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RESEARCH ARTICLE

ALVEOLAR RIDGE AUGMENTATION USING AUTOGENOUS CHIN GRAFT AND SIMULTANEOUS IMPLANT PLACEMENT. A CASE REPORT

Deepika Gorantla¹, SVVS Musalaiah², Pavuluri Aravind Kumar², Narendra Babu M.², Kalapala Raviraj³
and Harish Prabhudev³

1. Postgraduate Student, Department of Periodontics, St. Joseph Dental College, Eluru, India.
2. Professor, Department of Periodontics, St. Joseph Dental College, Eluru, India.
3. Senior lecturer, Department of Periodontics, St. Joseph Dental College, Eluru, India.

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Abstract

With increased awareness on dental implants, more and more patients are presenting to dental practitioners requesting for fixed solutions to their dilemmas. For successful osseointegration the placement of endosteal implants requires adequate bone volume. Alveolar ridge resorption is a common phenomenon that occurs after tooth loss which alters the size and shape of the host bone available for the dental implant placement. When the morphology of the bone does not allow proper implant placement, there are various bone augmentation procedures which aids in reconstruction of the residual alveolar ridge for ideal implant placement. The use of autogenous bone grafts continues to represent the “gold standard” in implant site reconstructive surgery despite recent advances in bone grafts and bone substitute technology. The mandibular symphysis i.e., chin bone in interforaminal region is a favorable donor site as it has an excellent risk-benefit ratio. Several augmentation procedures using chin graft have been proposed to increase alveolar bone volume to for correct placement of oral implants. This article describes a case report of localized alveolar ridge augmentation using particulate bone autografts harvested from mandibular symphysis with simultaneous implant placement.

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Introduction:-

Successful implant surgery is not merely the achievement of successful osseointegration, but rather the establishment of an ideal foundation for implant-supported prosthetic restorations¹. A major contraindication for dental implant placement is inadequate bone volume. Osseous defects may occur as a result of trauma, prolonged edentulism, congenital anomalies, periodontal disease, and infection². There are minimum dimensions that the remaining alveolar ridge must possess for implants to be placed. Based on clinical experience, the minimum dimensions in the maxilla to insert a dental implant are an alveolar ridge width of 5 mm and a bone height of 10 mm³. When these dimensions are not available, it will be necessary to augment the size of the alveolar ridge before implant placement using various grafting procedures. Without grafting, the implants may have to be placed in anatomically unfavorable positions or may have adverse angulations. These compromises can lead to unesthetic restorations, mechanical overload, and ultimately, failure of the implant. Various bone grafting techniques are available for reconstruction of alveolar deficiencies, which include autografts, allografts, and xenografts². The

Corresponding Author:- Deepika Gorantla

Address:- Postgraduate student, Department of Periodontics, St. Joseph Dental College, Eluru, India.

success rates of grafted bone have been excellent to moderate but have varied more than for conventional implant treatment⁴. Among them, autografts have excellent osteoinductive properties, and hence they are considered the gold standard in bone augmentation procedures⁵.

For alveolar ridge enhancement, autologous bone can be harvested from various extra oral sites such as the ilium, the tibia, the fibula, and the calvaria. The intraoral jaw bone is defined as the bone harvested from the maxilla and the mandible that usually includes the chin (mandibular symphysis and parasymphysis), the mandibular ramus (external oblique ridge), and the maxillary tuberosity. The jaw bone can usually be easily harvested from the oral cavity in the area surrounding the surgical field of implant placement, without the need for secondary surgery for bone harvesting. Jaw bone and iliac bone are the most frequently used autologous bone sources for dental implant placement in patients with atrophic alveolar ridges.

This article describes a case report of localized alveolar ridge augmentation using particulate bone autografts harvested from mandibular symphysis with simultaneous implant placement.

Case Report:

A twenty year old female patient reported to the Department of Periodontics with the chief complaint of missing upper front teeth (Figure 1). The patient gave the history of losing teeth in an accident one year back. All the treatment options were explained to her, and she opted for implant supported restorations on 11, 12. On clinical evaluation, the gingival biotype was thick with adequate width of attached gingiva and favorable arch position. The clinical and radiological (panoramic and periapical) examinations revealed that the alveolar ridge height was normal, but there was a lack of alveolar ridge width. Labio-palatal atrophy of the edentulous alveolar ridge made it intricate to place implants on 11, 12 regions.

