

**Alveolar Cleft Closure with Iliac Bone Graft: A Case Series**

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**Type of Publication:** Case Report

**Conflicts of Interest:** Nil

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**Abstract**

**Objective:** The purpose of the article is to report a series of cleft alveolus patients treated with the application of iliac bone graft irrespective of chronological age.

**Methods:** Six patients at the group of 9-25 years reported to the Department of Oral and Maxillofacial surgery with chief complaint of alveolar cleft in the maxilla while drinking, the water often out from the nose, difficulty in speech and esthetic concern. All the patients were associated with cleft lip or cleft lip and palate and underwent correction at appropriate ages. Currently the patients reported with the purpose to close the cleft.

**Results:** Based on the clinical and radiographic development of the patient, the treatment for overall

seemed success with the obtain of maxillary arch continuity, provide bone that is available for permanent canine to erupt, optimal alar base reconstruction, the fistulae was eliminated, provide a better nasal alar cartilage support, get a stable the maxillary segment for orthodontic treatment, and obtain an ideal alveolar morphology.

**Conclusion:** Regarding the age at grafting even after late secondary stage provides a good bony support in terms of functional and esthetic outcome. And also the use of alveolar bone graft from the iliac crest achieves a very high rate of success and has a very low incidence of complications.

**Keywords:** Alveolar cleft, iliac bone graft

## **Introduction**

Alveolar cleft is a common congenital anomaly which affects approximately 75% of cleft lip or cleft lip and palate patients.<sup>1</sup> Craniofacial development in an embryo commences during the middle of the third week in which the palate is formed during weeks 4 to 12 of gestation from the frontonasal and maxillary prominences. The alveolus lies within the primary palate; thus, an alveolar cleft is a result of divergence from normal development during frontonasal prominence growth, contact, and fusion. The etiology of is still poorly understood, but it is most likely considered to be multifactorial involving genetic and environmental factors.<sup>2</sup>

The anterior alveolar bone defect can affect tooth development and contribute to the collapse of alveolar segments.<sup>3</sup> Usually alveolar clefts are associated with cleft lip but not with isolated cleft palate deformities. It is typically located between the lateral incisor and canine, although it can also occur between the central and lateral incisors.<sup>4</sup>

Reconstruction of cleft alveolus is necessary in order of obtaining maxillary arch continuity, to provide available bone for permanent canine to erupt, to maximize alar base reconstruction, to eliminate labial and palatal fistulae, to provide nasal alar cartilage support, to stabilize the maxillary segment after orthodontic treatment, to provide a solid maxillary structure before orthognathic surgery, and to provide substructure for dental implant insertion or other prosthetic rehabilitation.<sup>5</sup>

The timing of alveolar cleft bone grafting has been divided into primary and secondary stages. Primary bone grafting (<2 years) performed after lip repair but before repairing the palate. Secondary grafting defined as early secondary stage done as the child reach 2-5 years old, early mixed dentition at 6-8 years old, late mixed

dentition at 9-12 years old, and it is called late secondary grafting if it is done when the age reaches 13.<sup>6</sup>

There are several sources of graft: autograft bone that is harvested from the same person, allograft bone that is harvested from another person, and synthetic grafts. The various donor site includes iliac crest, tibia, rib, cranial bone, mandibular symphysis. All of these sources have been used successfully because they contain pure bone, cancellous, and autogenous.<sup>7</sup> The purpose of the article is to report a series of cleft alveolus patients treated with the application of iliac bone graft irrespective of chronological age.

## **Case Series**

Six patients at the group of 9-25 years reported to the Department of Oral and Maxillofacial surgery with chief complaint of alveolar cleft in the maxilla while drinking, the water often out from the nose, difficulty in speech and esthetic concern. All the patients were associated with cleft lip or cleft lip and palate and underwent correction at appropriate ages. Currently the patients reported with the purpose to close the cleft. Proper history followed by clinical and radiological examination was done to assess the alveolar cleft. Both unilateral and bilateral cleft alveolus was presented. The entire procedure along with the harvesting of graft was explained to the patient along with their parents. Written informed consent was obtained for publishing the article and accompanying images. The age distribution at grafting was given in table 1.

Our first choice is to use bone from the iliac crest, because it allows harvesting of both cortical and cancellous bone with a low rate of complications. Also, it is possible to harvest the bone and place it in the cleft in a single procedure. The procedure is done under general anesthesia with nasotracheal intubation. Bone is obtained by making a 2 cm long skin incision 1 cm from the anteroposterior iliac spine. It is carried down to the

cartilaginous tissue overlying the iliac crest and then an osteotome is used to make 3 cuts: one parallel to the longitudinal axis of the crest and 2 perpendicular ones. In this way, a pyramid-form cortico cancellous block is obtained.

