

Simultaneous ridge augmentation and dental implant placement:
a case presentation

Sinus lift using a new minimally invasive technique

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The sinus lift, or sinus floor elevation, is a widely accepted procedure today prior to dental implantation in cases of atrophy of the distal maxillary ridge [1]. However, the usual procedure – the open sinus lift – is associated with potential complications [2-5] and significant patient trauma, and it usually requires a lengthy recuperation period accompanied by pain, swelling and bruising in the facial area as well as the loss of several days of work [6]. A hydraulic method for lifting the Schneiderian membrane was first presented by Chen in 2005 [7]. In this method, after carefully drilling to the sinus floor without damaging the membrane, the dentist uses the dental turbine's irrigation (an aerosol of air and water) to generate hydraulic pressure to separate the Schneiderian membrane from the sinus floor, creating sub-membrane space. The dentist then inserts bone graft into the newly formed volume, followed by a dental implant. The current article presents a case performed using a specialized dental implant that enables a hydraulic sinus lift (iRaise sinus lift implant; Maxillent, Herzliya, Israel).

The iRaise sinus lift implant comprises an internal channel that allows the injection of fluids in order to perform the hydraulic elevation. The dentist first injects saline solution through the implant to elevate the Schneiderian membrane. The saline is retrieved, and the dentist inserts bone graft in a gel formulation. Finally, the implant is fully inserted into the bone. The channel is L-shaped, so that after the implant is inserted, both openings of the implant are embedded within the bone. There is no communication between the mouth and the bone, preventing migration of bacteria from the prosthetic connection into the bone.

This case involves both a sinus lift using the specialized implant and a crestal ridge augmentation.

Case description

The patient, a 64-year-old woman, presented with missing upper left premolars and first molar (teeth 24, 25, 26). The residual alveolar bone height was between 3 and 4 mm at the intended implantation site – not sufficient to support dental implants. Therefore a sinus lift was indicated in order to place implants. Otherwise the sinuses appeared healthy in the CT scan (Fig. 1). The treatment plan was to insert

a single sinus lift implant at site 25, accompanied by two conventional implants at sites 24 and 26. A single sinus lift implant is sufficient to raise an entire sinus, allowing the simultaneous placements of additional implants inside the bone graft within the sinus without further preparation.

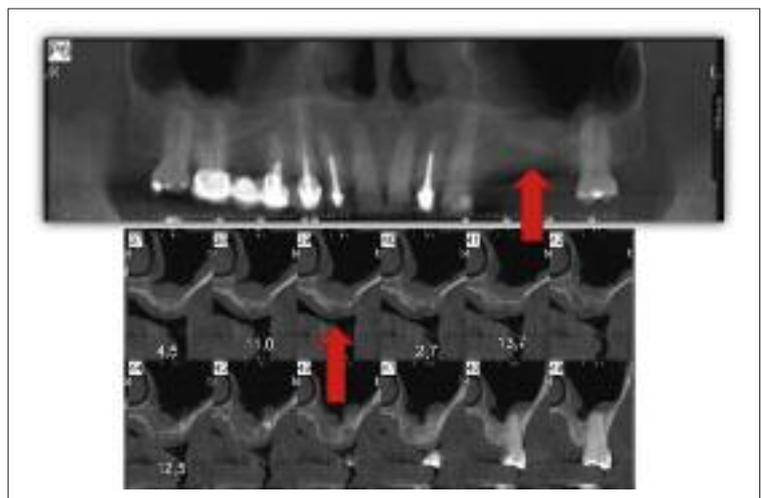


Fig. 1 Preoperative images. Arrows indicate the location of the sinus lift implant.



Fig. 2 Gingival incision.



Figs. 3 to 6 Marking drill, pilot drill, flat drill, cortex drill.

Before treatment the patient received prophylactic antibiotics (Augmentin 87 mg) and prednisone 60 mg. A gingival flap was raised with a crestal incision, including an L-shaped mesial extension above tooth 23 to facilitate subsequent crestal augmentation (Fig. 2) while preserving the mucosal attached gingiva around tooth 23.