Hence it was decided to augment the alveolar crest horizontally. The mandibular symphysis area was selected as the donor site for bone augmentation. The patient was systemically healthy and had no contraindications for intraoral surgery and implant placement. Surgical procedures were carried out as an outpatient procedure under local anesthesia (2% lignocaine hydrochloride with epinephrine 1:2,00,000). A full thickness mucoperiosteal flap was raised to expose and visualize the size of the defect, and the surface of the bone was released from the remaining muscle and periosteal fibers (Figure 2). Next, the bucco-palatal width and height of the alveolar bone were measured. The height of the alveolar bone was 12 mm. However, the width of the alveolar bone was about 4 mm. Osteotomy site preparation is done, and dental implants placed (Figure 3). Decortication of bone prior to placing a bone graft is performed as part of a GBR procedure. The intentional drilling of holes is carried out through the cortical bone into the cancellous bone (Figure 4).



Figure 1:- Partially edentulous area 11, 12.



Figure 2:- Flap elevated and defect visualized



Figure 3:- Implants in position irt 11, 12.



Figure 4:- Decortication.

After the extent of bone loss was outlined at the recipient site, we proceeded with the donor site exposure. A surgical marking pen was used to outline the area of the vestibular incision at the symphysis region. At the donor site, the incision was placed in the sulcus extending from the first bicuspid of one side to another side. An oblique releasing incision was made at the distal buccal line angle of these teeth and continued into the depth of the buccal vestibule.

A full thickness mucoperiosteal flap was reflected up to the inferior border to expose the symphysis. Frequent irrigation was done with saline to prevent dehydration. A trephine bur was used to harvest the bone graft (Figure 5). The graft was harvested in the form of small cylindrical blocks and then particulated using a bone miller. The particulate autogenous graft was then placed over the defect in relation to 11,12 (Figure 6).

PRF membrane was used to stabilize the graft material for guided bone regeneration (Figure 7). Finally, the periosteum of the mucoperiosteal flap was relieved at its base to mobilize the flap and allowed to cover the bone graft without any tension and sutured (Figure 8). Intra oral periapical radiograph was taken (Figure 9). The patient was placed on analgesics, antibiotics, and an antimicrobial mouthrinse for one week. The postoperative clinical and radiographic examination showed an increase in the width of alveolar ridge at the grafted site. Radiographic evaluation was done at six month follow up, which revealed complete osseointegration. The site was re-entered cover screw was removed and healing abutment placed to achieve an esthetic soft tissue emergence profile. After stabilization of gingival tissues, impressions were made using a closed tray impression copings, and a master cast was fabricated with implant body analogs. The casts were mounted on an articulator. The abutment preparation was done, and the implant crowns were manufactured. The metal porcelain crowns were finished and cemented on to the implants using glass ionomer cement (GC Fuji CEM, GC Corporation, Tokyo, Japan) (Figure 10). Finally, a thorough inspection was performed to ensure that the peri-implant sulcus was free of remaining cement particles hence prevent any foreign body reactions. At a two year follow up, the patient was asymptomatic, and the prosthesis was functioning well.



Fig 5:- donor site (chin graft).

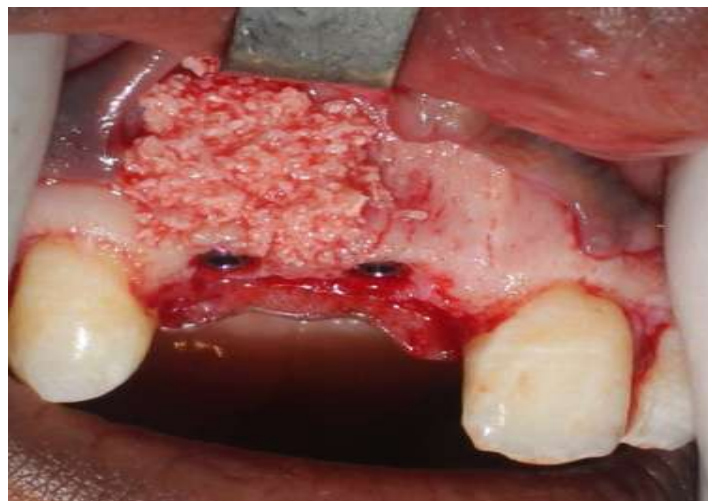


Fig 6:- particulate autograft placed at recipient site.



