

SINUS FLOOR AUGMENTATION TECHNIQUE AND SIMULTANEOUS IMPLANT PLACEMENT, PART II: THE 2-STAGE APPROACH

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KEY WORDS

Sinus
Osteotome
Graft
Implant

The 1-stage osteotome sinus floor augmentation and simultaneous implant placement technique has been previously reported as a simple solution to heighten the maxillary posterior region to nearly 5- to 6-mm bone height. In this report, a patient with initial bone height of 2 to 3 mm in the extracted site of #3 was treated with the 2-stage osteotome technique. In the first stage, the sinus floor was grafted and augmented up to 5 to 6 mm. In the second stage, 9 months later, the same area was regrafted and the implant was placed. Eight months after the second stage, radiographs showed the entire 10-mm length of the implant was covered with new bone and the implant was solid and functional.

Sinus floor elevation in the atrophic maxillary posterior region to make implantation possible has been increasingly popular in recent years. The surgical technique required, as described, included either lateral antrostomy (window opening) or the osteotome technique.¹ Compared with lateral antrostomy, the osteotome technique currently in use is less invasive and reduces the need for more traumatic and costly procedures with a lesser risk of membrane.² However, the osteotome technique requires a preexisting available bone height of 5 to 6 mm to achieve a primary stabilization for the implant. The objective of this article is to describe a new approach for osteotome sinus floor augmentation in pa-

tients with even 2 mm of bone between the sinus floor and alveolar crest with a predictable result.

CASE REPORT

A 58-year-old man, who had been treated previously by the author for periodontal disease, requested replacement of his extracted #3 with an implant (Figure 1). His medical history was unremarkable, and Panorex and preapical radiographs revealed approximately 2 to 3 mm of bone height at the extracted site of #3 (Figure 2A). Because there was not enough bone to provide good primary stabilization, the decision was made to proceed with the 2-stage crestal approach to

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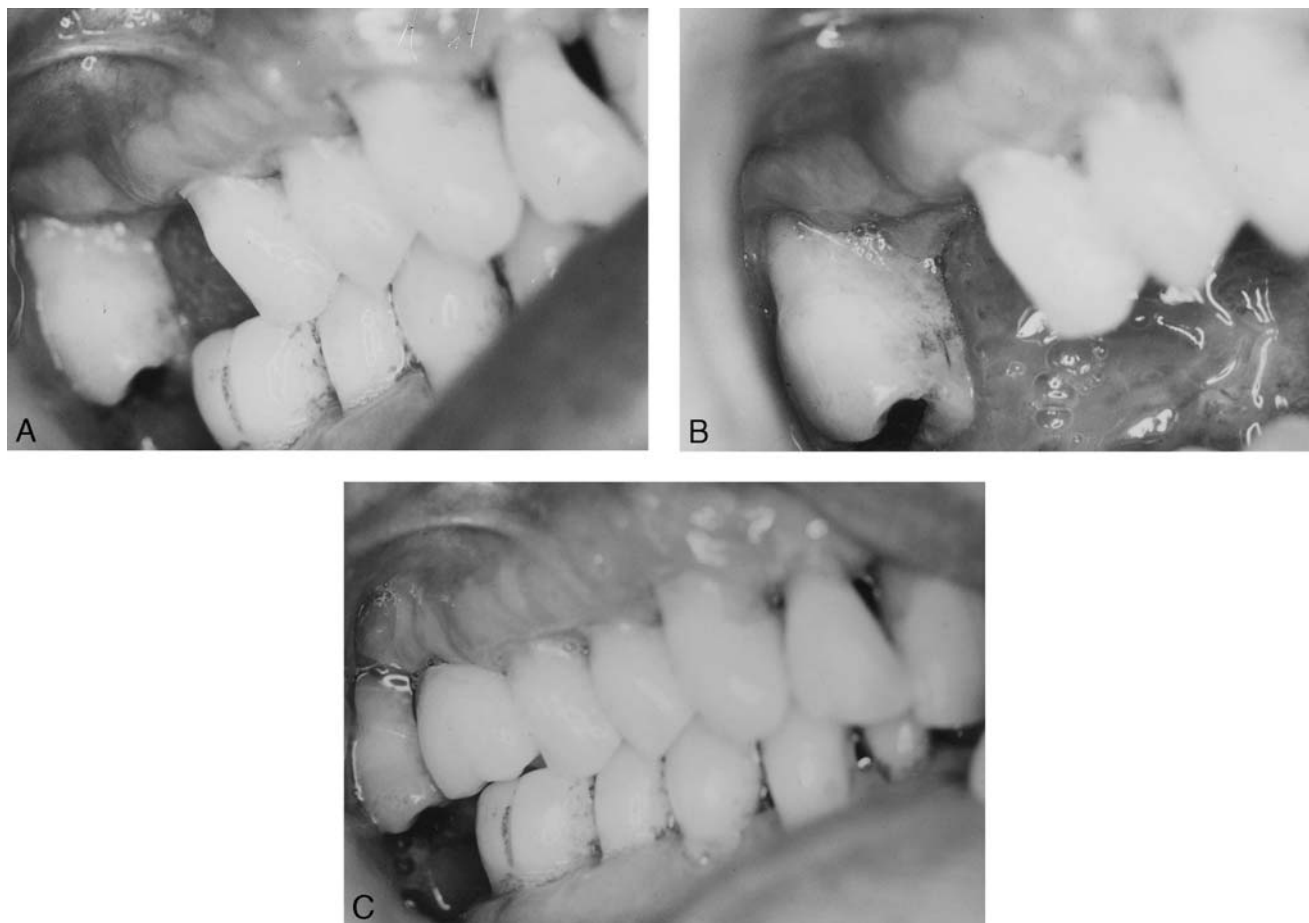


