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Sandwich Osteotomy for Alveolar Ridge Augmentation Prior to Implant Rehabilitation in a Patient Declining Conventional Prosthetic Options: A Case Report

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Abstract

Tooth loss causes alveolar ridge resorption, compromising implant placement. This case report describes sandwich osteotomy with an interpositional autogenous bone graft harvested from the mandibular symphysis for vertical ridge augmentation. Following osteotomy, the alveolar segment was mobilized, grafted, and stabilized. Postoperative assessment demonstrated ridge augmentation, facilitating planned implant rehabilitation. Sandwich osteotomy preserves native bone and offers a valuable approach for managing localized vertical ridge deficiencies in appropriately selected patients.

Keywords: Sandwich Osteotomy, Alveolar Ridge Augmentation, Vertical Bone Augmentation, Autogenous Bone Graft, Dental Implants

Introduction

Tooth loss causes progressive alveolar ridge resorption, compromising bone dimensions and implant rehabilitation. Adequate bone volume is essential for implant stability, positioning, and long-term functional and aesthetic outcomes.[1,2] Some patients decline conventional fixed or removable prostheses and prefer implant-supported rehabilitation.[3] Significant ridge resorption may require augmentation before implant placement.[4] Available techniques include guided bone regeneration, onlay grafting, distraction osteogenesis, ridge splitting, and interpositional grafting.[5]

Sandwich osteotomy involves mobilizing an alveolar bone segment and placing an autogenous graft between the segment and basal bone, facilitating vertical augmentation while preserving the native segment.[6] Originally described by Schettler, this technique has been

modified to reconstruct localized alveolar defects.[7] Autogenous bone possesses osteogenic, osteoinductive, and osteoconductive properties that support graft incorporation.[8] This report describes sandwich osteotomy with autogenous bone grafting to facilitate implant-supported rehabilitation in a patient declining conventional prosthetic options.

Case Report

Patient Presentation

A patient reported to the Oral and Maxillofacial Surgery (OMFS) outpatient department with a missing tooth and requested a fixed, stable replacement. Conventional options, including fixed and removable partial dentures, were discussed; however, the patient declined both and preferred implant-supported rehabilitation.

Clinical examination revealed a localized edentulous area with deficient alveolar ridge dimensions. The available bone was considered inadequate for predictable implant placement in the desired prosthetically driven position. Radiographic evaluation confirmed insufficient alveolar bone at the recipient site.

A staged treatment plan was established, comprising ridge augmentation followed by implant placement after adequate healing and graft consolidation.

Treatment Planning

Sandwich osteotomy with interpositional autogenous bone grafting was selected to correct the localized vertical ridge deficiency. The objectives were to increase bone volume, restore ridge dimensions, establish a suitable foundation for implant placement, and facilitate prosthetically guided positioning while avoiding preparation of adjacent teeth and removable prostheses.

The patient was informed about the procedure, treatment sequence, potential complications, alternatives, and subsequent implant rehabilitation. Informed consent was obtained.

Surgical Procedure (Fig 1 and 2)

Under local anesthesia and aseptic conditions, a mucoperiosteal flap was elevated to expose the deficient ridge while preserving the palatal/lingual soft-tissue attachment. Two vertical and one horizontal osteotomy were performed to create a mobilizable alveolar segment. The segment was carefully mobilized, maintaining its biological integrity and soft-tissue support.

Autogenous Bone Harvesting and Interpositional Grafting

Autogenous bone was harvested from the mandibular symphysis, prepared, and adapted to the recipient site. The graft was positioned between the basal alveolar bone and mobilized segment, creating the characteristic sandwich configuration. The graft and segment were stabilized to minimize micromotion during healing. The site was irrigated, the flap repositioned, and primary closure achieved with sutures.

Postoperative Course

Postoperative monitoring focused on wound healing, graft stability, infection, and other potential complications. Clinical and radiographic assessment demonstrated the augmented ridge. A healing and graft-consolidation period was planned before implant placement.

The treatment sequence comprised missing tooth, rejection of conventional prostheses, implant planning, identification of inadequate ridge dimensions, sandwich osteotomy with autogenous grafting, ridge augmentation, healing, and planned implant rehabilitation.

