A Complex Restorative Case

Orthodontics, implants, whitening and veneers help this patient discover her new smile

by Ehab Rashed, BDS, ICOI, DGOI

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Teamwork is key to success in achieving an optimal final result in clinical dentistry—the right treatment plan and proper treatment sequence will lead to a good outcome.

A patient came to my clinic asking to restore a missing tooth on the upper right side. Proper radiographical and clinical examination revealed that the desired result could be achieved through orthodontic adjustment of the patient’s occlusion, as well as surgical intervention to correct the bony and soft-tissue defect at the upper right side.

**Case presentation**

The female patient, age 29, had a deep-bite Class II occlusion with missing tooth 5, as well as short clinical crowns on the anterior region (Figs 1–3). Full-mouth X-rays and impressions for upper and lower study casts were taken (Figs. 4–5).

Figs. 1–3 (top to bottom): Preliminary photos, including occlusion (Fig. 2) and full dental arch with missing tooth and bone defect (Fig. 3).
Treatment plan

• Orthodontically adjust the occlusion, then insert an implant to restore the missing tooth 5.
• Sinus-floor elevation, and horizontal and vertical alveolar ridge augmentation to compensate for buccal and crestal bone loss.
• Chairside whitening, followed by four prepless anterior veneers on teeth 11, 12, 21 and 22.

Orthodontic treatment

• Extraction of tooth 12.
• Orthodontic treatment utilizing self-ligating braces was started to align the dental arch to Class I occlusion (Fig. 6).

Surgical treatment

The CBCT X-ray evaluation had measured the residual bone between the sinus floor and the alveolar crest at 5mm high, 1.5 mm wide. This ridge was too thin and short to receive an implant, so a sinus lift and ridge augmentation were planned.

After introducing local anesthetic (articaine hydrochloride 4 percent with 1:100,000 epinephrine), a full-thickness “envelope flap” was elevated through an intrasulcus incision, with one vertical releasing incision mesially so as not to disturb the blood supply to the flap at the surgical site (Figs. 7–8).

The thin bony ridge measured 1.5mm buccopalatal—a lancet drill was used to gain access and locate the correct 3-D position and the entry point. A crestal-approach sinus lift procedure was done through the osteotomy site using a hydraulic sinus lift kit, lifting the membrane up to 3mm (Fig. 9).
Blood was collected from the median cubital vein of the patient (Fig. 10)—the extracted blood was centrifuged for 12 minutes at 2,800 rpm, using a plain vacuum tube sous-vide without additive. Platelet-rich fibrin (PRF) (Fig. 11) was made to help elevate the sinus-floor Schneiderian membrane.

The PRF was used through the osteotomy to elevate this membrane (Fig. 12), and the implant was placed through the prepared site to ensure a good primary stability (Fig. 13). An implant 3.5mm in diameter, 8.5mm long was inserted. However, because of the thin ridge and buccal defect, about 4mm of the implant body showed through the buccal side (Fig. 14).

A buccal incision was made to expose the external oblique ridge of the mandible. To collect autogenous bone from the external oblique ridge, I used a bone collector that was 5mm in diameter, with a 2mm cutting depth (Fig. 15). A first layer of autogenous bone was placed with direct contact to the exposed implant surface (Fig. 16), then a mix of corticocancellous granules (particle size less than 2mm) and the patient’s autogenous bone was used as a second layer to protect the autogenous bone cells that were in direct contact with the implant (Figs. 17–18; Fig. 18 is on p. 72).
Titanium mesh was connected to the implant extending from the occlusal to the buccal side to maintain a space and to allow bone growth between the implant service and the external border of the maxillary arch (Figs. 19–21).

A PRF membrane was used to cover the titanium mesh to avoid direct contact to the soft-tissue flap (Fig. 22). A tension-free flap closure was done and a polytetrafluoroethylene (PTFE) suture was used (Fig. 23).

**Healing, impressions and final results**

After a healing period of five months, the titanium mesh was removed and a temporary acrylic crown was created to condition and shape the soft tissue around the implant (Figs. 24–27).
The mesiodistal dimension of the temporary crown was gradually reduced, using orthodontic elastic power chain for two months, to allow for an appropriately sized final crown (Figs. 28–32).

Three cycles of chairside whitening optimized the patient’s tooth shade. After a one-week period to ensure the stability of the final tooth shade, final impressions were taken and a screw-retained final crown was fabricated using CAD/CAM, then delivered to the patient (Figs. 33–42).

Finally, four units of ceramic veneers were bonded to teeth 11, 12, 21 and 22 (Fig. 43).
Fig. 35: Impression post

Fig. 36: Impression post with sulcus shape

Fig. 37: Close tray impression

Fig. 38: Post-op full arch view

Fig. 39: Buccal view with the final screw-retained crown

Fig. 40: Occlusal view of the final screw-retained crown

Fig. 41: Final frontal view after orthodontic and restorative correction

Fig. 42: Final occlusal view post-op

Fig. 43: Final view with the smile line after cementation of four units of veneers