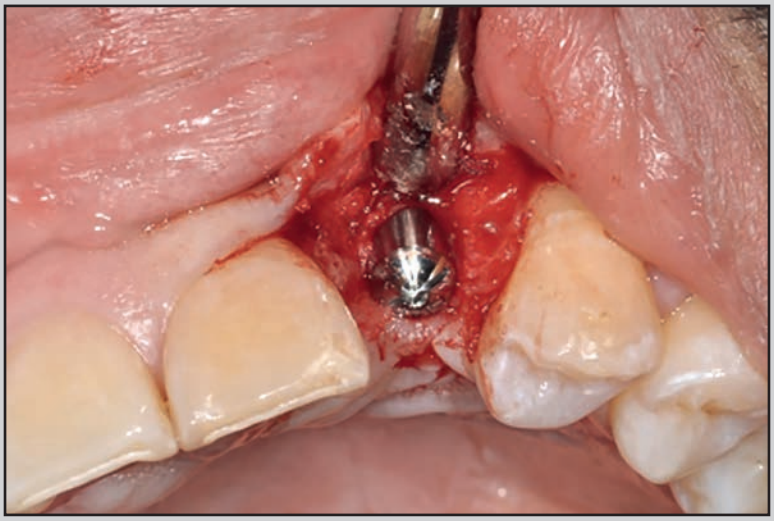
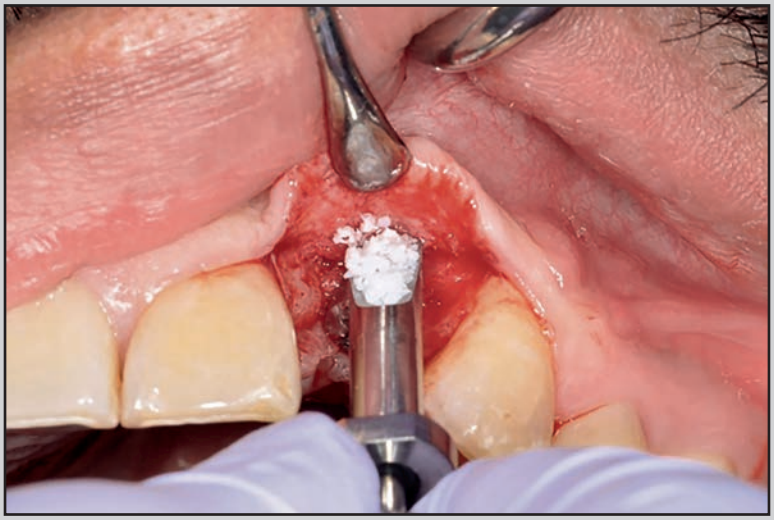
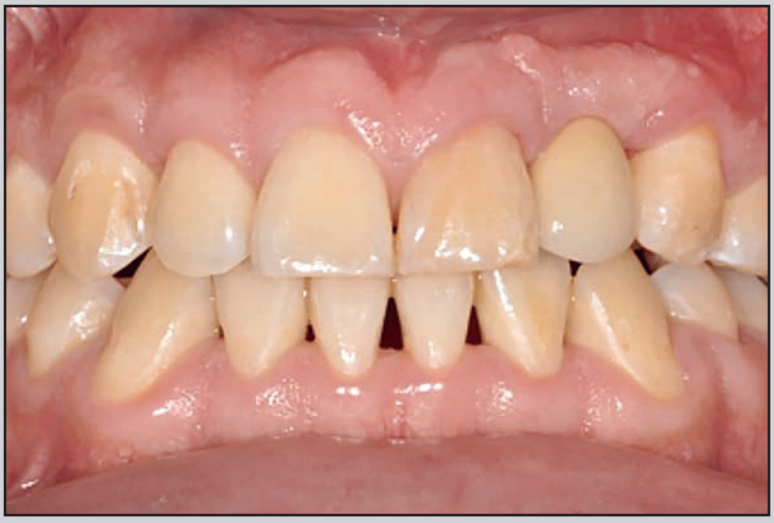
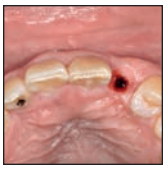






Treatment of a Soft Tissue Depression with a Xenograft Bone Substitute at the Second Stage of an Implant Procedure: A Case Report



