

Prosthetically Driven Replacement of Maxillary Central Incisors with Simultaneous Ridge Augmentation

Dr Waji Khan reports on treatment of a patient with caries, compromised restorations and gingival asymmetry



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Introduction

Implant-supported replacement of maxillary incisors is one of the most technique-sensitive indications in implant dentistry. The esthetic outcome depends not only on successful osseointegration but also on preservation or reconstruction of the facial contour, accurate three-dimensional implant placement, harmonious gingival architecture and prosthetic emergence profile.

A systematic review by Chen and Buser (2014) emphasized that acceptable esthetic outcomes can be achieved after extraction in the anterior maxilla. However, immediate post-extraction implant placement is associated with increased variability and greater risk of midfacial recession, particularly when facial bone and tissue conditions are compromised.

The diagnostic and planning phase can be improved by integration of CBCT data, intraoral scan information, restorative planning and the proposed guide design. Static computer-aided implant surgery has been reported as clinically acceptable in most situations, although it remains dependent on guide design, seating, drill tolerance and clinical execution (Tahmaseb et al., 2018). In esthetic-zone cases, digital planning is most valuable when it is prosthetically driven: the implant is planned according to the desired tooth position, anticipated restorative contour and the volume of bone and soft tissue needed to support that contour.

Implant-abutment interface design also influences peri-implant tissue behavior. Platform switching has been associated in systematic reviews with reduced marginal bone-level changes compared with platform-matched configurations, although study heterogeneity and risk of bias limit overinterpretation (Atieh et al., 2010; Strietzel et al., 2015). Internal implant connections have similarly been associated with lower marginal bone loss than external connections in a systematic review, with much of the effect attributed to platform-switching concepts common to internal-connection implants (de Medeiros et al., 2016).

The bredent medical copaSKY implant system monoplatfrom has a conical-parallel internal connection. Its narrow-diameter range includes 3.5 mm, with equicrestal or subcrestal positioning, a microstructured backtaper and a surface design created to support soft-tissue attachment and osseointegration. A preclinical rabbit tibia micro-CT study of copaSKY implants reported greater bone volume and bone-to-implant contact for subcrestal placement compared with crestal placement after one month. The findings, however, should not be interpreted as evidence of clinical superiority in human anterior maxillary cases (Calvo-Guirado et al., 2023).



Fig. 1 — Clinical photographs showed esthetic-zone restorative compromise, cervical discoloration and gingival asymmetry



Figs. 2 & 3 — Lateral views revealed occlusal and gingival relationships relevant to anterior implant planning



The following case report presents the staged replacement of maxillary central incisors using bredent medical copaSKY implants with simultaneous ridge augmentation and platelet-rich fibrin (PRF) biological healing adjuncts. The report describes the diagnostic, surgical, restorative and maintenance features of the case while highlighting relevant clinical attributes of the copaSKY implant system.

Case Report

Patient presentation and diagnostic work-up

A female patient in her seventies presented at Catarauqui Woods Dentistry. Her chief concern was the need for two implants in the maxillary central incisor sites (FDI 11 and 21). The clinical assessment revealed caries on the buccal aspects, and clinical photographs showed esthetic-zone restorative compromise, cervical discoloration and gingival asymmetry (Figure 1).

The assessment highlighted the need for prosthetically driven implant planning (Figures 2 and 3). The diagnostic phase included detailed examination, panoramic radiography, small-field CBCT acquisition and interpretation (Figure 4), digital smile design photographs (Figure 5), intraoral scanning for surgical guide planning, and an upper impression for an interim Essix-type retainer.

The records were used to evaluate the patient's incisor position, interarch relationship and smile-line demands, implant trajectories and the need for simultaneous ridge augmentation.

Treatment plan summary

Baseline: specific examination, panoramic imaging, small-field CBCT, digital smile design photographs, intraoral scan, interim-appliance planning for compromised maxillary central incisors 11 and 21.