Local anaesthesia administered around the cleft region, sulcular incision placed full thickness mucoperiosteal flap raised separating nasal mucosa from gingiva. Closure of nasal floor mucosa with 3-0 vicryl. Simultaneously the graft harvested from anterior iliac crest of approximately 1.5x2x1.5cm for unilateral clefts and 2x2.5x2cm for bilateral clefts. The donor site is irrigated and closed with 3-0 Ethilon. The harvested bone graft packed in the respective cleft region. The entire procedure is depicted in the following figures 1 to 4. Routine follow up visit was recommended. After 2 weeks the suture removed and the next stage of management was planned

Age At Grafting	No of Patients
<5 YEARS	-
5-10 YEARS	2
10-15 YEARS	1
15-20 YEARS	1
20-25 YEARS	2

Table 1: Age at which alveolar grafting is done: distribution by age ranges

### Discussion

Bone grafting of the alveolus introduced in 1901 by von Eiselsberg, has now become widely accepted as the principal surgical treatment of alveolar clefts.<sup>8</sup> Although secondary alveolar bone grafting has been widely accepted by professionals, there is still controversy as to: (i) the age at which secondary bone grafting should be performed (ii) the type of bone graft and the site from which the donor bone will be harvested.

Since in the description of seventies, primary alveolar grafting (before 3 years of age) was being done frequently, until Koberg and Ross described its adverse effects, such as restriction of maxillary growth or deficient alveolar morphology with unerupted teeth or teeth with no support.<sup>9</sup> Although various authors have presented the optimal timing based on their experience and/or investigations, most practitioners so far accept that the optimal timing for bone grafting is before eruption of the canine to create an area of regenerated bone in the cleft site so that the adjacent teeth (canines and sometimes lateral incisor) can erupt spontaneously.<sup>10</sup> Freitas J et al in their study concluded that the graft is typically placed between 8 and 12 years of age, when the permanent canine is located high in the alveolar process (with 1/3 or 1/2 completed root formation) at the height of the eruptive process.<sup>11</sup> Many studies have shown that the success rate of grafts is lowered if the procedure is done after the eruption of the canine on the side of the cleft. Once the tooth has erupted, improvement in the periodontal support of the tooth cannot be expected with the placement of the graft. For this reason, it is recommended that the graft be placed before the eruption of the permanent canines.<sup>12</sup> In our case series, 70% of the completed grafts were done before the age of 20 and 30% were done after age 20 and were related to transfers from other centers (which meant that the patient entered into our treatment protocol at a more advanced age) or with previous preparation for implant placement in the anterior region.

Bone grafts have two types: cancellous bone, that is commonly used for grafting non-union or cavity defects because it is quickly remodeled and incorporated, and cortical bone that is slower to turn over than cancellous bone which is used for structural defects. However, the iliac crest is used to be the most suitable donor site, the concerns associated with iliac bone harvesting is the

possibility of effects on growth, hematoma, and donor site morbidity. Those complications could be minimized with a careful surgical technique with a minimally incision and stripping of the muscular attachment on the iliac crest, adequate hemostasis, careful wound closure, and adequate postoperative pain control.<sup>6</sup> Because of its strong osteogenic properties, Boyne and Sands described cancellous bone harvested from the iliac crest as the preferred bone grafting material for the secondary closure of alveolar clefts.<sup>13</sup> This is in relation with our study in which the alveolar cleft was closed using iliac bone graft, owing to its ease of access, and also it is easy to get an adequate amount of cancellous bone with a percutaneous incision.

### Conclusion

Restoration of the cleft alveolus and maxilla by grafting is a critical part of the overall management of patient with cleft palate. It has functional and aesthetic significance with significant benefit to the patient. Regarding the age at grafting even after late secondary stage provides a good bony support in terms of functional and esthetic outcome. And also the use of alveolar bone graft from the iliac crest achieves a very high rate of success and has a very low incidence of complications. However, a proper post-operative treatment will lead to a successful healing.

### References

1. Cho-Lee G, Garcia-Diez E, Nunes R, et al. Review of secondary alveolar cleft repair. *Ann Maxillofac Surg* 2013;3: 46-50.
2. Luque-Martín E, Tobella-Camps ML, Rivera-Baró A. Alveolar graft in the cleft lip and palate patient: Review of 104 cases. *Med Oral Patol Oral Cir Bucal*. 2014 Sep 1;19 (5):e531-7.
3. Bajaj AK, Wongworawat AA, Punjabi A. Management of alveolar clefts. *J Craniofac Surg*. 2003 Nov;14(6):840-6.

