

ALVEOLAR BONE GRAFTING WITH MANDIBULAR SYMPHYSIS AS DONOR MATERIAL

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ABSTRACT

The purpose of this study was to assess the outcome of alveolar bone grafting using symphysis menti as donor material and assess its adequacy and morbidity. Seventeen patients with previously repaired cleft lip and palate, belonging to different parts of the country were selected and treated at Armed Forces Institute of Dentistry, Rawalpindi – Pakistan.

In this study the demographics donor sites and surgical outcome of cleft alveolus grafting have been highlighted.

There were ten males (58.8%) and seven females (41.2%). Two patients had bilateral cleft, (11.7%) while rest had unilateral cleft alveolus. The most commonly used donor site was mandibular symphysis (52.9%) followed by iliac crest.

The comparatively higher mean age in our study emphasizes the need for education of these patients at national level to provide treatment at optimum age.

Key words: *Cleft Alveolus, Alveolar grafting, Symphysis menti.*

INTRODUCTION

The concept of grafting of the cleft maxilla was introduced in the early 20th century but it was in 1950s that the successful grafting of cleft alveolus with cortical bone was reported in both infancy and childhood.¹ Since then it has become an integral part of surgical management of many orofacial cleft deformities.² The benefits and goals of alveolar grafting include,³ stabilization of the maxillary arch, elimination of oronasal fistulae, creation of bony support for subsequent tooth eruption, soft tissue nasal base support and tooth transplant in the grafted cleft alveolus.²⁸

The surgical repair of lip and palate is recommended at young age but there is still controversy in optimal age for alveolar bone grafting. The following chronological nomenclature in alveolar bone grafting is used;⁴

- Primary alveolar bone grafting-younger than 2 years of age.
- Early secondary alveolar bone grafting-between 2 and 5 years of age.
- Secondary alveolar bone grafting-greater than 5 years of age.

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The principle aim in secondary bone grafting is to unify the maxilla and create an osseous base that will support tooth eruption into the arch.⁵

The most important part in secondary bone grafting is the flap design. It is important to use mucoperiosteal flaps to support tooth eruption and provide adequate periodontal support of teeth adjacent to cleft²⁹ in order to sustain their longevity once in proper position in the arch.¹ Grafting bone can be, harvested with cancellous bone from the ilium or tibia. Similarly corticocancellous particulate can be obtained from the calvarium or mandibular symphysis.⁶

The autogenous bone from iliac crest is considered as a gold standard for grafting cleft alveolus. It supplies large amounts of cancellous bone with osteogenic cells. Cancellous bone grafting results in rapid vascularisation of the graft than the cortical bone due to their difference in the mechanism of bone formation. The main criticism is the post operative gait disturbance resulting in prolonged recovery and hospital stay.⁷

Cranial bone has also been used to fill the cleft defects. It provides limited morbidity, a hidden scar in the hairline⁸ and a comparable success rate with iliac crest.⁹ Complications include dural exposure, subdural hemorrhage and neurological problems.¹⁰

Tibial bone harvesting for cleft alveolus is a safe procedure with low complication rates.¹¹ Disadvantages include pain and tibial fracture postoperatively.¹²

The mandibular symphysis is an attractive donor site as the surgery is confined to only one intra oral site and patients are reported to have lesser pain and discomfort.¹³ There is no visible extra oral scar on the skin which is produced by using rest of the donor sites¹⁴ and is unacceptable in certain societies.²¹ However; limited volume of bone available for grafting is its disadvantage.¹⁵

The main cause of graft failure is poor flap design resulting in breakdown of the overlying tissue flaps and subsequent graft extrusion.¹ When teeth are present and erupt into the grafted alveolus usually with the aid of surgical exposure and orthodontic assistance alveolar bone height is retained.¹⁶ However, when teeth are not present to erupt through the graft, partial resorption of the graft occurs, even when the cleft is overfilled intraoperatively.⁶

The unpleasant facial appearance and the deranged dentition of the patient can be improved by grafting cleft alveolus that would provide support to the upper lip and nasal alar base.