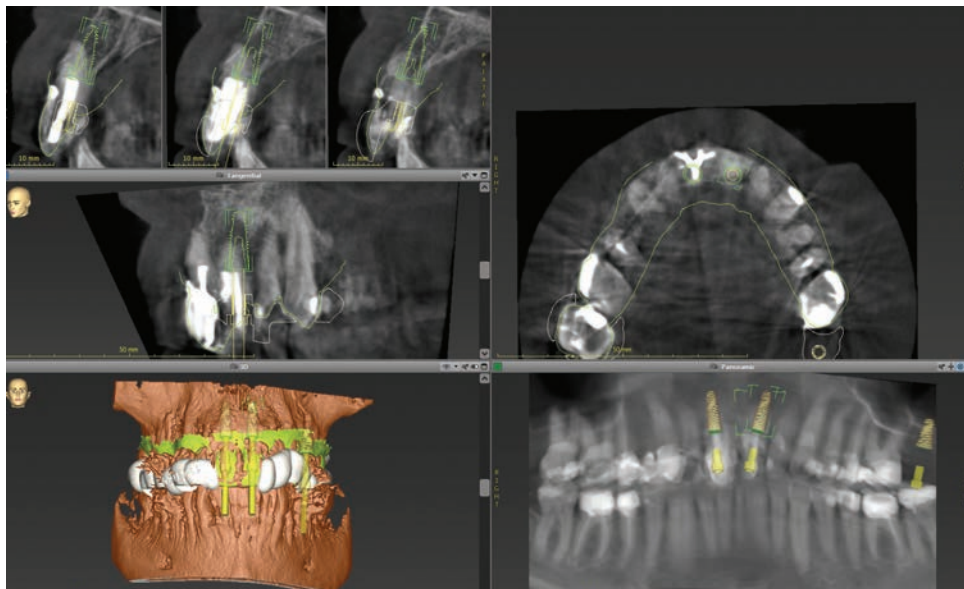


Fig. 4 — CBCT cross-sectional, tangential axial, panoramic and three-dimensional views were used to evaluate implant trajectory, restorative position and anatomic relationships

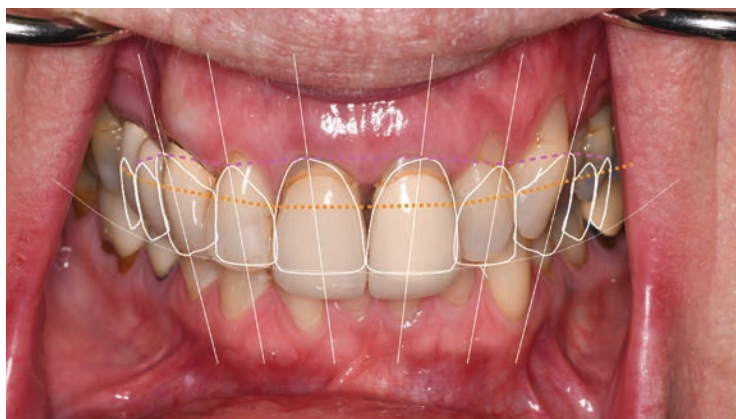


Fig. 5 — Digital smile design was used to communicate the planned incisal edge position, tooth proportions and esthetic contours

Day 0: extraction of teeth 11 and 21, full-thickness flap elevation, placement of two 3.5 x 12.0 mm bredent medical copaSKY implants each at 10 Ncm insertion torque, cover screws, simultaneous ridge augmentation with injectable platelet-rich fibrin (iPRF), autogenous bone and 0.5 cc mineralized cortical allograft, advanced platelet-rich fibrin (aPRF) coverage and primary closure.

Approximately 11 weeks: normal healing; no evidence of pain, infection, paresthesia or implant instability; favorable radiographic implant position and stable peri-implant bone; implant stability quotient (ISQ) >70 recorded using resonance frequency analysis (RFA); fixture-level impression.

Approximately 13 weeks: initial crown try-in; crowns did not fully seat; periapical radiograph obtained; fixture-level impression repeated and returned to the laboratory.

Approximately 16 weeks: definitive crown delivery with acceptable contacts, margins and occlusion; radiographic verification; prosthetic screws torqued to 30 Ncm; access channels sealed with PTFE and composite resin.

Approximately 7 months after surgery: periodontal maintenance with vertical bitewings, full-mouth debridement and oral-hygiene reinforcement; no implant-specific complication documented.

