and protect the gingival margin.[13] The flapless posterior approach reduced morbidity and preserved keratinised tissue, while the anatomically shaped scannable healing abutment enabled controlled tissue maturation without provisionalisation, significantly improving efficiency and reducing chair-time.[17–19]

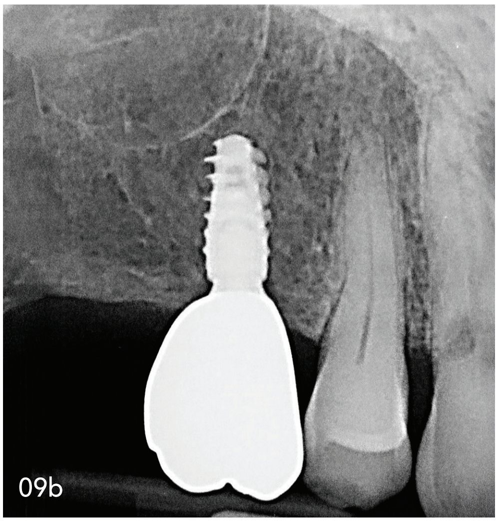
06
Healed sites UR2, UR5 and UL2 defective crown removal, 12 weeks postsurgery.

07a+b
Digital workflow and final intra-oral scanning. Lateral view using a metal scan body for UR5 and the HealFit® SH abutment retained *in situ* at UR2 **(a)**. Occlusal view including UL2 for a new zirconia crown **(b)**.



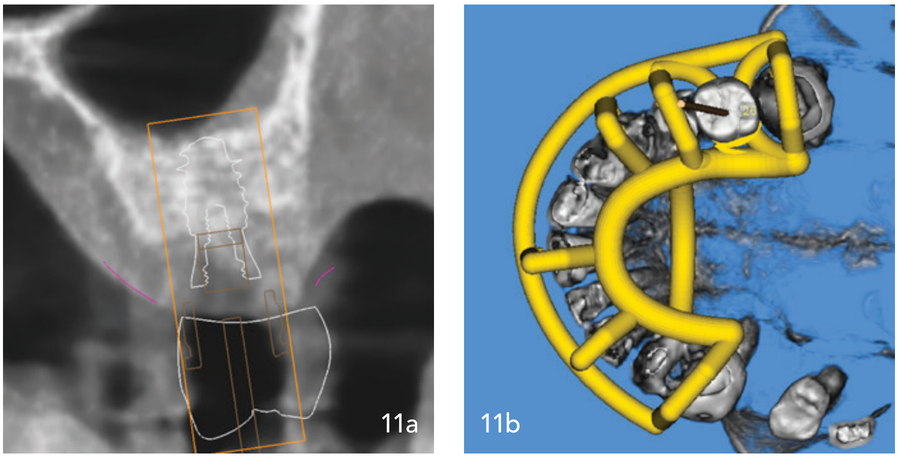
08a–e
Final restorations. Emergence profiles using the anatomic HealFit® SH abutment at UR2 and a standard cylindrical healing abutment at UR5 **(a)**. Maxillary occlusal view of the screw retained UR2, UR5 zirconia restorations and the new zirconia crown on UL2 **(b)**. Final frontal retracted view **(c)**. Final retracted right lateral view **(d)**. Final frontal smile **(e)**.





09a+b
Final radiographic result demonstrating passive fit and stable bone levels. UR2 final radiograph **(a)**. UR5 final radiograph **(b)**.

10a+b
Preoperative assessment UL6. Baseline retracted occlusal view **(a)**. Baseline retracted left lateral view **(b)**.



11a+b
Digital planning using SMOP® (Swissmeda) software. UL6 3D implant planning **(a)**. UL6 digital wax-up and surgical guide design **(b)**.