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Following the extraction of a compromised tooth, the edentulous alveolar ridge undergoes physiologic bone remodeling, which may create a bone volume too deficient for implant placement. Guided bone regeneration (GBR) provides a predictable treatment option to increase the alveolar bone volume for implant placement, but a soft or hard tissue deficiency may remain even after this augmentation procedure has been completed. These deficiencies can be especially challenging in the esthetic zone, where patient expectations and esthetics often determine the satisfaction of the treatment outcome. This paper presents a case report of a xenograft bone substitute used at the second-stage surgery and abutment insertion to provide a solution to these deficiencies even after the patient had undergone a GBR procedure, thus improving the esthetic and functional outcomes of the final implant-supported restoration.
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The use of implant-supported dental restorations have become the gold standard in terms of tooth replacement options, requiring sufficient primary stability, osseointegration, and appropriate hard and soft tissue contours in order to be deemed successful. After tooth extraction, the alveolar ridge has been shown to undergo marked remodeling within the first 8 weeks,[1] with an average width reduction of 3.87 mm within the first 12 months.[2] This alveolar ridge remodeling is a natural phenomenon exhibited in most patients after tooth extraction and will occasionally result in an atrophic alveolar ridge with an insufficient volume for implant placement.

In order to obtain optimal esthetic and functional results for implant placement, treatment of atrophic alveolar ridges has focused on bone augmentation procedures. The most common and most documented procedure for local bone augmentation is guided bone regeneration (GBR), which applies a bone grafting material at the defective site, which is then covered and contained by a barrier membrane.[3] GBR has been shown to yield effective results, with a 95% success rate in terms of bone augmentation.[4]

However, common complications of implant placement via GBR include membrane exposure and the presence of a facial concavity of

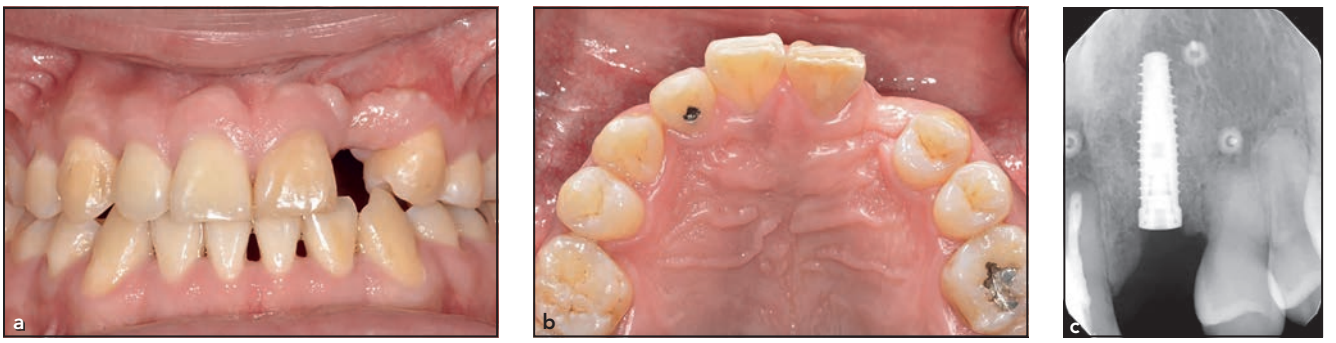


Fig 1 (a) *Facial,* (b) *occlusal, and* (c) *radiographic views at presentation, after previous GBR and implant placement procedures.*

the peri implant tissues, particularly when the facial bone or the overlying soft tissue is thin prior to or following tooth extraction.[5] This defect often requires additional interventions, using surgical techniques that improve the soft tissue contour of the implant site to avoid nonesthetic results,[6] food impaction, and soft tissue irritation.

This case report presents the step-by-step surgical and restorative procedures for managing a buccal soft tissue depression at an implant site after a failed GBR procedure, using xenograft particulate bone substitute to obtain an optimal soft tissue contour.

Case Report

A 33-year-old man presented to the Ashman Department of Periodontology and Implant Dentistry at the New York University College of Dentistry with a chief complaint of wanting to restore an implant that had been placed in a private dental office. The patient had a congenitally missing lateral incisor and an impacted canine and had undergone treatment to extract the impacted canine and replace it with an implant-supported restoration. The patient did not have any medical conditions and was not taking any medications at the time of his visit. Upon clinical examination, the patient exhibited an obvious soft and hard tissue buccal depression, even after a GBR and implant placement procedure had been performed to achieve the desired functional and esthetic results.