Approximately 13 months after surgery: periodontal maintenance; intraoral and extraoral examination within normal limits; generalized light interproximal bleeding and plaque/calculus noted; no implant-specific pain, infection, paresthesia, mobility or prosthetic complication documented.



Fig. 6 — Periapical verification was carried out during surgical implant placement

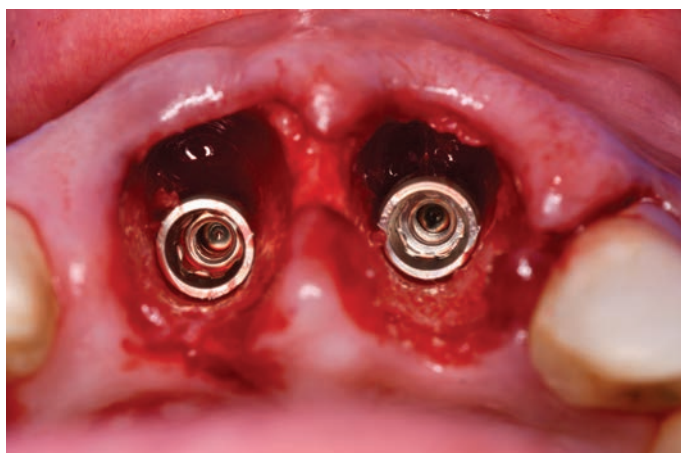


Fig. 7 — The postoperative occlusal view shows implants placed in the maxillary central incisor sites

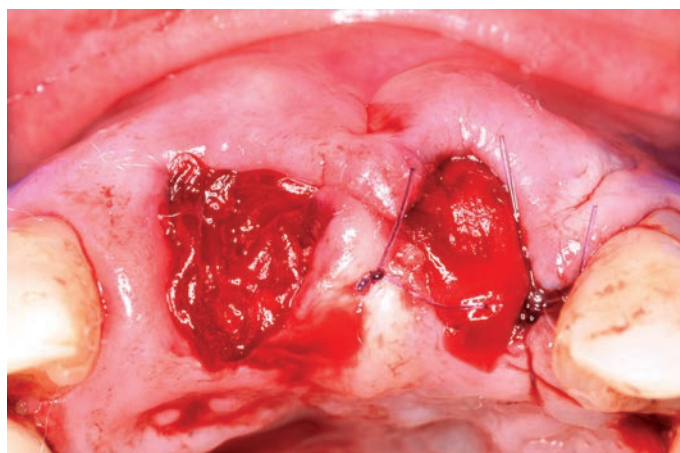


Fig. 8 — Ridge augmentation was performed with PRF-assisted grafting and followed by soft-tissue closure



Figs. 9 & 10 — Photographs reveal early healing and peri-implant soft-tissue contours before the definitive prosthetic delivery



Figs. 11 & 12 — Postoperative radiographs demonstrate parallel implant placement and grafted ridge

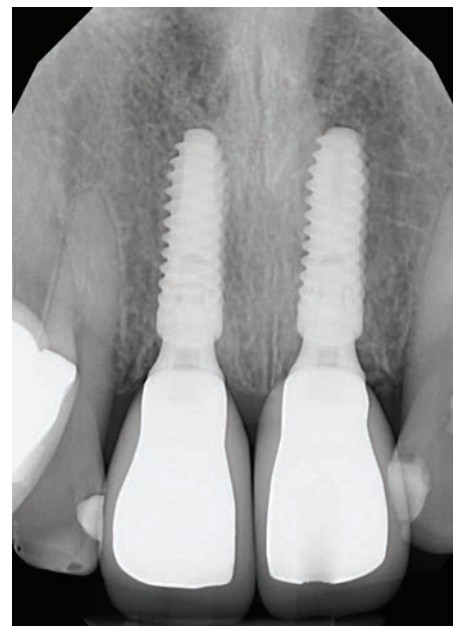


Fig. 13 — Periapical view records the definitive implant-supported crown delivery

Surgical protocol

The patient was classified as ASA I on the day of implant surgery. Oral sedation was selected due to her dental anxiety. The patient was instructed to remain nil per os for six hours before oral sedation, which included lorazepam 1 mg, pulse oximetry, noninvasive blood-pressure monitoring and local anesthesia using 2% lidocaine with 1:100,000 epinephrine. Pre- and postoperative blood pressures were stable.