Case 2

Managing bone deficiency with osseodensification in the posterior maxilla—occlusal and biomechanical factors

Another 68-year-old male (ASA Class I), with a history of successfully managed periodontitis, presented for replacement of his missing upper left first molar (UL6) with a fixed restoration. The tooth had been extracted approximately six months earlier due to unrestorable caries and chronic infection. The site had healed uneventfully, with sufficient soft-tissue thickness but with established recession around his upper left second premolar (UL5) and upper left second molar (UL7; Figs. 10a+b). The CBCT scan revealed limited residual bone height beneath the sinus floor, and treatment options included an internal sinus lift or placement of a short implant with a longer crown. The periodontal condition was stable, and bone quality appeared soft (Class D4), necessitating a technique and implant design capable of achieving reliable primary stability in low-density bone.[20,21]

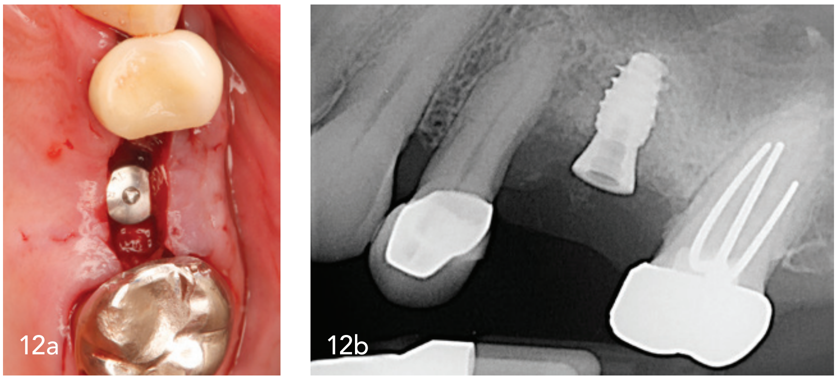
Treatment plan

Digital planning confirmed adequate ridge width but only 8–8.5 mm of vertical height to the sinus membrane. As the patient declined sinus augmentation, and given the bone limitation and periodontal background, a short tissue-level (TL) implant (Axiom® X3 TL) was selected. Tissue-level implants maintain the implant–abutment junction supra-crestally, reducing microbial leakage and supporting improved hygiene for susceptible patients.[22] A prosthetic-driven plan was created using SMOP® (Swissmeda) software to ensure ideal implant positioning and prosthetic emergence (Figs. 11a+b).

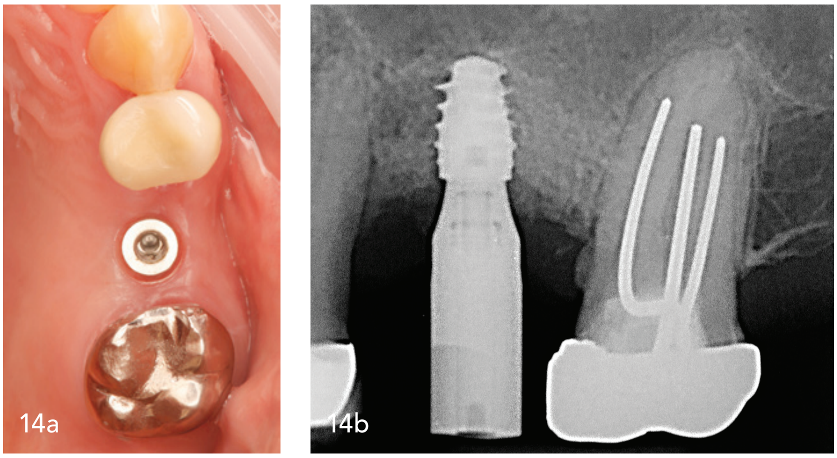
Surgical procedure

Under local anaesthesia, a full-thickness envelope flap was raised to visualise the ridge and confirm guide adaptation. Bone sounding indicated adequate papillary support (3 mm from both mesial and distal bony peaks). A tooth-supported guide was secured, and osteotomy preparation followed the guided Integral (Anthogyr) sequence with an under-preparation protocol adapted for low-density bone.

Following verification of osteotomy depth and angulation, a TL implant (4.6 × 6.5 mm, Axiom® X3) was inserted with an insertion torque of 40 Ncm. Despite achieving high primary stability, a decision was made to submerge the implant to optimise peri-implant soft-tissue healing. A cover screw was placed, and the flap was repositioned using 4/0 single-interrupted resorbable sutures (PGA Resorba®). Postoperative radiography confirmed accurate three-dimensional placement beneath the sinus floor (Figs. 12a+b).