The buccal depression observed at the implant placement site was nonesthetic and resulted in an area that caused food impaction and tissue irritation (Fig 1). To resolve this defect, a minimally invasive xenograft placement technique was carried out at the second-stage surgery. Surgery was performed under local anesthesia (2% lidocaine with 1:100,000 epinephrine). A midcrestal incision was made, extending from the maxillary left central incisor to the first premolar, and a full-thickness buccal flap was elevated (Fig 2). No releasing incisions were made in order to preserve the papilla adjacent to the implant site. Following flap elevation, it was observed that the implant was completely encased by bone and was well osseointegrated; however, the buccal bone plate was very thin, resulting in both hard and soft tissue invagination. The defect was debrided of any granulation tissue, and a xenograft material (Bio-Oss small particle, Geistlich) was placed at the site of the buccal depression in conjunction with the placement of a healing abutment on the implant (Fig 3). A provisional restoration was fabricated chairside using the provisional partial removable prosthesis that had been provided to the patient prior to the second-stage surgery. An access hole was created through the palatal aspect of the acrylic tooth, and the remaining tissue-supported pink acrylic restoration was removed. A temporary cylindrical abutment was then inserted into the access hole and fixed with acrylic resin to create a sufficient emergence profile (Fig 4).

At the 6-month follow-up, the patient presented with sufficient improvement of the buccal contour, and no intraoral complications were reported (Fig 5). The provisional restoration was removed, and the

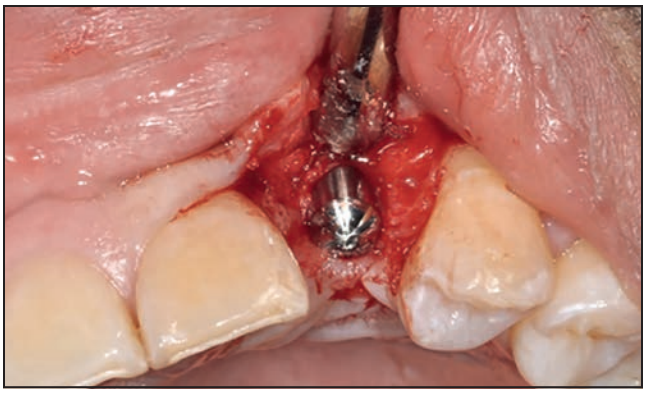


Fig 2 *A buccal full-thickness flap was elevated to expose the implant.*

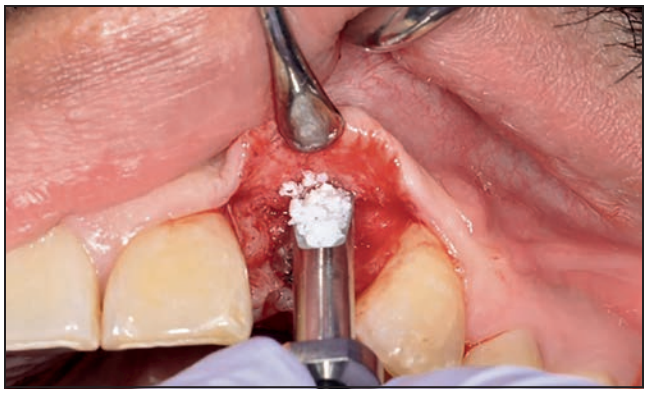
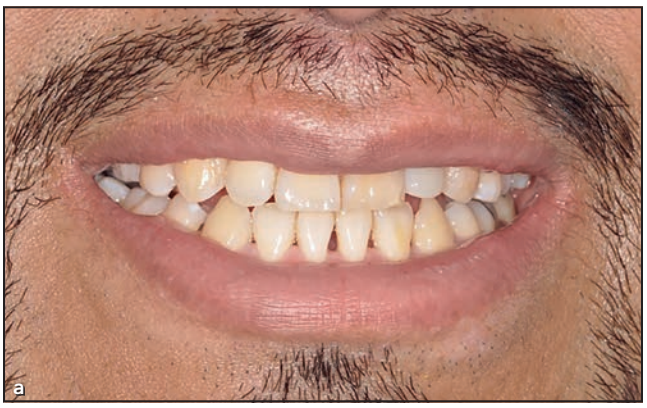


Fig 3 *Xenograft particulate was placed.*



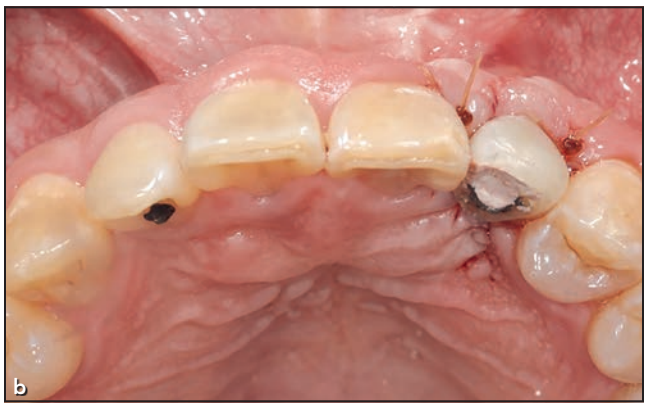


Fig 4 (a) *Smiling and* (b) *occlusal view of a chairside provisional restoration, fabricated and placed at the second stage.*

final screw-retained restoration was placed (Fig 6).

