Use of Titanium Mesh in Lieu of a Fixation Screw to Stabilize an Autogenous Block Graft: A Case Report

Sudhindra Kulkarni, MDS[1]*
Srinath Thakur, MDS[1]
Sujatha Kamath, MDS[2]
Sampath Kumar, MDS[2]

Localized alveolar augmentation is carried out either before, during, or sometimes after implant placement. The placement of autogenous graft as a block or a particulate alone or in combination with anorganic bone mineral has been practiced with a great deal of success. The block graft is secured in place with a screw and protected by a membrane. This case report describes the treatment of a female patient with a bucco-lingual bone deficiency grafted with autogenous block and a titanium mesh. Five months later, implant was placed in the grafted area. The definitive prosthesis was cemented 6 months later and followed up for 2 years.

Key Words: autogenous bone graft, titanium mesh, implant

INTRODUCTION

The treatment of complete and partial edentulism with implant-retained restorations is now an accepted reality. The root form dental implants and osseointegration are now a proven entity.[1–3] The availability of sufficient volumes of bone is one of the prerequisites for successful osseointegration. Conditions like trauma, periodontal disease, periapical cysts, and sometimes anatomic limitations compromise the amount of bone available for implant placement and also influence the final restorative outcome.[4] Such cases necessitate replacement of the missing teeth by other modes of replacement or augmentation of the alveolar bone.

Localized ridge augmentation has become one of the most common modes of replacement of the lost bone, and it is carried out either before, during, or sometimes after implant placement.[5–11] Bone augmentation is carried out not only to provide the underlying base for implant placement but also to create harmonious tissue contours in relation to the adjacent teeth.

Studies have shown that the implant survival in regenerated bone is predictable.[7–13] Various types of grafts, including autogenous bone as a corticocancellous block or in a particulate form,[6,14–20] allografts,[17,21,22] xenografts,[23,24] and alloplastic[17] materials or a combination of these materials have been used by clinicians, and the overall perception has been that the procedure has been successful,[11]

Autogenous blocks have been stabilized routinely using a fixation screw holding the block to the recipient bed.[5,6,16,17,25] Though the use of collagen membrane or expanded polytetrafluoroethylene membrane over the graft is routinely carried out, the problems of membrane collapse, local infection after membrane exposure, and incomplete bone formation in the space provided by the membrane haunt practitioners.[5,6,26–28]

Titanium mesh provides a unique advantage in that it is malleable, making it adaptable to the underlying graft, which helps it achieve a firm shape and secure the graft in situ. It also prevents the collapse of the overlying tissue into the defect area. The current report presents a case of a localized alveolar defect treated with a corticocancellous block graft stabilized with a titanium mesh.

