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Reconstruction of Atrophic Alveolar Edentulous Ridge with Autologous Mandibular Symphysis Block Bone Graft for Future Implant Placement

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***Abstract*---**Alveolar ridge resorption after a tooth loss due to disease, atrophy or trauma is a common phenomenon. Often in clinical practice, the loss of a tooth does not coincide with replacement by a dental implant, therefore it is often required that we perform hard tissue ridge augmentation to increase bone volume prior to dental implant placement and restoration so that the implants can be inserted in ideal bucco-lingual and mesio-distal position with good axial inclination and to reshape soft tissue contour. This study demonstrated the amount of resorption of Symphysis Block graft which helps to harvest adequate bone in future to compensate resorption for future implant placement. The accurate graft resorption

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and required graft harvest was assessed with Cone Beam CT. Five patients underwent harvesting of corticocancellous bone from Mandibular symphysis region for Reconstruction of atrophic alveolar ridge. A tension free closure was obtained. Periosteal scoring was done and flap was closed tension free. We assessed the preoperative available bone and the defect in horizontal and vertical dimensions in the anterior region and evaluated the amount of bone graft necessary to augment the defect.

***Keywords*---**alveolar ridge, block graft, bucco-lingual, corticocancellous, dental implant.

Introduction

The goal of modern dentistry is to restore the patient to normal function, esthetics, comfort, speech and heath. Loss of front teeth maybe devastating for the patient both functionally and aesthetically. Traditionally removable prosthesis or fixed partial dentures have been treatment of choice in such patients. Alveolar ridge resorption after a tooth loss due to disease, atrophy or trauma is a common phenomenon with as much as 50% loss in width during the first year, two-thirds of which occuring in the initial 3months. Often in clinical practice, the loss of a tooth does not coincide with replacement by a dental implant, therefore it is often required that we perform hard tissue ridge augmentation to increase bone volume prior to dental implant placement and restoration so that the implants can be inserted in ideal bucco-lingual and mesio-distal position with good axial inclination and to reshape soft tissue contour.

The autogenous bone grafts have been used for many years for ridge augmentation and are still considered the gold standard for jaw reconstruction. For most localized alveolar defects, as in reconstruction of atrophic alveolar ridges for implant placement, block bone grafts from the Symphysis and Ramus buccal shelf offer advantages over iliac crest grafts, including close proximity of donor and recipient sites, convenient surgical access, decreased donor site morbidity, and decreased cost. As auto grafts always exhibit some amount of resorption in due course, we here study the amount of resorption of Symphysis Block graft which helps to harvest adequate bone in future to compensate resorption for future implant placement.

Aim and objective

To evaluate the amount of bone resorption of mandibular autogenous block bone graft in reconstruction of atrophic anterior alveolar ridges. To obtain accurate graft resorption and required graft harvest can be assessed with advanced diagnostic aid such as Cone Beam CT, the amount of resorption determined, helps to obtain an appropriate sized graft in future for grafting cases.

Materials and Method

The subjects of this study were patients who visited SRM Dental College and Hospital for Replacement of missing front teeth, 5 patients underwent harvesting of corticocancellous bone from Mandibular symphysis region for Reconstruction of atrophic alveolar ridge. All patients were reviewed for follow-up, for 5 months to participate in the study to evaluate the Amount of resorption and acceptance of graft.

Method

Informed consent obtained from the patient. Patient prepared and draped. Bilateral Inferior alveolar nerve block was given and local infiltration was given at the donor site. Infra orbital nerve block was given in maxillary recipient sites.

Recipient site preparation

Crestal incision placed and incision extended to a tooth beyond the edentulous space, triangular flap raised. Trough created to receive the graft, decortications done and intra medullary groves placed. A template of the recipient site was made to serve as a guide for the length of the graft to be obtained.

Donor site

Vestibular incision placed and sub periosteal flap elevation done to expose the mandibular symphysis, mental neuro vascular bundle identified and protected, marking groves were made with the prepared template, using 701 bur groves were made along the length of the template and was connected and osteotomy cut was made, a surgical chisel was used to split the graft segment and a curved osteotome was used and the graft was harvested. The graft was kept in the site itself until it was transferred to the recipient site. Some amount of blood from the donor site was also collected for placement at the recipient site.