FIGURE 1. (A and B) Preoperative view of the extracted site of #3. (C) Four months after loading.

augment the sinus floor by the osteotome technique.

After local anesthesia was administered to the patient, an intrasulcular incision was made on the buccal and palatal of teeth 2 and 4 with midcrestal incision on the edentulous area of #3. A full-thickness flap was reflected and a round #6 bur was carefully used to penetrate the cortical bone to a depth of almost 2 mm and initiate the osteotomy site. A 2.2-mm-diameter drill followed by a 2.8- to 3.2-mm, concave-tipped osteotome were then used with gentle pressure and care to widen the osteotomy site without penetrating the sinus cavity. Then a mixture of autogenous bone chips and Biogran resorbable

synthetic bone graft (3i, Palm Beach Garden, Fla) was applied to the osteotomy site by a concave-tipped osteotome. The grafting mixture and osteotome were advanced upward with gentle malleting to break the sinus floor and push up the Schneiderian membrane.³ This was accomplished easily, since a thin layer of bone (cortical) remained on the sinus floor. The material was added several times until a volume of almost 0.5 g of the grafting mixture was placed under the membrane.

The wound was then sutured, and an immediate postsurgical radiograph was taken (Figure 2). Postsurgical medication, including amoxicillin, 500 mg every 6

hours for 7 days, and analgesic with 0.02% chlorhexidine-gluconate mouthwash twice a day, was prescribed. Ten days later, the sutures were removed. The healing was uneventful, and primary wound closure was fully achieved.

The patient was then seen 1, 4, 8, and 9 months postoperatively; at 9 months, radiographs showed that almost 5 to 6 mm of new bone had regenerated on the sinus floor (Figure 2C). The treatment course was to proceed with the second stage of the surgery, including re-grafting of the already augmented area of #3 with a combination of bovine mineral (Bio-Oss, Geistlich Biomaterials, Schlieren, Switzerland) and autogenous bone chips and the simultaneous

