



Nonfixated inlay graft for anterior localized mandibular defect

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Localized vertical bone defects within the anterior mandibular alveolar ridge frequently pose a unique challenge for functionally and aesthetically pleasing rehabilitation of this area. Causes for significant bone loss in this region may include periodontal disease, post-extraction atrophy, trauma, and orthodontic treatment. In the presence of such a defect, ridge augmentation may be obligatory before installation of dental implants. Several surgical procedures, notably bone augmentation techniques, including guided bone regeneration, onlay bone grafting, and interpositional grafts, have been described. However, loss of a single incisor or a few incisors may render these methods complicated for surgical manipulation. In this article, we aim to report the outcome of 4 cases with localized vertical osseous deficits in the anterior mandible, treated by using a technique whereby we utilized the bony defect's margins through a vestibular approach to wedge inlay grafts without additional fixation or distraction hardware, thus overcoming the surgical difficulties and achieving a favorable outcome. (Oral Surg Oral Med Oral Pathol Oral Radiol 2020;130:e1–e4)

Localized vertical bone resorption of the anterior mandibular alveolar ridge poses a surgical challenge for rehabilitation through the use of dental implants. Among the causes for such a defect is postextraction atrophy, periodontal disease, infection, trauma, neoplasia, and careless orthodontic treatment.¹⁻⁴ In such cases, ridge augmentation is obligatory before installation of dental implants. Different surgical procedures for ridge augmentation have been described in the literature and are used extensively, with good outcomes and predictable results.⁵ Among these techniques are guided bone regeneration, onlay bone grafts, interpositional bone grafts, and various combinations of these procedures.⁶⁻⁹ However, the morphologic characteristics of the resorbed anterior mandibular alveolar ridge may render these techniques complicated because of buccolingual deficiency and a short mesiodistal span between the remaining teeth, making the use of fixation hardware difficult to perform.

The present article describes an approach for augmentation of local defects in the mandibular incisors area to overcome the difficulties mentioned above.

MATERIALS AND METHODS

Patients

This observational study includes data obtained from 4 patients, who presented with a localized vertical bone

defect in the anterior mandible area, which had to be augmented before implant placement (Table I).

Informed consent for the planned surgical procedure was obtained from all patients.

The inclusion criteria for participating in the study were as follows: (1) indication for implant-supported rehabilitation of 1 to 3 missing incisors in the mandibular region and (2) presence of vertical alveolar bone resorption.

The exclusion criteria for participation in the study were (1) medical contraindication for the installation of dental implants, including unstable diabetes mellitus, prior irradiation treatment to the head and neck region, treatment with intravenous bisphosphonates, and American Society of Anesthesiologists (ASA) score higher than 3; and (2) lack of consent to participate in the study.

All patients were clinically evaluated before the surgical procedure by performing thorough intraoral examination and radiographic inspection, which included periapical plain radiography and cone beam computed tomography (CBCT) of the anterior mandibular alveolar ridge.

Treatment and surgical technique

All patients were treated under local anesthesia. A single horizontal vestibular incision was made in the lining oral mucosa, 7 mm below the mucogingival line, underneath the resorbed alveolar ridge (Figure 1A). No crestal or vertical release incisions were made. Meticulous subperiosteal undermining dissection was performed coronally to expose the margins of the bony defect at the alveolar crest and apically for the exposure of the mandibular

Statement of Clinical Relevance

This article describes an efficient technique osseous augmentation of narrow bone defects within the anterior mandible. This modality is designed to overcome a clinical surgical challenge of bone grafting in this region.

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Table I. Study’s population: patients’ demographic characteristics data, including gender and age, and clinical information regarding augmented site and measured bone gain

Patient	Age (years)	Gender	No. of missing teeth	Vertical bone gain (mm)	No. of implants placed	Follow-up period (years)
1	47	F	3	6	2	2
2	45	F	2	7	2	1.5
3	50	M	1	6	1	3
4	50	M	1	4	1	2

F, female; M, male.

symphysis donor site (Figure 1B). After measurement of the defect size, the donor site was marked accordingly with sterile pencil oversizing its mesiodistal dimension by 1 to 2 mm. The bone graft was harvested from the symphyseal area by using a high-speed drill (Figure 1C). The graft was wedged into the alveolar defect without the need for additional fixation (Figure 1D). Remaining voids between the graft and the defect walls were filled with allograft (Raptos, Citagenix Inc., Laval, QC, Canada) (Figure 1E). Collagen membrane (Remaix, Metrice

GmbH, Herzogenrath, Germany) was used to cover the graft. The incision was sutured in 2 layers—mentalis muscle and oral mucosa—with resorbable sutures (Vicryl Rapide, Ethicon, CA).