Discussion

Vertical ridge augmentation aims to provide sufficient bone for implant placement in a biologically and prosthetically favorable position. Sandwich osteotomy achieves this by positioning a graft between a mobilized alveolar segment and basal bone, providing vascular

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support from surrounding native bone and potentially reducing graft resorption.[9–12]

Nóia et al. reported a mean vertical bone gain of 5.12 mm after four months in 17 sandwich osteotomy procedures involving 14 patients. The present case used an autogenous mandibular symphysis graft, combining the biological properties of autogenous bone with the advantages of interpositional placement.[13]

Rachmiel et al. reported a mean vertical bone gain of 7.5 mm in 21 patients, with 96.7% implant survival over a median follow-up of 3.1 years. These findings support sandwich osteotomy for moderate vertical deficiencies. Preservation of the native cortical segment may help maintain ridge contour and facilitate subsequent implant rehabilitation.[14]

Marconcini et al. reported a mean vertical gain of 5.6 mm in 32 posterior mandibular sites, with 95.5% implant survival and mean marginal bone loss of 1.06 ± 0.37 mm after three years. These results suggest that augmented bone can support subsequent implant rehabilitation, although direct statistical comparison with an individual case is inappropriate.[15]

Roccuzzo et al. reported approximately 94% implant survival after a mean follow-up of 3.7 years, with mean peri-implant marginal bone resorption of approximately 1.6 mm. They considered sandwich osteotomy predictable but emphasized the need for longer-term evidence.[16] Bera et al. reviewed 1,030 implants and reported survival rates of approximately 90–100%, supporting the technique's potential for vertical augmentation. However, anatomical limitations, particularly the inferior alveolar nerve in the posterior mandible, require careful consideration.[17]

Autogenous mandibular symphysis bone provides osteogenic, osteoinductive, and osteoconductive properties, potentially supporting graft incorporation. However, donor-site morbidity and additional surgery must be considered. Bone substitutes may also provide acceptable augmentation; therefore, graft selection should depend on defect morphology, required bone gain, and patient-specific factors.[18,19]

Unlike conventional onlay grafting, sandwich osteotomy positions the graft between vascularized bony segments, potentially improving vascular access and mechanical protection. Preservation of the native cortical segment and reduced relapse reported in previous studies further support its use in selected vertical ridge defects.[11] Nevertheless, the technique is not universally superior to alternatives. Urban et al. reported a weighted mean vertical bone gain of approximately 4.16 mm across different augmentation techniques, highlighting the importance of considering defect anatomy, soft-tissue conditions, donor-site availability, and anticipated implant position.[20]

Potential complications include transient sensory disturbances, postoperative paresthesia, and wound dehiscence. Careful preoperative imaging, appropriate osteotomy design, preservation of vascularity, stable fixation, and meticulous closure are essential to minimize morbidity. Although an uncomplicated outcome may be favorable when confirmed during follow-up, it does not eliminate the recognized risks of the procedure.[11–16]

A staged approach was selected to reconstruct the deficient ridge before implant placement. Although Younis et al. reported that simultaneous implant placement may be feasible in selected moderate defects, staged augmentation permits assessment of regenerated bone dimensions and quality before definitive rehabilitation.[21]

Patient preference was central to treatment planning. Sandwich osteotomy addressed the anatomical limitation to ideal implant placement while accommodating the

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patient's preference for implant-supported rehabilitation. This illustrates the importance of integrating patient expectations, surgical feasibility, and prosthetic requirements.[13–20]

Overall, published studies demonstrate clinically meaningful bone gain and generally favorable implant survival following sandwich osteotomy. However, differences in study design, graft materials, anatomical sites, and follow-up limit direct comparisons. This case illustrates the technique's clinical applicability rather than superiority over alternative procedures. Long-term clinical, radiographic, and implant-related follow-up is necessary to evaluate ridge stability and subsequent rehabilitation outcomes.[18–23]

Conclusion

This case illustrates the application of sandwich osteotomy for vertical ridge augmentation in a patient who preferred implant-supported rehabilitation and declined conventional fixed and removable prostheses. The technique addressed deficient ridge dimensions and established a foundation for planned implant placement. Its clinical value lies in integrating patient preference, prosthetically driven planning, and surgical reconstruction. Although sandwich osteotomy is a useful option for selected vertical ridge defects, long-term follow-up and further studies are required to establish the durability of augmented bone and implant outcomes.

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Legend Figures



Figure 1: Pre- op photographs (Clinical and radiological)



Figure 2: Intra op and post op photographs

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