[1] Department of Periodontics and Implantology, SDM College of Dental Sciences and Hospital, Dharwad, India.
[2] Department of Prosthodontics and Implantology, SDM College of Dental Sciences and Hospital, Dharwad, India.
* *Corresponding author,* e-mail: drsudhindrak@gmail.com
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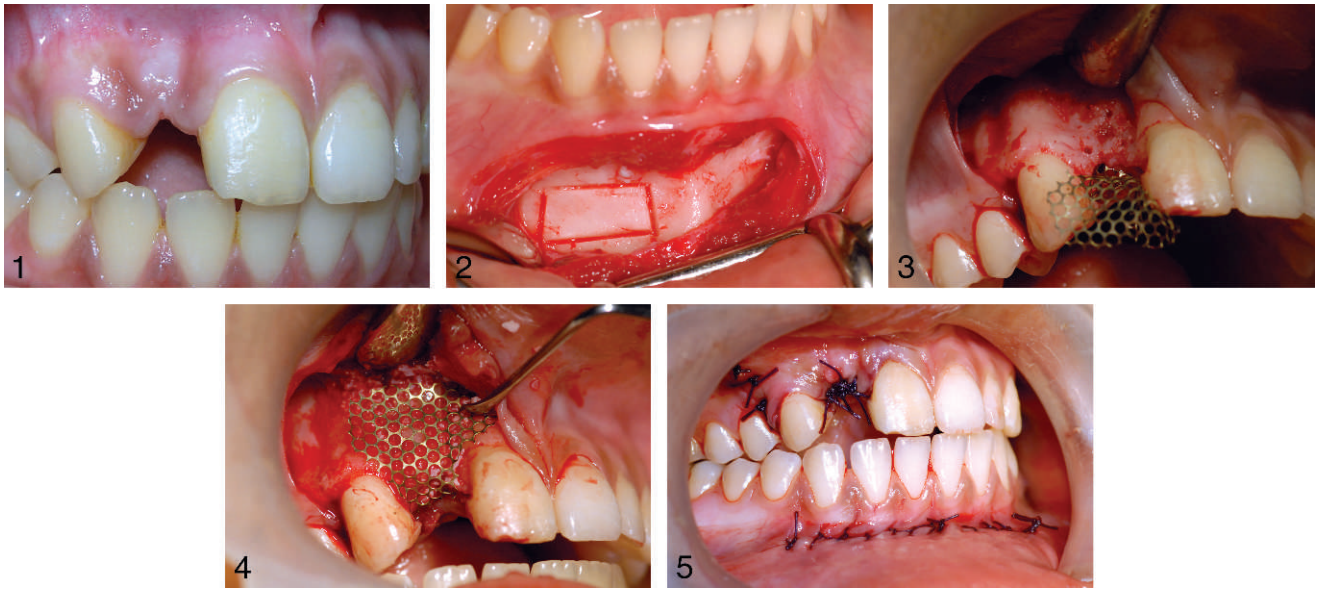


Figures 1–5. Figure 1. Preoperative view. **Figure 2.** Outline of the graft at the donor site. **Figure 3.** Titanium mesh tucked under the palatal flap and the recipient bed decorticated. **Figure 4.** Titanium mesh contoured and adapted over the graft. **Figure 5.** Primary closure attained at the donor and the recipient sites.

Case Report

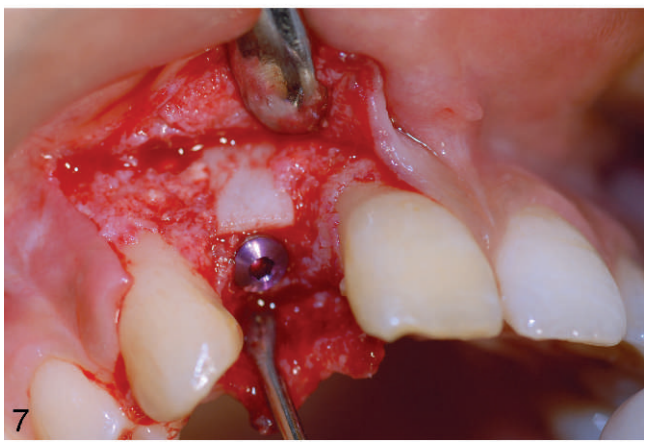
An 18-year-old female patient was referred to the Department of Implantology for replacement of her missing upper right lateral incisor (tooth #7). The patient's history revealed trauma at the age of 10 years and avulsion of the lateral incisor, which was treated by reimplantation and splinting of the same tooth. The tooth underwent discoloration and root resorption and was eventually extracted when the patient was 15 years old. For the previous 3 years the patient had been wearing a treatment partial denture but now desired a fixed replacement. Clinical examination revealed discolored tooth #8 and ridge deficiency in the tooth #7 area (Figure 1).

Surgical technique

A midcrestal incision was made in the tooth #7 area, extending mesially and distally to the gingival crevices of the adjacent teeth. A vertical release incision was placed distally, exposing the underlying bone. The recipient bed was de-corticated and shaped to receive a corticocancellous bone graft. Corticocancellous autogenous block graft was harvested from the mandibular parasymphyseal area using piezosurgery (Figure 2).