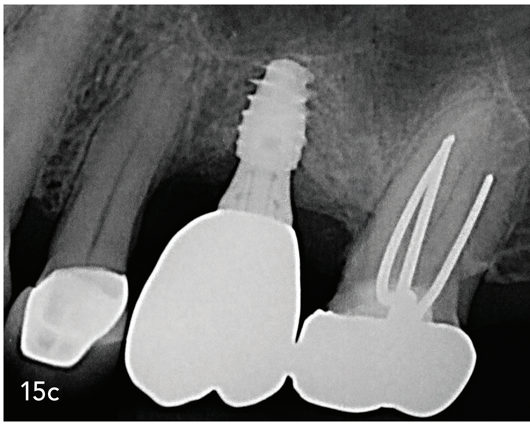


12a+b
UL6 Implant placement. Cover screw fit and implant submersion **(a)**. Axiom® X3 tissue level implant 4.0x6.5mm **(b)**.



13
Fit of a tissue level healing abutment 4.8×2mm, ten weeks post-placement.

14a+b
Healing and digital workflow. UL6 healed site, 13 weeks post-placement **(a)**. Intra-oral radiograph of the tissue level scan body showing passive fit **(b)**.



15a–c
Final restoration UL6. Final occlusal view of the screw retained zirconia restoration **(a)**. Final retracted left lateral view **(b)**. UL6 final radiographic result demonstrating passive fit and stable bone levels **(c)**.

Treatment outcome

Ten weeks post-placement, the implant was exposed, and the cover screw was replaced with a tissue-level healing abutment (4.8 × 2 mm; Fig. 13). Three weeks after uneventful soft-tissue maturation, digital impressions were taken using a TL metal scan body (TRIOS 3, 3Shape; Figs. 14a+b). The definitive restoration—a screw-retained monolithic zirconia crown on a titanium base (X-Base®, Anthogyr)—was torqued to 25 Ncm. Occlusion was refined for balanced centric contacts and light functional guidance. A periapical radiograph confirmed full seating and stable crestal bone, while the tissue-level collar maintained a thick, healthy band of keratinised mucosa (Figs. 15a–c).

At the three-month post-restoration review, soft-tissue health remained stable, and the patient reported improved function and comfort with the restoration.

Discussion

This case demonstrates the importance of osseodensification concepts combined with a short tissue-level configuration to enable predictable rehabilitation of the posterior maxilla with limited vertical bone—avoiding the need for sinus augmentation.[23,24] The rationale for selecting a short implant was both anatomical and biomechanical. Occlusal forces are primarily concentrated within the coronal 3–4 mm of the bone–implant interface, and when primary stability and favourable load distribution are achieved, short implants perform predictably.[9,11]

A fully guided approach in complex posterior cases, combined with the macro-geometry; tapered smooth collar and concave neck—of the Axiom® X3 Tissue Level design, enhances placement accuracy and provides a mechanical safeguard against apical displacement towards the sinus. The rounded apex further minimises the risk of inadvertent Schneiderian membrane perforation.

Conclusion

Prosthetic-driven planning and an integrated digital workflow can improve the predictability and efficiency of implant rehabilitation. Although the two cases presented in this series faced different challenges, both benefitted from a shared approach: start with the final restoration in mind, plan carefully, and choose the right implant designs and digital tools that support biological stability. In the aesthetic zone, early soft-tissue shaping with a scannable anatomic healing abutment improved efficiency and allowed a natural emergence profile to develop without interrupting tissue maturation. In the posterior maxilla, the use of a short implant with favourable macro-geometry and a simplified under-preparation protocol, instead of using separate reverse-rotation densifying burs, enabled us to avoid a sinus lift while still achieving reliable primary stability in soft bone. Together, these cases illustrate how combining clinical judgement with the thoughtful use of contemporary implant systems can simplify treatment, reduce chairtime and enhance the final outcome.

References

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