Graft placement

The obtained graft was trimmed and shaped to fit the recipient site, the graft was fixed to the recipient site with the help of 2×6 mm screw. Through and through holes were made on to the graft and underlying bone to increase blood flow within the graft.

Closure of the donor and recipient site

A tension free closure was obtained. Periosteal scoring was done and flap was closed tension free. Suturing done with 3-0 vicryl, simple intrupted suturing was done in recipient site. Mentalis muscle suturing was done, followed by mucosal suturing with 3-0' vicryl. The amount of bone present and the graft size and amount of resorption was assessed with Cone beam CT.

Discussion

Reconstruction of alveolar ridge deficiencies requires bone augmentation before implant placement. Osseous defects occur as a result of trauma, prolonged edentulism. congenital anomalies, periodontal disease, and infection, and they often require hard and soft tissue reconstruction. Autogenous bone grafts have been used for many years for ridge augmentation and are still considered the gold standard for jaw reconstruction. The use of autogenous bone grafts with osseointegrated implants originally was discussed by Branemark and colleagues, who often used the iliac crest as the donor site. Other external donor sites include calvarium, rib, and tibia.

For repair of most localized alveolar defects, however, block bone grafts from the symphysis and ramus buccal shelf offer advantages over iliac crest grafts, including close proximity of donor and recipient sites, convenient surgical access, decreased donor site morbidity, and decreased cost. Our study was carried out to determine the amount of resorption of mandibular symphysis block bone graft in anterior atrophic edentulous ridge for the future implant placement. We assessed the preoperative available bone and the defect in horizontal and vertical dimensions in the anterior region and evaluated the amount of bone graft necessary to augment the defect. This includes the amount of bone resorption in the due course, so that the exact amount of bone required for the augmentation alone can be harvested from the donor site in future which helps to minimize the donor site morbidity.

We included 5 patients in our study with anterior atrophic edentulous ridges. We evaluated the graft take up and amount of resorption in 5 patients (3 male and 2 female) who had upper or lower anterior atrophic edentulous ridges. 3 male patients had upper anterior edentulous ridge and 2 female patients had lower anterior edentulous ridge. The reasons for tooth loss being Periapical pathology in 1 patient, traumatic extraction in 2 patients and prolonged edentulism in 2 patients. Alveolar ridge resorption after tooth loss is a common phenomenon, alveolar ridge decreases in width and height very rapidly, nearly 50 % loss in width within the first year in which 2/3rd of resorption occurs in the first 3 months. Most of the patients do not prefer dental implant treatment as a first choice due to various causes, primarily due to economic reasons. So the patients often present in the clinician after a long period of edentulism. In the study 4 patients were using removable dentures before they came for the treatment. The mean average edentulous period being 2 ½ years (2 to 4).

All the patients were within the age group of 18-45 years and they were assessed clinically for the available bone and soft tissue for implant placement with help of clinical observation, radiographs and Cone Beam CT scan. Assessment of bone density and volume is an important component in implant surgery. Periapical or panaromic x-rays have been used to evaluate the implant sites, there is limitations of these radiographs like distortion, magnification and missing 3rd dimension bone volume. However CT images have 3 major drawbacks, 1. High radiation dosage, 2. High degree of scattered radiation around metallic restorations and implants, 3. There is significant burnout of medullary bone

which is directly proportional to the radiation dose. These parameters often obscure the fine osseous structures and eliminate soft tissue profile.

Low radiation focused Cone Beam CT scanners helps to view osseous architecture in a highly detailed format without burnout with greater contrast. And its ability to create topographic slices down to .08 mm gives a true volumetric representation of the arch. In our study we analysed the bone quality and amount of resorption with the help of Cone beam CT scan. Vestibular incision was placed for 3 patients and sulcular incision was placed in 2 patients. No wound dehiscence was seen during the follow up period, Sulcular incision was used in 2 mandibular cases due to the proximity of donor and recipient sites.