A titanium mesh screen (Synthes, West Chester, Pa) of 1.0-mm sized pores was cut and shaped to the defect and tucked under the palatal flap (Figure 3). The block was placed in the recipient area and was stabilized into the defect shaped to receive it. Bovine anorganic bone mineral (Bio-Oss, Geitslich Biomaterials, Wolhusen, Switzerland) was grafted around the block. The mesh was contoured and adapted around the graft, which ensured stabilization of the graft and the mesh. No fixation screws were used to hold the graft or the mesh. The flaps were approximated and closed with 3-0 resorbabale sutures (Vicryl, Ethicon, Johnson and Johnson, Aurangabad, India) (Figures 4 through 6). Five months later the site was reentered, and the mesh was removed. It was noticed that the graft was well adapted and integrated into the site and did not display much resorption.

Sequential drilling was carried out, and a 3.5 diameter Nobel Replace Select Tapered (Nobel Biocare AB, Goteborg, Sweden) implant was placed in the osteotomy (Figure 7). The implant was uncovered 4 months later and was temporized for a period of 2 months (Figures 8 through 10). Porcelain fused to metal (PFM) crowns were fabricated and cemented on the implant and the central incisor (Figures 11 and 12). The patient has now been followed up for 2 years. The soft tissue and the bone levels around the implants have been maintained (Figures 13 and 14).



Figures 6–8. Figure 6. Radiograph showing the mesh and the graft. **Figure 7.** Implant placed at the grafted sites 5 months after the surgery. **Figure 8.** Second-stage procedure done and the final abutment placed.

Discussion

Esthetic rehabilitation of missing anterior teeth is a challenging proposition, and the unavailability of adequate bone volume at the site adds to the challenge. Though bone grafting procedures around dental implants have been shown to be predictable, no single procedure has been shown to be better than the other. Autogenous bone has been said to be the gold standard because of its osteogenic potential and compatibility.[17]

The graft harvested from the mandibular parasymphysis has shown good clinical outcomes.[6,18,19,27] The block has usually been fixed with mini screws to secure it in place so as to prevent fibrous growth into the graft, which could lead to failure of integration of the graft.[16,25,26]

The decortications of the recipient site with perforations created an ideal bed for the placement of the corticocancellous autogenous block, which was then secured with the help of a titanium mesh. Once contoured, the mesh stays as shaped and remains firm.[22,24,28–30] The mesh was well contoured and adapted to the graft, thus avoiding the placement of a fixation screw. However, in most studies, the mesh has been stabilized with screws.[24,28–30] This is probably the first case report wherein the block graft is secured by the mesh only and without the use of the fixation screws. This, however, does not mean that even in large defects one can avoid the use of a screw to stabilize a block or the mesh. The fact that stabilization of the graft at the recipient site is the key to success and has to be achieved irrespective of the mode of fixation cannot be undermined.

In the present report, no membrane was placed over the mesh, as it has been observed that a pseudo-periosteum forms around the mesh, which may act as a protective barrier.[30]

Graft resorption is a very common occurrence, irrespective of the type of the graft or coverage by a membrane.[31] In the present patient no significant resorption of the block was noticed. Studies have shown that whether or not a membrane is used, there is some amount of graft resorption, which necessitates overcorrection. So the use of a membrane is not mandatory as done in the present case.

The nonplacement of the fixation screw to hold the graft might have been one of the reasons there was little resorption of the graft as it avoided an

Figures 9–14. Figure 9. Temporary restoration placed. **Figure 10.** Well-healed tissues before cementation. **Figure 11.** Final restorations placed. **Figure 12.** Radiographic image immediately after the cementation of the final restorations. **Figure 13.** Clinical picture at the 2-year follow-up. **Figure 14.** Radiographic image 2 years after the restorations.

additional trauma to the block caused by drilling; however, more studies are needed to establish this as a fact and not a one-time occurrence.

The temporary restoration placed at the second-stage surgery provided ideal soft tissue contours over a 2-month period, and thus, an ideal emergence profile was achieved. The final restorative outcome was very well accepted by the patient.

In conclusion, it can be stated that titanium mesh can be used to secure the autogenous block graft and result in predictable graft integration.

Abbreviation

PEM: porcelain fused to metal

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