RESULTS

Case 1

A 50-year-old male was referred to our clinic with the request for an implant in the right mandibular central incisor area. Clinical examination revealed missing

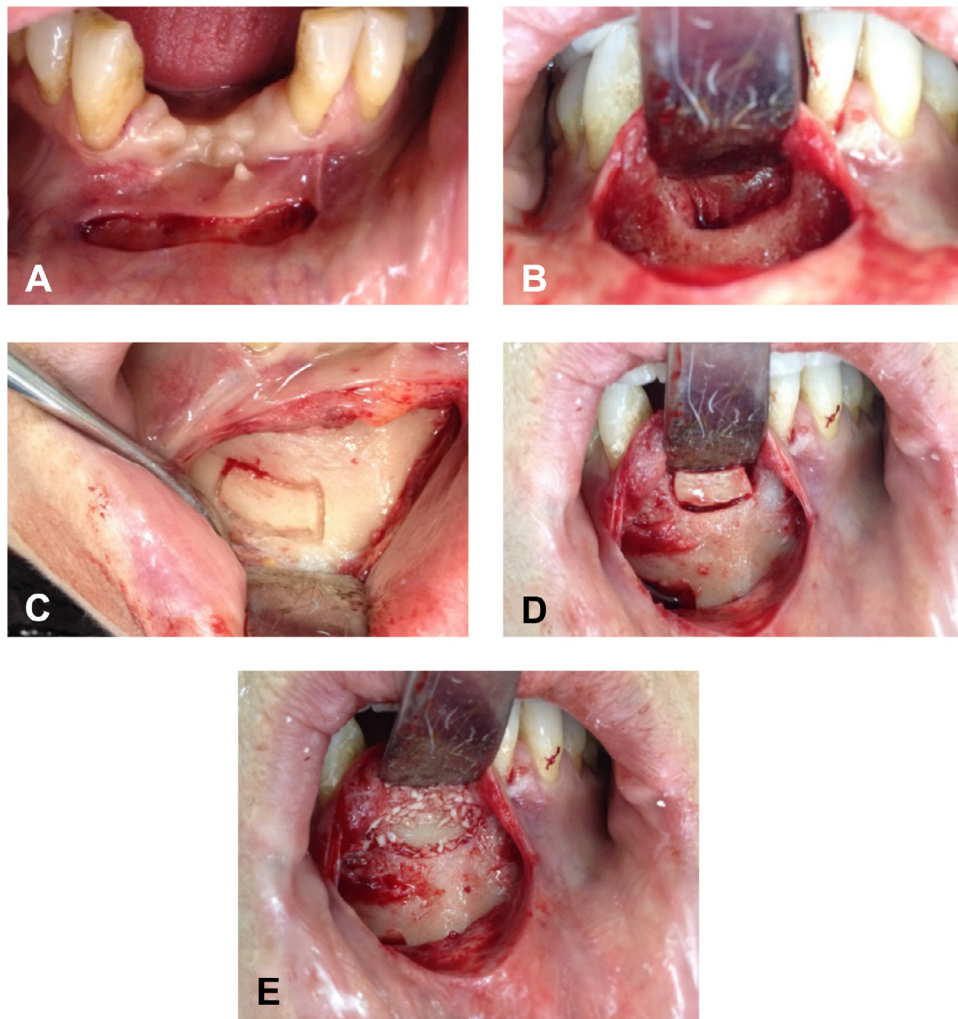


Fig. 1. Surgical technique: Surgical approach via single vestibular incision (A), access to donor site (B), bone graft harvest from symphysis (C), graft wedging into recipient site (D), and peripheral filling with bone substitute (E).

tooth #41, which had been extracted because of periodontitis. Initial clinical evaluation and radiography revealed a narrow concave ridge with vertical and horizontal bony defects, with a mesiodistal span of 6 mm between the adjacent teeth (Figure 2A). A CBCT scan demonstrated a vertical alveolar defect reaching down to the level of the apical third of the adjacent incisors roots, with a well preserved lamina dura of the adjacent dentition (Figure 2B).

