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Case Report

Cortical Block Graft in Areas of Inadequate Keratinized Tissue Followed by Immediate Implant Placement - A Case Report

Roja Yandapalli[1], Prabhuji MLV[2], Rashmi Paramashivaiah[3]* and Akshita Srivastava[4]

[1]Assistant Professor, Department of Periodontology, CKS Teja Institute of Dental Sciences and Research, Tirupati, Andhra Pradesh, India

[2]Professor and Head of the Department, Department of Periodontology, Krishnadevaraya College of Dental Sciences and Hospital, Bangalore, India

[3]Associate Professor, Department of Periodontology, Krishnadevaraya College of Dental Sciences and Hospital, Bangalore, India

[4]Postgraduate Student, Department of Periodontology, Krishnadevaraya College of Dental Sciences and Hospital, Bangalore, India

***Corresponding Author:** Rashmi Paramashivaiah, Associate Professor, Department of Periodontology, Krishnadevaraya College of Dental Sciences and Hospital, Bangalore, India.

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Abstract

Objective: A successful implant is largely dependent on support received by hard and soft tissues around it, some anatomic structures can however cause hindrance. Both horizontal and vertical bone augmentation can be helpful in achieving osseointegration around implants. Thus, this case study aims to report a case wherein cortical FDBA block graft has been used to regenerate bone using different incision designs to maximize soft tissue coverage after grafting.

Materials and Methods: A 30 year old male patient reported with grossly decayed tooth, with a keratinized tissue width of 1.5 mm. The treatment was planned with tooth extraction (#16) and placement of cortical block graft in the area with immediate root form implant placement. Patient was recalled after 1 week for suture removal and re-enforcement of post-operative instructions. Implant site was surgically exposed at 5 months and a gingival former was placed while a final prosthesis was given after 5 months.

Results: The 5 months post-op follow-up was satisfactory. Radiographically implant appeared to be well osseointegrated with a moderate density of bone around the area. The soft tissue collar was healthy with no signs of inflammation or peri-implantitis.

Conclusion: Immediate implant placement along with ridge augmentation is a viable option.

Keywords: *Block Graft; Immediate Implant; Inadequate Keratinized Gingiva*

Introduction

Implant success is determined by both the hard and soft tissues in the native area with an added complication added complication of underlying anatomic structures. Maxillary sinus can be a major impediment for implant placement in the molar region. This, there is often a requirement of vertical and horizontal augmentation to obtain adequate osseointegration.

Autogenous bone, the gold standard grafting material in bone reconstruction has drawbacks which include morbidity, availability and unpredictable graft resorption [1].

A bone allograft often obtained commercially from tissue banks that process the donor tissues. Allografts can be osteoconductive or osteoinductive. These materials have gained popularity with their relatively high success rates and an additional advantage in that no additional surgical procedure is required to procure bone from a donor site. However, they have some disadvantages which include a foreign body immune response, cost, and contamination of the graft during processing [2].

Particulate bone grafts provide more rapid ingrowth of blood vessels (revascularization), larger osteoconduction surface, more exposure of osteoinductive growth factors, and easier biologic remodeling compared with a bone block for reconstruction of large defects but also lack a rigid, supportive structure which displaces them much more easily compared with monocortical block grafts [1].

Cortical grafts give sufficient hard tissue anchorage. But the common problem is to obtain proper soft tissue coverage. Horizontal alveolar deficiencies that might be difficult to reconstruct with particulate grafts can easily be reconstructed with a monocortical block bone graft [1].

Among various types of grafts, allografts form the next best option after supreme autografts. Freeze Dried Bone Allograft (FDBA) and Demineralized Freeze Dried Bone Allograft (DFDBA) are the main categories of allografts.

Although decalcification exposes Bone Morphogenetic Proteins having osteoinductive properties but it also causes DFDBA to resorb much faster, making it a less effective scaffold than FDBA [2]. When implants are planned there is need for a prolonged resorption time in that area.

The process of osteoconduction, osteoinduction, and osteogenesis support the use of bone graft materials successfully [1].

Osteoconduction characterizes a material (often inorganic) which permits bone apposition from existing bone and requires the presence of bone or differentiated mesenchymal cells [3]. An Osteoinductive material is capable of inducing the transformation of undifferentiated mesenchymal cells into osteoblasts or chondroblasts and enhances bone growth or may even grow bone where it is not expected [3]. Osteogenesis refers to organic material capable of forming bone directly from osteoblasts [3].