A full-thickness flap was elevated and teeth 11 and 21 were removed. Periapical radiographs were acquired intraoperatively to evaluate trajectory, platform position and final implant placement (Figure 6). Two 3.5 x 12.0 mm bredent medical copaSKY implants were placed in the central incisor sites with cover screws under saline irrigation (Figure 7). Insertion torque was recorded as 10 Ncm for each implant. The initial low insertion torque was due to the large jumping gap, with a substantial portion of the implant placed in graft material. Because primary torque was modest and ridge augmentation was performed simultaneously, a submerged, staged healing protocol was selected rather than immediate restoration.

Autologous blood was drawn from the right antecubital fossa into red vacutainer tubes without anticoagulant and centrifuged for ten minutes. Injectable PRF was mixed with autogenous bone and 0.5 cc mineralized cortical allograft (250-1000 µm). Advanced PRF was placed over the grafted sites. The flap was closed with three interrupted 4-0 Monocryl sutures (Figure 8). The patient was advised to take 500 mg of amoxicillin every eight hours for ten days and 400 mg of ibuprofen as required for any discomfort.

Prosthetic protocol and follow-up

At approximately 11 weeks, the patient reported the temporary prosthesis to be comfortable and normal healing was observed (Figures 9 and 10), with resolving swelling and bruising, and absence of pain, infection and paresthesia. Implant and abutment stability was also recorded, and radiographic evidence was captured of favorable implant position and stable peri-implant bone (Figures 11 and 12).

Digital implant stability testing documented ISQ values greater than 70. The healing abutments were removed, and impression copings were seated on the implants. A periapical radiograph confirmed the seating, and fixture-level impressions were sent to the laboratory.

During crown delivery, the restorations did not fully seat. A further periapical radiograph was taken, and a fixture-level impression was repeated, avoiding the need to force the restorations into position. This step is clinically important in anterior implant prosthodontics because incomplete seating can create open margins, altered interproximal contacts, or occlusal discrepancies that may compromise esthetics and biology.

At the subsequent delivery appointment, the corrected implant crowns were seated with clinically acceptable contacts, margins and occlusion. A periapical radiograph was taken for verification (Figure 13). The prosthetic screws were torqued to 30 Ncm, and the screw-access channels were sealed with PTFE tape and composite resin.

The patient's ongoing treatment includes periodontal maintenance, debridement, oral-hygiene reinforcement and monitoring. Approximately 13 months after surgery,



Figs. 14 & 15 — A clinical restorative comparison shows an initial view of the compromised maxillary central-incisor esthetics and the definitive implant-supported central-incisor crowns after prosthetic correction and delivery

generalized plaque, calculus, extrinsic staining and interproximal bleeding were recorded, underscoring the importance of continued supportive periodontal maintenance for implant patients.

Discussion

Clinical rationale in the anterior esthetic zone

Implant surgery in the maxillary central incisor region is particularly demanding because two implants placed side by side must support interimplant papillae and preserve a convex facial contour while avoiding facial malposition. The decision to capture CBCT records, digital smile design photographs and an intraoral scan reflects a prosthetically driven approach in which the desired restorative contours are planned before surgery. This is consistent with contemporary implant planning principles, particularly for anterior esthetic-zone treatment (Figures 14 and 15).

The staged protocol was also biologically conservative. Although some implant systems and clinical conditions permit immediate restoration, the recorded insertion torque of 10 Ncm for each implant and the simultaneous ridge augmentation justified submerged healing. This avoided loading during the early healing period and allowed the grafted facial ridge contour to mature before definitive impressions and crown delivery.

Clinical features of the bredent medical copaSKY implant highlighted by the case

Several features of the copaSKY implant system are relevant to this case. First, the availability of a 3.5 mm diameter option is helpful in the esthetic zone, where mesiodistal restorative space and interimplant distance are critical. In this case, two 3.5 x 12.0 mm implants were selected for central incisor replacement, allowing me to plan the implants within the available bone and restorative envelope.

Second, the copaSKY system uses an internal conical-parallel implant-abutment connection and a common connection geometry across diameters. This acts as a stable, reversible connection that can simplify prosthetic inventory and retrieval. In this case, the fixture-level impression workflow, laboratory correction after non-seating and final screw-retained delivery were all compatible with a retrievable anterior implant-prosthetic approach. Achieving 30 Ncm torque and the PTFE and composite access sealing also contributed to the outcome.