Drilling was then initiated at site 25 with a marking drill and a pilot drill. A key step in the drilling sequence was the identification of the hard cortical bone at the sinus cortex using a flat drill. The osteotomy was then widened using larger-diameter drills. Finally, the sinus cortex was abraded using a diamond-tipped cortex drill (Figs. 3 to 6).



Figs. 7 and 8 The sinus lift implant; blood observed in the lateral opening upon partial insertion in the osteotomy.



Figs. 9 and 10 Tube connector associated on implant; saline injection and retrieval.



Figs. 11 and 12 Bone graft preparation and injection.

The sinus lift implant (Fig. 7) was inserted partially into the osteotomy. At this point, blood was observed to emerge from the lateral opening (Fig. 8), indicating that the implant apex had come in contact with the Schneiderian membrane – as the membrane separated from the sinus floor, small blood vessels were detached and bled.

The tube connector was then assembled on the implant (Fig. 9). 2 ml of saline solution were injected

through the implant and then retrieved (Fig. 10). The integrity of the Schneiderian membrane was ensured by the fact that the saline remained contained beneath the membrane and did not leak into the nasal cavity and out of the nose.

Bone graft material was then prepared and inserted. 3 ml of bone graft in a gel formulation (MBCP Gel by Biomatlante) were prepared (Fig. 11) and injected through the implant (Fig. 12). The connector was



Figs. 13 and 14 Connector disassembly and final insertion of the implant.



Figs. 15 and 16 Bone condensation and implant insertion at site 24.



Figs. 17 and 18 Guided bone regeneration.

then disassembled from the implant (Fig. 13), and the implant was fully inserted into the osteotomy (Fig. 14).

After an additional conventional implant was uneventfully inserted at site 26, additional bone was prepared prior to implantation at site 24. An osteotomy was prepared first, followed by bone condensation in order to improve the bone density, given the low quality of bone at the site (Figs. 15 and 16).

Next, guided bone regeneration was conducted in order to augment the crestal ridge above site 24. 0.5 ml of maxgraft by Botiss Biomaterials was placed buccally on the ridge (Fig. 17). The bone graft was covered by extracellular matrix membrane (Dynamatrix membrane 20 x 30 by Keystone Dental) (Fig. 18), and the gingiva was sutured.



Fig. 19 Postoperative X-ray. The sinus lift implant is in the middle.



Fig. 20 X-ray six months postoperatively.

The postoperative periapical X-rays (Figs. 19 and 20) show the three implants, with the sinus lift implant in the middle, at site 25. Two conventional implants are located at sites 24 and 26. The distal implant also extends into the sinus. Both implants in the sinus are visibly embedded within the bone graft inside the sinus.

After the procedure, the patient returned to full activity on the same day and reported no excessive pain or swelling. Figure 21 shows the clinical situation eleven months postoperatively.

Discussion

A conventional open sinus lift is a technically demanding procedure to perform, and is accompanied by considerable side effects and complications. It also entails a lengthy and unpleasant healing period. The minimally invasive technique presented here is based on the principle of hydraulic elevation of the Schneiderian membrane, a principle that has been previously documented and can look back on several years of experience. In our experience involving several cases, the technique is simple to learn and to employ. Patients undergo the procedure with minimal pain and minimal disruption to their daily lives.

To date, the author has had twelve months of experience with the iRaise technique, in fifteen patients. Fourteen cases were completed successfully. One case was interrupted due to a membrane perforation while drilling; this case was completed successfully using the Caldwell-Luc technique. In one additional case, upon opening the gingival flap, the membrane was discovered to be exposed and perforated (no alveolar bone at the implantation site), and the procedure was discontinued, to be performed later using the Caldwell-Luc technique.

No cases of infection or hematoma were observed. Pain and edema were very limited. Notably, loss of work was in all cases confined to the day of the intervention itself.

After performing additional cases and following up patients over a longer period, it will be possible to more extensively evaluate the efficacy of the method and the quality of the regenerated bone. ■

Visit the web to find the list of references (www.teamwork-media.de). Follow the link "Literaturverzeichnis" in the left sidebar.



Fig. 21 Clinical situation eleven months postoperatively. Note the gingival graft.

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