METHODOLOGY

The study comprised of 17 subjects with previously repaired cleft lip and palate. The alveolar bone grafting of all the patients belonging to different regions of the country was performed at the Armed Forces Institute of Dentistry, Rawalpindi.

The duration of the study was two years. Both male and females were included in the study. The age group ranged between 10 to 21 years. The donor sites for bone graft used were mandibular symphysis, iliac crest and allogenic bone graft material.

All patients were treated according to the same protocol, as mentioned below;

The patients referred by the orthodontist for alveolar reconstruction were treated and their leveling, alignment and expansion was achieved by orthodontist at the department of orthodontics, Armed Forces Institute of Dentistry.

The demographics of all the patients were recorded which included age, gender and address. The type of cleft was noted. Preoperative and postoperative upper standard occlusal radiograph were obtained. The donor site was noted.

All patients underwent surgery under general anesthesia. All surgeries were performed by the same surgeon. 1 gram of Rociphen (Ceftriaxone) was administered preoperatively to all the patients.

A vestibular gingival crevicular incision was made and a wide mucoperiosteal flap elevated including at least one tooth lateral and mesial to the cleft. In the area of the cleft itself, the incision was taken vertically into the vestibular sulcus. When the perforation extended into the nasal cavity, the nasal mucosa was elevated allowing for a tension-free repair of that layer. After the nasal layer and palatal flaps had been repaired, required cancellous bone, harvested from iliac crest were pressed in small chips over the cleft on both the vestibular and palatal sides so that they extended over the cortical part of the bordering alveolar process.

In case of mandibular symphysis graft, corticocancellous bone was harvested, after taking necessary measurements. Finally, the grafted alveoli were covered by redraping the mucoperiosteal flaps on the vestibular and palatal aspect before the wound was closed.

Patients were prescribed post operative antibiotics and antiseptic mouthwash. They were given strict oral hygiene instructions. An acrylic palatal protection plate was used in all patients.

The donor site of mandible was examined clinically for iatrogenic damage to roots, pulp necrosis, soft tissue healing and function of the mental nerve. In case of iliac crest, the donor site was examined for gait disturbance or sensory loss to the area.

Descriptive statistics for maximum, minimum and mean were calculated for age, gender, donor site and duration of stay at the hospital.

RESULTS

The sample consisted of 17 patients. Out of 17, ten were males and seven were females. Two patients had bilateral clefts, both were females (Fig 1). Fifteen

patients had unilateral clefts (ten were males and five were females) making a total of 19 cleft sites.

Lateral incisor was missing in four of the cleft sites, while canine was missing in one cleft site.

The duration of stay postoperatively at hospital was 3 to 4 days.

The average age at the time of grafting was 15 years for females and 17 years for males.

Nine patients were grafted with mandibular symphysis only, two patients with combined mandibular symphysis and allogenic grafts while six were grafted with the iliac crest

Only two patients showed mild dehiscence of the labial soft tissue covering. No graft was lost.

At donor site in mandibular bone graft, lower labial sulcus, gingival and periodontal conditions were normal. No pulp necrosis or mental nerve injury was seen.

In the iliac crest, no sensory loss was noted while one patient experienced post operative gait disturbance.