In our study the problem we encountered was graft exposure in one patient and screw impingement on the buccal flap and screw exposure buccally in another patient. Resuturing was done in patient who had graft exposure, flap elevation was done and adequate tension free flap was obtained and resuturing was done. In patient who had screw impingement removal of the screw was done under topical LA without opening of flap, no graft mobility was appreciated during screw removal. The advantage of our study was the use of cone beam CT which helped us to assess the bone density accurately which helped us to obtain an adequate thickness of the block graft avoiding donor site morbidity. The disadvantage of cone beam CT was the cost factor. The shortcomings of our study were that the sample size was less to predict the accuracy of the result. Further study is required to give accurate results on symphysis block graft resorption in alveolar ridge reconstruction.

Result

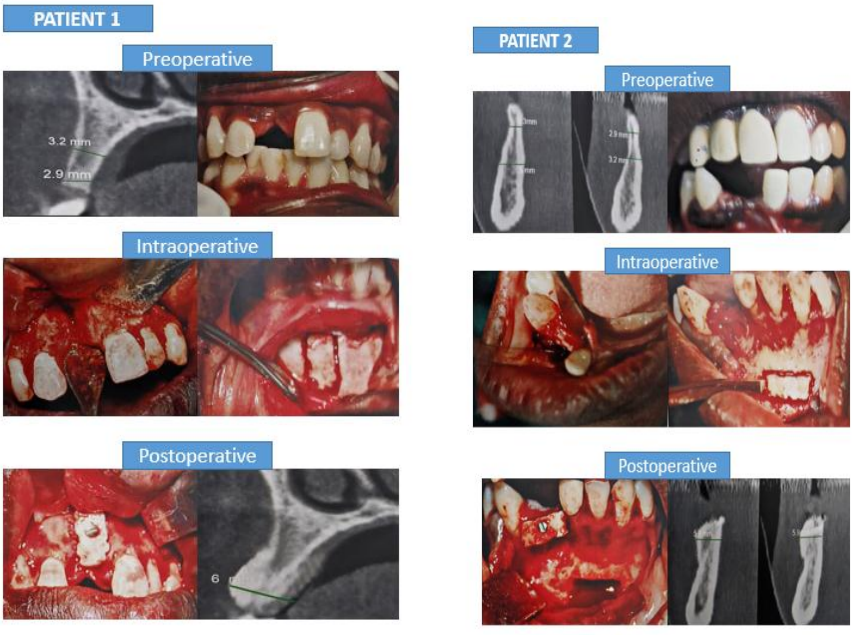

Figure 1. Resorption of mandibular symphysis block bone graft in anterior atrophic edentulous ridge for future implant placement

Table 1
Resorption of mandibular symphysis block bone graft in anterior atrophic edentulous ridge

PATIENTS	CRESTAL BONE	GRAFT LENGTH	IMMEDIATELY POST OPERATIVE CBCT	4th MONTH CBCT	AMOUNT OF BONE RESORPTION	PERCENTAGE OF BONE RESORPTION
Patient 1	2.9 mm	4 mm	6.9 mm	6 mm	0.9 mm	15%
Patient 2	3.3 mm	4.2 mm	7.1 mm	5.9 mm	1 mm	16%
Patient 3	2.5 mm	5 mm	6.5 mm	5.3 mm	1.2 mm	22.6%
Patient 4	3.3 mm	4.5 mm	7.5 mm	6 mm	1.5 mm	25%
Patient 5	2.3mm	5 mm	7.3 mm	6.8 mm	0.8 mm	11.8%

Summary and Conclusion

Alveolar ridge augmentation is a necessity in many cases which present in clinical practice to facilitate cases adequate bone volume for implant placement. Successful implant placement can be achieved in atrophic anterior regions by using block autografts taken from mandibular symphysis region. Graft resorption and donor site morbidity are clinical concerns associated with autogenous grafting procedures. Membranous grafts have shown less resorption than endochondral bone grafts, which suggests that intra oral donor sites may provide an advantage in harvesting block grafts for augmentation of the alveolar ridge, and they can be easily accessed in an office setting. Moreover, the advanced imaging techniques such as Cone beam CT is an effective diagnostic tool in the assessment of bone defects, bone resorption and aids in treatment planning and follow up. Block bone graft augmentation in atrophic ridges for implant placement remains an attractive and simpler option.

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