Figure 7:- PRF placed over graft.



Figure 8:- Sutures placed.



Figure 9:- IOPA.



Figure 10:- Crowns cemented.

Discussion:-

Esthetic and functional compromises in implant restorations can be prevented by ridge augmentation procedures, which result in enhanced emergence profile for an implant supported restoration. A thorough clinical and radiological examination should be done in order to diagnose the exact quantity of bone loss and accordingly plan for various bone augmentation procedures. Autogenous bone grafts are recommended in bone augmentations prior to implant placement because of their osteogenic potential⁶. Intramembranous autogenous osseous grafts including the mandibular ramus, mandibular symphysis, angle of mandible, maxillary tuberosity and intraoral exostoses, are the “gold standard” for improving intraoral osseous volume to facilitate placement of implants⁷. Alveolar defects can be restored by autologous grafting techniques including corticocancellous blocks, compressed particulate cancellous bone and marrow, and cortical grafts.

Chin offers a large amount of cortico-cancellous autograft and easy access among all the intraoral sites⁸. It can be easily harvested in the office settings under local anesthesia on an outpatient basis. The donor and recipient sites proximity reduce operative time and cost. Other added advantages include convenient surgical access, low morbidity, elimination of hospital stay, minimal donor site discomfort, and avoidance of cutaneous scars. The chin bone graft is derived from intramembranous bone, which shows less resorption than grafts derived from endochondral bone. Moreover, the chin area contains more cancellous bone than other intraoral sites, thus providing a greater amount of osteoprogenitor cells⁹. An end-cutting trephine bur design was used, and the trephination protocol that was followed, prevented heat damage to the bone and allowed safe graft harvesting. Decortication is done ostensibly to enhance the healing process by promoting bleeding and allowing progenitor cells and blood vessels to reach a bone grafted site more readily. Also, decortication may improve the physical bond between grafted bone and a recipient site.

The particulate autograft provides a rich source of bone and marrow cells that have osteogenic potential and a large osteoconductive surface area. GBR is based on the same principle as of GTR (Guided tissue regeneration), and utilizes resorbable or non-resorbable barrier membrane for space maintenance over the defect, resulting in compartmentalization and allows osteoblasts to populate the wound before epithelial and connective tissue cells, thus regenerating bone. Resorbable membranes have the advantage of eliminating the need for a second surgery for removal and thus reducing patient discomfort and maintaining tissue integrity¹⁰. In this case report PRF membrane was used as it could serve as a resorbable membrane for guided bone regeneration (GBR), preventing the migration of non-desirable cells into bone defect and providing a space that allows the immigration of osteogenic and angiogenic cells and permits the underlying blood clot to mineralize. PRF membrane helps in wound healing, protecting the surgical site promoting soft tissue repair; when mixed with bone graft, it may act as a “biological connector”, which attracts stem cell, favors the migration of osteoprogenitor cells to the center of the graft, and provides a neo-angiogenesis¹¹. The combination approach of particulate autogenous chin graft in conjunction with GBR membrane demonstrated improvement in the ridge dimensions at six months and two year follow-up.

Conclusion:-

This article presents a case of alveolar ridge augmentation in a partially edentulous site with simultaneous implant placement, using autogenous bone grafts harvested from the mandibular symphysis and firmly secured to the recipient site with PRF membrane. The clinical indication for the case described was the lack of sufficient alveolar bone quantity, a situation that could interfere with the esthetics and functional loading of implants. The mandibular symphysis bone grafts give predictable outcome within a short healing time and provide ideal sites for endosseous implant placement.

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