FDBA has been shown to be a better scaffold (osteoconduction) than DFDBA, proving FDBA to be superior in space maintainence. Eventually, osteoclasts breakdown the mineral content of FDBA until demineralization occurs, inducing new bone formation and a prolonged protein release [4].

The commonest complication after block grafting will be graft exposure due to inadequate coverage which is all the more pronounced in the areas of deficient keratinized tissue. The maxillary molar area has minimal keratinized tissue width making cortical graft challenging. Many times vertical incision is needed to overcome this anatomic obstacle.

Thus, this case aims to regenerate bone using cortical FDBA block graft using different incision design to maximize soft tissue coverage after grafting.

Case Report

A 30-year-old male patient reported to outpatient section of Department of Periodontology, Krishnadevaraya College of Dental Sciences, Bangalore with a chief complaint of pain in upper right tooth (Figure 1).

Figure 1: *At baseline.*

The tooth (#16) was noted to be grossly decayed. Keratinized tissue width was 1.5 mm. An intra-oral radiograph is shown in figure 2. A cone beam computed tomography (CBCT) of the region was performed in order to enable a proper treatment plan based on the bone quality (Figure 3).

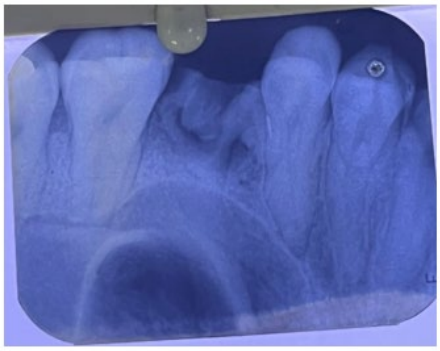

Figure 2: *IOPA pre-operatively.*

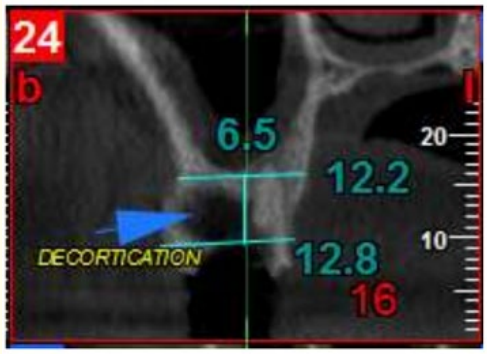

Figure 3: *CBCT pre-operatively (tooth #16).*

CBCT report revealed:

- The cortical bone is thin and continuous buccolingually with sparse intervening trabecular bone.
- Presence of buccal decortication and furcational bone loss.
- Presence of periapical rarefaction.
- Bone density - D3.

A treatment plan consisting of tooth extraction (#16) followed by placement of cortical block graft in areas of inadequate keratinized tissue and immediate implant placement was decided.

One day prior to surgery, antibiotic was started and continued for 6 days postoperatively.

Procedure

Patient was prepared for the surgery. The surgical area was anaethesized using local anesthesia (Commercial name: lignox (2% lignocaine with adrenaline)). Atraumatic extraction of tooth (#16) with periosteal elevator was carried out (Figure 4). Ostectomy of the area was performed (Figure 5). Block graft was obtained from Bangalore Medical Services Trust. Ostectomy drills were used within the block graft to facilitate implant placement Block was then customized to fit into socket. The same final osteotomy drills was used in the centre of the block graft to adapt it along with implant (Figure 6A-6C). This block graft was then placed at the particular site and then the implant was inserted using hand wrench (Figure 7). Vertical incisions were placed at end of incision to facilitate complete coverage of the flap with 3-0 non-resorbable silk sutures (Figure 8).