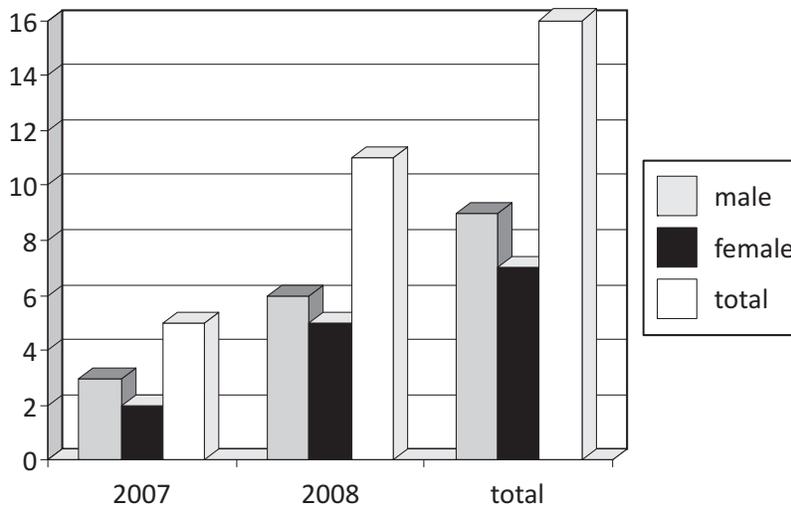


Fig 1: Gender Distribution

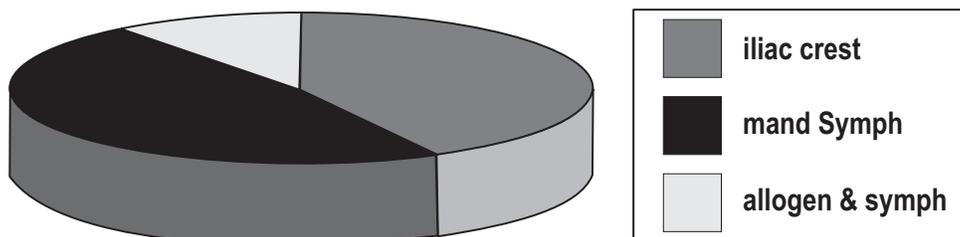


Fig 2: Distribution according to donor site

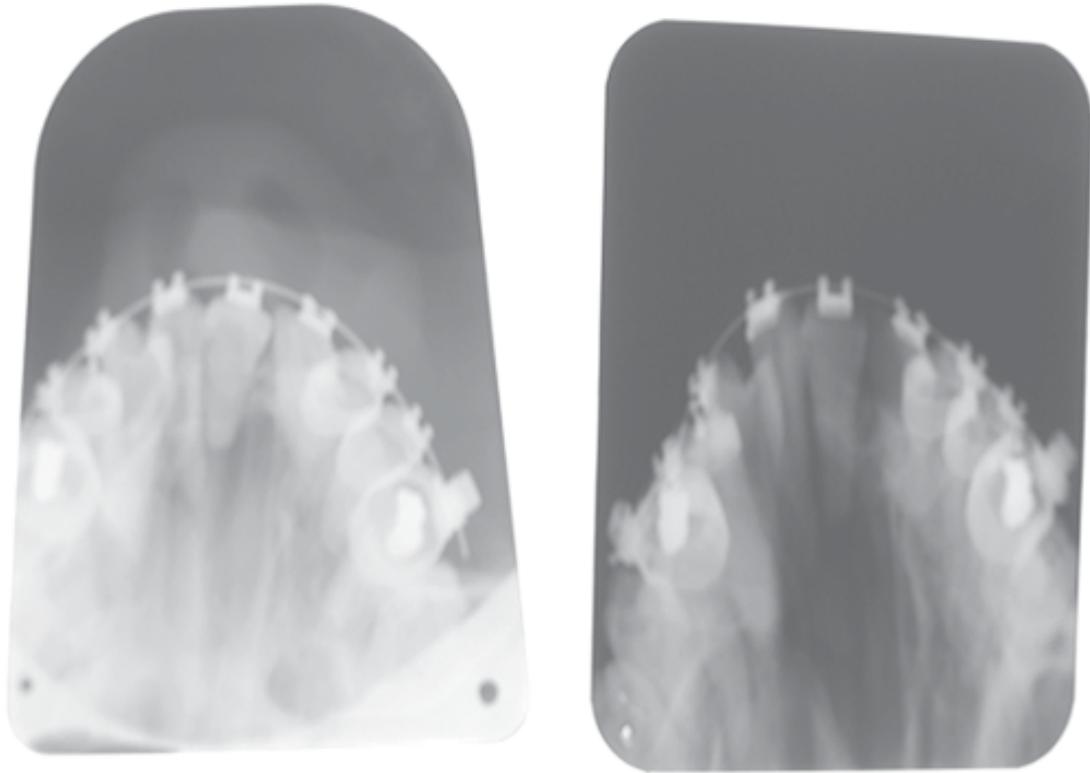


Fig 3: Comparison of pre and post op occlusal view of the Alveolar Cleft site

DISCUSSION

The presenting complaint of the patient with cleft alveolus is an unpleasant facial appearance and deranged dentition. The orthopantomogram reveals an inverted pear shaped radiolucent area where as occlusogram (Fig 3) shows the cleft extended backward to soft palate.¹⁷