Discussion

The present case report presents a minimally invasive treatment method when there is insufficient buccal contour within the esthetic zone, even after GBR and implant placement procedures were performed. Although GBR in conjunction with implant placement has been well documented as a highly successful procedure (with success rates of 95% to 100%[7]), there is still variability in terms of achieving the proper esthetic contour of the buccal soft tissue surrounding the implant. The morphology of the defect to be treated plays an important role in the outcome of the GBR procedure. These defects are often associated with implants placed too far buccally.[8]

Soft tissue grafting techniques have also been a popular treatment modality for soft tissue defects associated with implant surgery, often obtaining a desired contour within the esthetic zone. Free gingival grafts were initially used by periodontists to correct these esthetic deficiencies, but the results often did not meet the desired qualitative and quantitative parameters.[9] Of the variety of soft tissue treatment options, connective tissue grafting remains the gold standard in terms of obtaining adequate soft tissue volume. However, it entails a more invasive procedure than the one proposed in the present case report and is limited by the patient anatomy at the donor site.

To prevent the need for additional ridge augmenting procedures, Caiazzo et al proposed a buccal plate preservation technique that involved immediate implant

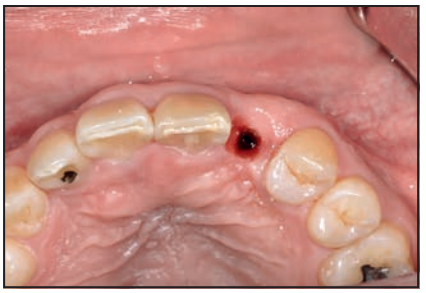
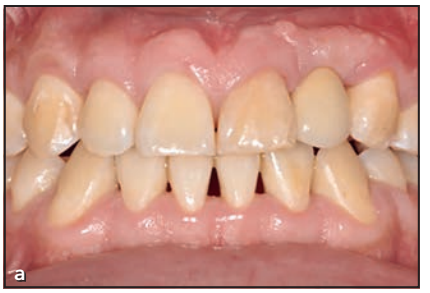


Fig 5 *Occlusal view of the site at 6 months, prior to placement of the final restoration.*



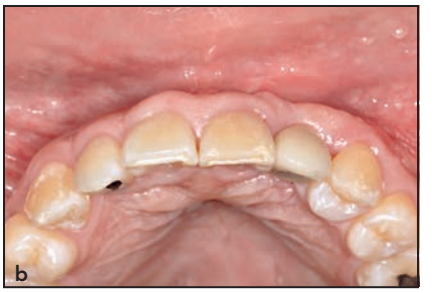


Fig 6 (a) *Facial and* (b) *occlusal views of the final restoration and buccal contour 6 months after the second stage.*

placement and preservation. The results of that study showed that performing atraumatic extraction with immediate implant placement kept the buccal plate and ridge contour intact, thus providing a viable solution, both esthetically and functionally, for implant placement in the esthetic zone.[10] However, the procedure is only applicable in ideal case scenarios in which there is an adequate buccolingual bone dimension (not affected by trauma) and where the defect site has not suffered any severe bone loss due to periodontal disease.

The purpose of this xenograft fill technique was to provide acceptable soft tissue volume and contour at the second-stage surgery in cases where previous GBR treatment had not provided adequate esthetic bone and soft tissue fill. Araújo et al[11] postulated that xenograft material can be used and incorporated into soft tissue without an inflammatory reaction, thus acting as a scaffolding to increase soft tissue profiles. According to Steigmann et al's[12] results, bone fill may also occur when elevating a full-thickness flap and inserting a xenograft without using a membrane. However, the principal aim of the xenograft fill technique was to improve the soft tissue contour over adequate but thin buccal bone surrounding an implant that was well osseointegrated.

Achieving an ideal esthetic buccal contour of the soft tissues surrounding an implant has been a prevalent problem and has been addressed by a multitude of different surgical and prosthetic procedures. Soft tissue grafting may present a viable solution with similar results in terms of soft tissue horizontal dimension.[13] However, these techniques are more invasive and costly than the technique used in the present case report.

Conclusions

The current case report demonstrated a successful outcome using a xenograft fill technique in a patient with high esthetic demands in a site with an inadequate soft tissue contour. The step-by-step surgical treatment showed an alternative way to rebuild soft tissue while minimizing the postoperative risks, complications, and morbidity seen with other surgical techniques. Nevertheless, more studies and randomized controlled trials are necessary to confirm the present results.

Acknowledgments

The authors declare no conflicts of interest.

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