Figure 4: *Extracted tooth #16.*

Figure 5: *Ostectomy done irt tooth #16.*

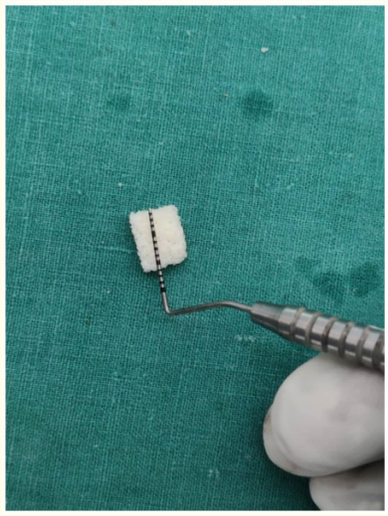

Figure 6A

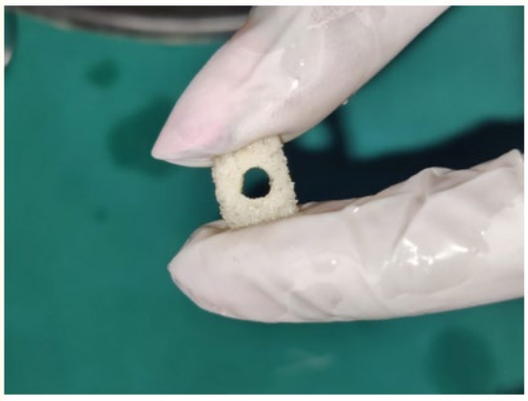

Figure 6B

Figure 6C

Figure 6A-6C: *Block graft customized to fit in to the socket.*

Figure 7: *Block graft placed along with immediate implant.*

Figure 8: *Tissues approximated with the help of sutures.*

Post-operative instructions and medications were given (Cap Amox., Tab Zerodol-Sp, Tab Metrogyl, Tab Pan-D) for 5 days. A topical mouthrinse (0.2% chlorhexidine gluconate) was also advised to be used after 2 days for 2 weeks.

Patient was recalled after 1 week for suture removal and re-enforcement of instructions (Figure 9). Implant exposure was carried done at 5 months surgically and a gingival former was placed (Figure 10).

Final prosthesis was given after 5 months (Figure 11).

Figure 9: *Surgical site 1 week postoperatively.*

Figure 10: *Implant exposure done 5 months after surgery.*

Figure 11: *Final prosthesis irt 16.*

Discussion

Alveolar bone deficiencies can be corrected by various ridge augmentation procedures for stability and longevity of dental implants [1]. Some deficiencies which are minimal, require bone augmentation which can be completed simultaneously with the implant placement [1]. Many techniques and biomaterials have been used to successfully reconstruct deficient bone volume and contours.

Bone blocks maintain the architecture of bone and appear to adapt easily to the receptor area, whereas particulate bone grafts must be placed into cavities or reinforced with membranes which limits its use for specific clinical situations [5]. Autografts in the form of block grafts can be obtained from an intraoral (e.g. mandibular symphysis or ramus) or an extraoral (e.g. iliac crest or tibia) site[1] but the invasiveness of the procedure is compounded. Thus, the next best option would be allografts mainly, FDBA and DFDBA.

Desai and co-workers described a technique for reconstruction of the periodontally hopeless extraction site with autogenous chin block graft and observed effective prevention of bone and soft tissue loss at the end of six months which allowed for placement of implants [6]. Augmentation of the maxilla with calvarial bone and simultaneous placement of implants has been performed by others [7].

Lev., *et al*. [8] in their study suggested that the particulate and the cancellous block h-FDB forms yielded similar BIC (Bone Implant Contact) and BAF (Bone Area Fraction) outcome.

Badr., *et al*. [9] demonstrated that either the application of autogenous bone ring or xenogenic bone ring within immediately placed dental implants in periodontally compromised extraction sites reduced the time for restoration function and esthetic.

Tresguerres., *et al*. [10] concluded that allogeneic bone block graft procedures constitute a clinically acceptable alternative for bone reconstruction. Other studies have also been supporting the use of block grafts [11-15].

In the literature, prospective studies relating to use of block grafts in immediate implants are still lacking. Thus, this case report provides an insight towards role of block graft in inadequate keratinized tissue sites after implant placement.

Conclusion

Though implants have become a part of the treatment regimen in the past couple of decades, they are still fraught with many hurdles like anatomic, prosthetic and systemic concerns. Among them the maxillary sinus and a deficient alveolar ridge in that area require a complex treatment plan. This often prolongs the treatment duration and reduces patient compliance. Alveolar ridge augmentation with FDBA block graft and immediate implant placement in the maxillary molars could provide a comprehensive solution both to clinician as well as the patient.

Conflict of Interest

The authors claim to have no conflict of interest or no financial interest in any company or any of the products mentioned in this article.

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