In cleft children constricted maxillary arch may present both transverse and sagittal cross bite.²⁶ Following lip surgery due to moulding action, the cleft segment moves medially and arch further collapses. Maxillary dental arch can be expanded by ordinary removable screw plates or fixed expanders.²⁷

The upper lip and nasal alar base improves by restoring contour of the grafted alveolus resulting in a pleasant change in the facial appearance.¹⁸

In our study the mean age was comparatively higher to other studies.¹⁹ This signifies the importance of awareness and also to provide adequate facilities in different corners of the country so that patients receive treatment at optimum age.

Out of 17 subjects, only two had bilateral clefts of alveolus. The incidence of unilateral or bilateral clefts was in compliance with various studies published.¹⁸

The use of autogenous bone is considered as gold standard for grafting the cleft alveolus. Various donor sites are being used for obtaining the graft.²⁰ Bone with cancellous tissue has a much wider acceptance as it provides more predictable results. The fresh cancellous bone supports the survival of maximum amount of transplanted bone, therefore providing necessary raw material for osteoconduction, osteoinduction and osteogenesis. The extra oral sites such as iliac crest, tibia and calvarium are used for grafting.²¹

Many documented complications are associated with these sites, such as persistent pain, nerve injury, hemorrhage and gait disturbance with iliac crest.²² In this study, only one patient experienced post operative gait disturbance following the use of iliac crest as donor site. Although the complication rate is fairly low in comparison to other studies but iliac crest was only used for large or bilateral clefts. It was found in our study that grafting from iliac crest takes a longer

operation time and patient suffers increased morbidity as compared to intra oral donor site.

Certain complications associated with cranial bone are hematoma formation, seromas, wound infection, dural tear, and in some cases neurological complications.¹⁰ There is also an issue of visible scarring and skull depression in elderly balding males. Similarly, there is no possibility of two teams working together which increases operation time.²²

The tibia has been used for a very long period of time in orthopedic surgery. It has gained popularity in maxillofacial region also but in children, the proximal tibia is small and epiphyseal cartilage is growing. This results in limited amount of area available for taking the graft.²³ Proximal tibial fractures have also been reported following taking the tibial graft.²⁴ In our study, neither the calvarium nor the tibial bone was used a graft donor due to their possible complications.

The intra oral sites used commonly for grafting are mandibular symphysis, ramus, and palatine tori, the most common being symphysis.²⁵

Mandibular symphysis was first reported in 1980s as a donor for grafting alveolar clefts.²¹ The main criticism for the use of mandibular symphysis as a graft is the limited volume of bone available for grafting,¹⁵ hence it is not suitable for larger clefts. In this study, symphysis was used for unilateral clefts. Some studies also report canine impaction following the use of chin graft³⁰, but in our study no canine impaction was found. One, reason was that a large proportion of patients operated at our centre had their canines already erupted. In rest of the cases where canine had not been erupted, no impaction was found. Similarly, other reported complications associated with chin graft ,i.e, decreased lower labial sulcus, compromised gingival and periodontal conditions, pulp necrosis or mental nerve injury did not occur in any of the cases. The graft uptake was very good (Fig 3) and no graft failure was reported. The patients were satisfied with the outcome and felt minimal pain or discomfort as compared to other graft sites. The teeth were also moved orthodontically in the graft.

CONCLUSION

The mandibular symphysis is an attractive donor site, with low morbidity rate. The surgery is restricted

to one intra oral site which would produce an invisible scar in the labial sulcus. The grafted bone provides adequate periodontal support for eruption and preservation of teeth adjacent to the cleft, this requires an increased cooperation between the orthodontist and the surgeon to achieve good results.

The surgical results of alveolar bone grafting were assessed by using Bergland index and it was found that alveolar reconstruction by using mandibular symphysis graft in this unit has been very successful which supports the idea that chin can be used successfully as graft bone in favorable situations.

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