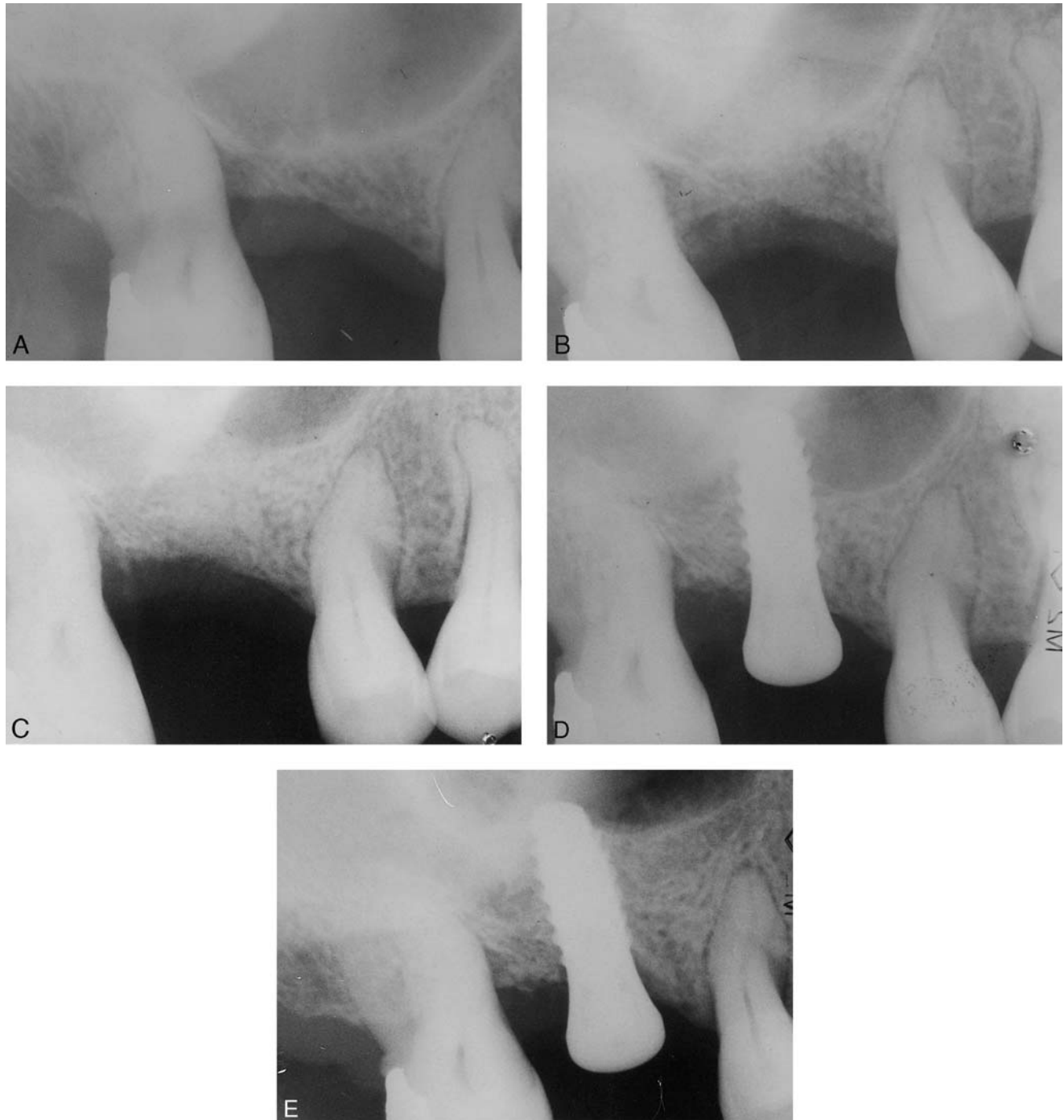


FIGURE 2. (A) Preoperative radiograph of the extracted site of #3. (B) Immediate postsurgical radiograph of the grafting site (first stage). Note the radio-opacity, representing the grafting materials within the sinuses. (C) Eight months after first-stage grafting. (D) Immediate radiograph after the second-stage grafting and implant placement. (E) Eight months after the second stage. Note the height of new bone, which has significantly increased and covered the entire length of the implant.

placement of a 10-mm-long by 4.1-mm-diameter nonsubmerged implant. The surgical procedure and postoperative medication

and care were the same as described previously, and an immediate postsurgical radiograph was taken (Figure 2D).

Sutures were removed 10 days later, and healing was uneventful. Again, the patient was seen regularly, and at 8 months

postoperatively a radiograph was taken (Figure 2E).

As is shown in Figure 2E, at 8 months after implant placement, the entire length of the implant (10 mm) was covered by newly regenerated bone, and clinically the implant was solid with healthy soft tissue around its neck. The patient was then referred to a prosthodontist for crown restoration (Figures 1C and 2F).

DISCUSSION

An important factor that must be carefully evaluated before considering implant placement in the maxillary posterior region is the quantity of the bone between the alveolar crest and the sinus floor. Computerized tomography and preapical radiography can help to determine the bone height in this area before implant placement.

In cases with inadequate bone between the sinus floor and alveolar crest, the sinus floor augmentation or elevation is a surgical technique that helps to resolve the problem of deficient bone height in the posterior maxillary region to receive the implants. The surgical techniques currently used for sinus elevation and augmentation, as described by Ioannidou and Dean,¹ are as

follows: (1) 1- and 2-stage lateral antrostomy and (2) osteotome technique with crestal approach.

In the 1-stage lateral antrostomy and also the osteotome technique, a preexisting bone height of at least 4 to 5 mm is required to provide implant primary stabilization after sinus floor has been augmented. However, when the bone height between the alveolar crest and the sinus floor is less than 4 to 5 mm, the 2-stage lateral antrostomy presents a viable treatment option. Because there is not enough bone to provide a good primary stabilization for the implant in such a case, the sinus floor augmentation must be performed first, and then 6 to 9 months later the implant can be placed. The lateral antrostomy (window opening) technique appears to be a more invasive, resective, and costly procedure compared with the osteotome technique.

The 2-stage osteotome technique as described in this article is a less invasive procedure compared with the lateral window technique. In this latter technique, the sinus floor is grafted through a small canal or hole to build up enough bone (>5 mm) in the first stage to provide implant primary stabilization for the second stage. In the second stage, the same area is grafted, if necessary, and

simultaneously the implant is placed.

The follow-up of the case reported in this article demonstrated that the initial bone height of 2 to 3 mm was increased to 5 to 6 mm in the first stage and subsequently to 10 to 11 mm 8 months after the second stage with simultaneous implant placement. According to the author's knowledge, this 2-stage osteotome technique has not been previously reported.

However, considering the frequent need for implant placement in the posterior maxilla with inadequate bone height, the 1- and 2-stage osteotome technique can be another option with a simpler and less invasive procedure to increase the bone height on the sinus floor to receive the implants with predictable results.

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