The patient underwent the surgical procedure described earlier, uneventfully, with no exposure of the grafted bone and no complications at the adjacent donor site (Figure 2C).

Four months after treatment, follow-up CBCT was performed, revealing bone regeneration in the grafted site (Figure 2D). A crestal incision was made, exposing the ridge, and 1-piece implant with the diameter of 3 mm (Arrow press implant system; Alpha-Bio Tec, Petah Tikva, Israel) was inserted (Figures 2E and F).

Case 2

A 47-year-old female was referred to our clinic with a request for implants in the area of teeth #31–#41; these teeth had been extracted because of chronic periodontitis and alveolar bone resorption. Clinical examination revealed a vertically resorbed narrow ridge, with increased interocclusal space (Figure 3A). CBCT showed a vertical alveolar defect reaching down to the apices of adjacent teeth (Figures 3B and C). A well-preserved lamina dura was noted reaching up to the coronal two-thirds of the adjacent roots. The same procedure described earlier was performed, with the harvest and wedging of a 15 × 5 mm symphyseal graft (Figures 3D–F).

Six months after treatment, the area was exposed for the insertion of 2 dental implants, and vital cortical bone at the level of the adjacent crestal ridge was observed (Figure 3G).

Final implant-supported prostheses were placed 9 months after the grafting surgery, with an aesthetically pleasing outcome (Figure 3H).

DISCUSSION

The vertically resorbed alveolar ridge in the incisor mandibular region presents a substantial hurdle for proper prosthetic rehabilitation. The natural dimensional characteristics of the narrow anterior mandibular alveolar ridge, together with the short mesiodistal span left after the loss of a mandibular incisor, makes traditional augmentation methods inapplicable.

Onlay bone augmentation, interpositional bone grafting, and distraction osteogenesis require utilization of hardware, such as plates, screws, and distractors, which are technically difficult to adjust in this unique surgical field.

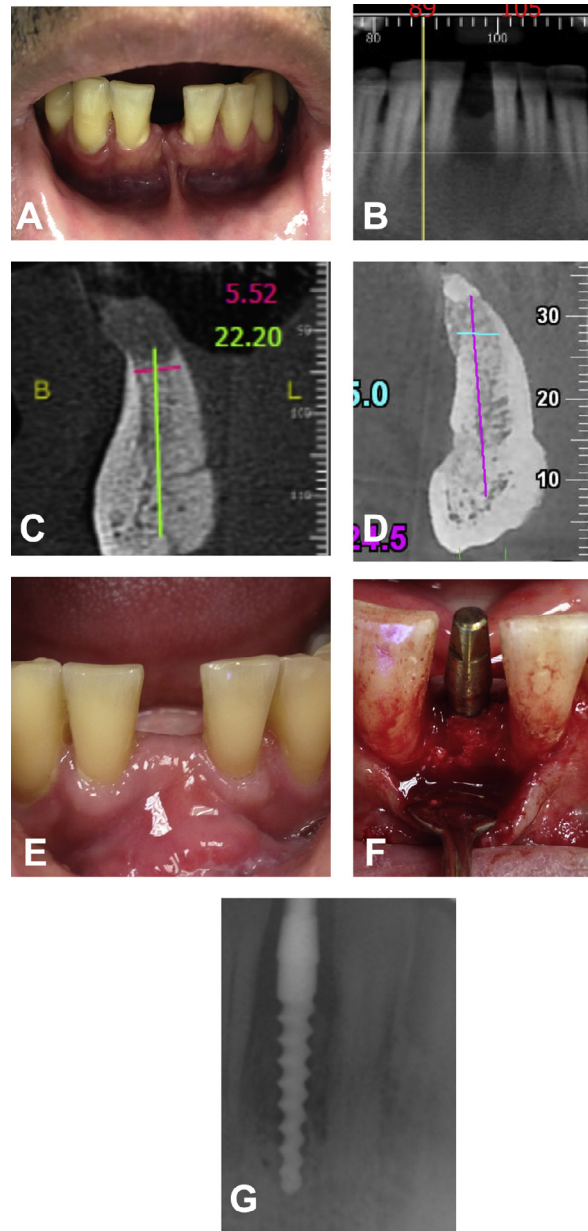


Fig. 2. Case 1: Clinical evaluation of alveolar ridge missing single incisor (A), cone beam computed tomography (CBCT) demonstrating localized alveolar defect (B), preoperative CBCT demonstrating a vertical osseous defect (C), CBCT demonstrating alveolar bone gain 4 months after treatment (D), postoperative evaluation of the surgical site during the consolidation period (E), preprosthetic implant placement within the augmented site (F), and periapical radiograph demonstrating the postoperative implant site (G).