Third, the copaSKY design includes a microstructured backtaper and a subcrestal or equicrestal positioning concept, moving beyond traditional platform switching with space for bone and soft tissue around the neck region. This concept aligns broadly with the rationale of platform switching and internal connection designs, which have been associated in systematic reviews with reduced marginal bone-level changes in certain contexts. However, this case does not prove that the backtaper, platform-shifted restorative geometry or connection design caused the favorable short-term bone response.

Fourth, the implant surface design and healing protocol are relevant, in particular the horizontal microgrooves at the soft-tissue region and etched regions for osteoblast attachment. In this case, the implants integrated uneventfully despite low initial insertion torque. By approximately 11 weeks, ISQ values greater than 70 were recorded with RFA and the patient proceeded to definitive prosthetic treatment. This outcome was consistent with successful staged healing but site preparation, bone augmentation, the avoidance of immediate loading and follow-up care were also critical factors.

Role of PRF and simultaneous ridge augmentation

The regenerative protocol included the use of autogenous bone, mineralized cortical allograft, injectable PRF and advanced PRF. PRF as an autologous platelet concentrate may support wound healing. A systematic review by Miron et al. (2017) reported favorable findings for PRF in soft-tissue repair and post-extraction dimensional stability, while noting limited high-quality evidence for hard-tissue regeneration and guided bone regeneration. More recently, Guan et al. (2023) reported that PRF may improve implant stability and may contribute to accelerated bone healing and new bone formation. The case supports the clinical feasibility of using PRF as an adjunct, but implant design, choice of graft material, surgical technique and staged healing all contributed to the outcome.

Prosthetic verification as a biologic safeguard

The prosthetic correction step is an important teaching point. The first set of crowns did not fully seat and therefore a further radiograph was taken and the impression repeated. In the anterior maxilla, an open implant-abutment interface or ill-fitting restoration can compromise peri-implant tissue response, proximal contacts and occlusion. The retrievable workflow allowed the discrepancy to be identified and corrected before the definitive torque and access closure.

Limitations

This report presents a single case with a short, documented follow-up period and no control group. The report does not include calibrated marginal bone-level measurements, peri-implant probing depths, keratinized mucosa measurements, plaque scores specific to the implants, or pink and white esthetic scores.

The radiographs provided are useful but they do not replace standardized long-cone radiographs with calibrated measurements. Long-term follow-up reports are required to determine whether peri-implant bone levels and soft-tissue architecture remain stable.

Conclusion

This case report describes replacement of adjacent maxillary central incisors using a staged, prosthetically driven workflow with bredent medical copaSKY implants, simultaneous ridge augmentation, PRF adjuncts and definitive screw-retained crowns. The favorable short-term outcome highlights clinically relevant copaSKY features including the 3.5 mm diameter option, conical-parallel internal connection, restorative retrievability and backtaper/platform-shifted concept. The case should be interpreted as descriptive clinical documentation rather than comparative evidence of implant-system superiority.

Clinical relevance

Adjacent central-incisor implants require prosthetically driven three-dimensional planning to support papillae, facial contour and restorative symmetry. Low insertion torque and simultaneous grafting support a staged, submerged healing protocol rather than immediate loading. Retrievable screw-retained workflows allow correction of non-seated restorations before final torque and access closure. Features of the bredent medical copaSKY design aided the case outcome while appropriate placement protocol, ridge augmentation and prosthetic planning all contributed to the restorative esthetics and hard- and soft-tissue stability.

Acknowledgments, funding and disclosures

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Statement on the use of artificial intelligence: During the preparation of this clinical case report, the author utilized ChatGPT to assist with structuring the article (based on clinical notes, case images and external references), grammar correction and improvement of the narrative flow. Following the use of this tool, the author thoroughly reviewed, edited and verified all clinical data, terminology and outcomes. The author takes full responsibility for the accuracy, authenticity and final content of the case report.

Ethics, consent and de-identification

Written informed consent was obtained from the patient for publication of de-identified clinical information, radiographs and intraoral photographs. ■

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