4. Bartlett S, Ehrenfeld M, Mast G, et al. Congenital Deformities. Unilateral CLP-Alveolar bone grafting; 2013.
5. Lilja J. Alveolar Bonegrafting. *Indian J Plast urg*.2009;42:110-115.
6. Cho-Lee G, Garcia-Diez E, Nunes R, et al. Review of secondary alveolar cleft repair. *Ann Maxillofac Surg* 2013;3: 46-50.
7. Kazemi A, Stearns JW, Fonseca RJ. Secondary grafting in the Alveolar cleft patient. *Oral Maxillofac Surg Clin North Am* 2002;14: 477-490.
8. Cohen M, Polley JW, Figueroa AA. Secondary (intermediate) alveolar bone grafting. *Clin Plast Surg* 1993;20:691–705
9. Ross RB. Treatment variables affecting facial growth in complete unilateral cleft lip and plate. Part 7: an overview of treatment and facial growth. *Cleft Palate J* 1987;24:71–77
10. Berkowitz S. Cleft lip and palate diagnosis and management. 2nd Edition. Germany; 2006.
11. Freitas J, Garib D, Oliveria R. Rehabilitative treatment of cleft lip and palate: experience of the Hospital for Rehabilitation of Craniofacial Anomalies-USP (HRAC-USP)-Part 2: Pediatric Dentistry and Orthodontics. *J Appl Oral Sci*. 2012;20:272-285.
12. Miller LL, Kauffmann D, St John D, Wang D, Grant JH 3rd, Waite PD. Retrospective Review of 99 patients with secondary alveolar cleft repair. *J Oral Maxillofac Surg*. 2010;68:1283-1289.
13. Boyne PJ, Sands NR. Secondary bone grafting of residual alveolar and palatal clefts. *J Oral Surg* 1972; 30:87–92

**Legend Figure**

Fig 1: Unilateral cleft alveolus with iliac bone grafting at the age of 7 years



Fig 2: Unilateral cleft alveolus with iliac bone grafting at the age of 12 years



Fig 3: Bilateral cleft alveolus with iliac bone grafting at the age of 17 years

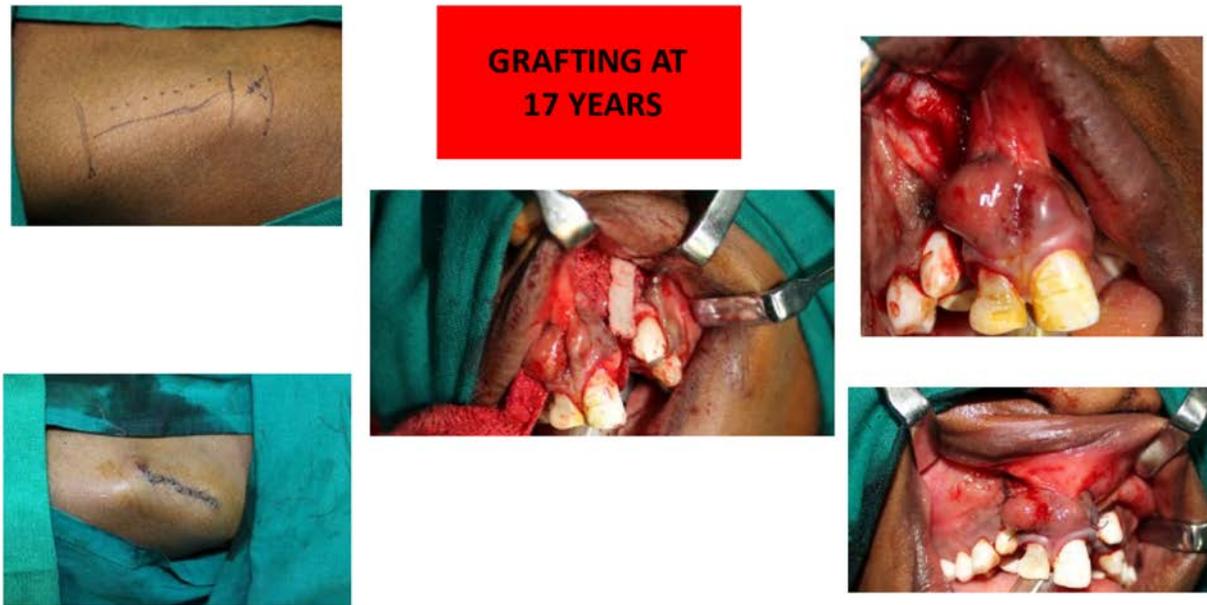


Fig 4: Unilateral cleft alveolus with iliac bone grafting at the age of 25 years