In the present study, we describe a predictable technique for the grafting of a narrow vertical defect within the region of the mandibular incisors. This technique utilizes the defect walls to wedge the graft into position, rather than using fixation hardware for stabilization, thus protecting the small graft from fracture and

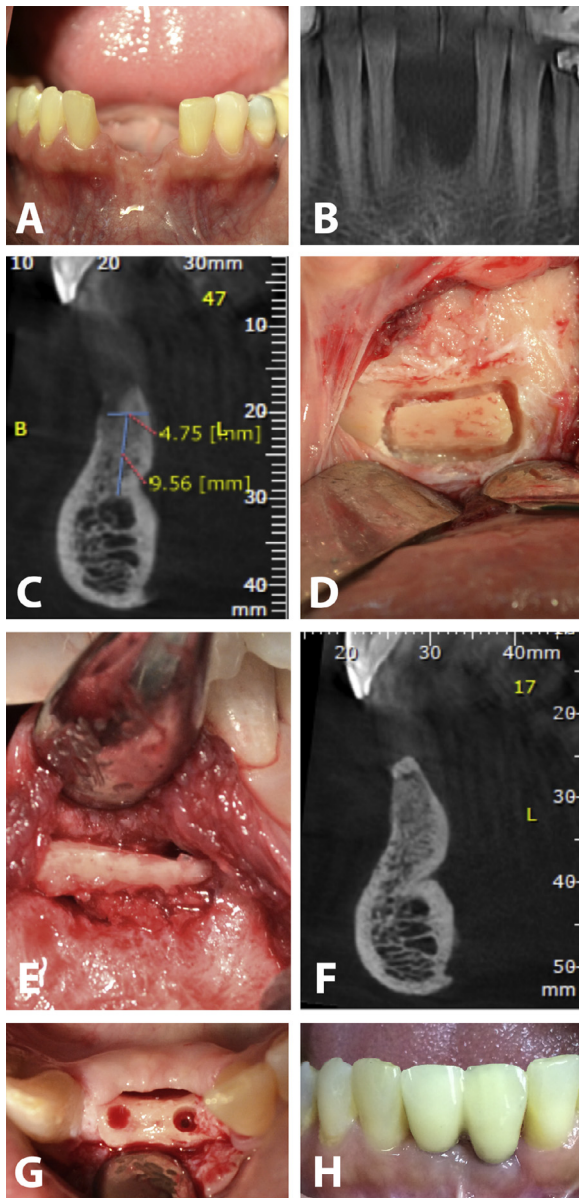


Fig. 3. Case 2: Preoperative clinical evaluation of anterior mandibular alveolar crest missing 2 central incisors (A), radiograph of the vertical bony defect within this site (B), preoperative CBCT scan showing an osseous deficit within the defect area (C), bone graft harvest (D), augmented site exposure before implant placement (E), postoperative radiographic bone gain (F) with site preparation for 2 implants (G), and final prosthetic outcome (H).

necrosis. Moreover, in this technique, a single vestibular cut is used to approach both the symphyseal donor site and the recipient site.

The technique is simple and quick, obviates the stage of graft fixation, and is easily performed under cover of local anesthesia.

The access through a vestibular approach reduces the rate of flap dehiscence, which is a common complication

of surgical augmentation procedures. In case of failure of the procedure, a second attempt can be made from the same starting point at the recipient site, as opposed to a case of failed transport segment resulting in a worse condition and few salvage possibilities.

CONCLUSIONS

According to our clinical experience and findings, reconstruction of vertical narrow defects in the anterior mandibular region by placing and wedging a bone graft between the defect bone rims through a single surgical incision appears to be a viable and predictable procedure, which will allow successful placement of the foundations for proper installation and osseointegration of implants. Although the number of cases in this study is limited, we did not observe any major complications with this technique. There was no radiologic bone resorption of the grafted bone at the time of implant insertion, and at long-term follow-up, good clinical, aesthetic, and prosthetic outcomes were achieved.

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