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American Journal of Oral and Maxillofacial Surgery

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Research Article

Complications after Use of Iliac Bone Graft for Post Cleft Alveolar Bone Defect

Hamada Mahran[1], Mohannad Alanezi[2], Mohd Khaja Saad Ali[3], and Abdulwahab Alshehri[4]

[1] Department of Maxillofacial & Plastic Surgery, faculty of medicine, Assiut University, Egypt

[2] Department of Oral and Maxillofacial Surgery in Ministry of health, Saudi Arabia

[3] Department of Oral and Maxillofacial Surgery, King Fahd Specialist Hospital, KSA

[4] Department of Oral and Maxillofacial Surgery, King Fahd Specialist Hospital, KSA

Abstract

Background: The purpose of the present study was to evaluate the efficacy of the iliac bone graft for secondary alveolar bone grafting in cleft patients and to monitor its complications as a donor site during the last five years, in maxillofacial unit, faculty of medicine, Assiut University, Egypt.

Methods: Eighteen cleft patients with secondary alveolar bone grafts using iliac crest bone grafts were included in this study, 10 males and 8 females ranging in ages from 6–22 years. Full history taking, operative details, and follow up to one year postoperatively, early and late postoperative complications reported and analyzed.

Results: the iliac bone was reliable as a donor site for bone grafting of the alveolar cleft, the success rate was 11/18, also 5/18 had success from the second interference, the overall complications were acceptable.

Conclusions: the anterior iliac crest is one of the best sites for autogenous bone graft for treatment of secondary alveolar cleft; it gives a big volume of highly vascular cancellous bone, with accepted range of postoperative complications.

Keywords: iliac crest, cancellous, cleft, defect, autogenous.

Received: May 9, 2018; **Accepted**: May 28, 2018; **Published**: June 17, 2018

Competing Interests: The authors have declared that no competing interests exist.

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***Correspondence to**: Hamada Mahran, Department of Maxillofacial & Plastic Surgery, faculty of medicine, Assiut University, Egypt

E-mail: dr.h.mahran@gmail.com

Introduction

Cleft lip and palate is considered the most prevalent of the common human congenital craniofacial birth defects. The approximate incidence ratio of CL/P has been reported as 1:700 live births. In addition, CL/P is the second most common congenital malformation following clubfoot [1]. Patients with cleft lip and palate also have a cleft in the tooth bearing alveolar region that is managed by secondary alveolar bone grafting in most centers. The technique was successfully introduced by Boyne and Sands [1], and one of its key objectives is to enable the eruption of the permanent canine through the cleft side with sufficient periodontal and bony support[2]. An alveolar cleft is a common congenital deformity with an incidence of 0.18-2.50 per 1000 births [1], And presents in approximately 75% of cleft lip and palate patients[3]. Genetic and environmental factors may cause incomplete fusion of the maxillary prominence and intermaxillary prominence, which results in alveolar cleft [4]. The existence of an alveolar cleft may impact facial asymmetry, development of the dentition, speech, and oral hygiene. Reconstruction of the alveolar process can stabilize the maxillary segments, close the oronasal fistulae, eliminate the nose asymmetry, and provide bony support for tooth eruption, orthodontic treatment, and the placement of dental implants[5]. The iliac cancellous bone graft (ICBG) harvested from the anterior iliac crest has been the most common grafting material for the SABG procedure because of its abundance of bone, ease of harvest, and the ability to harvest simultaneously with alveolar cleft preparation[6]. Although the ICBG is considered the gold standard graft for the SABG procedure, it has some noted disadvantages. Donor site morbidity at the iliac crest is significant, such as postoperative pain, sensory disturbance, and claudication, and this result in a prolonged hospital stay [7]. There is also unavoidable bone absorption of the ICBG. It has been reported that the bone absorption rate could be more than 40% at one year after SABG, which may increase the need for reoperation [8].

Materials and Methods

In this retrospective study, we chose 18 patients with cleft lip and palate with residual alveolar cleft defect. Most of them had unerupted maxillary lateral/canine adjacent to the defect requiring surgical interference for bone grafting. Exclusion criteria were those medically compromised, those younger than 6 years old due to small volume of the anterior iliac crest, those refuse to participate in the study. We explained to the patients/parents and signed informed consent was taken from all of them. All patients were evaluated as regard history of nasal regurgitation of liquids, speech clarity, number of teeth, ectopic teeth, periodontal status, site of unerupted teeth, and presence of oronasal fistula, lip length and dehiscence.

Preoperative radiological examination included OPG to all patients; CT scan was done for some cases only. Routine laboratory investigations were done. Preoperative orthodontic expansion done only for required cases. Photographs were taken preoperative and postoperative.

Surgical procedure

A vertical incision was done through mucosa of the cleft reaching the bones for exposure of the nasal floor, then we elevated mucoperiosteal flaps to be dissected palatally, then we reflected the labial soft tissues to expose the alveolar defect, then we sutured the flaps for sealing off the nasal cavity and palatal floor and preparing the graft bed, for cases with nasoalveolar fistula lip revision was done. then we shifted to the donor site, we started 2 cm posterior to anterior superior iliac spine, incision of the skin about 5-6 cm length, subcutaneous tissue and periosteum stripping of the muscle attachment to expose the medial surface of the iliac bone, hummer and osteotome were used to expose the cancellous bone, then by using curette we harvested the required corticocancellous amount of bone. The harvested bone preserved in normal saline. Homeostasis was done, fixation of small rubber drain, closure in layers. The harvested graft was melted and packed to graft bed in the alveolus, proper soft tissue closure with pressure dessing. The patients kept on parentral antibiotics and analgesics for one week and discharged. Figures from 1 to 6 show the surgical procedure, preoperative and postoperative x-rays .

Results

Eighteen patients from 6 to 22 years of age were included in this retrospective study. The average age was 14 year. There were 10 males and 8 females. The data of the patients were summarized in Table 1. The follow up period was up to one year. The complications after the use of iliac bone graft for post cleft alveolar bone defect were classified into two groups minor complications that can be managed conservatively and major complications that could need other interference. At the donor site sixteen patients (16/18) had postoperative pain which gradually improved and disappeared by the fifth week except for two patients (2/18) who had persistent chronic hip pain, two cases (2/18) had immediate postoperative bleeding from the donor site, but it was mild and controlled by redressing and pressure packing, two other cases (2/18) developed superficial infection and prolonged serous discharge from the donor site for about 40 days, and controlled by repeated dressing covered by broad spectrum antibiotics, one case (1/18) developed partial wound dehiscence and managed conservatively , six cases (6/18) developed transient gait disturbances and improved spontaneously, three cases (3/18) had hypertrophic scars and local numbness at the donor site. No cases developed iliac bone fracture or thigh paraesthesia or persistent limping, but two cases (2/18) developed persistent chronic hip pain more than 6 months and controlled by medications and assurance. At the recipient site, one case (1/18) developed partial wound dehiscence and managed conservatively, one case (1/18) developed complete wound dehiscence and graft exposed and lost.

The degree of graft uptake was evaluated clinically(start of eruption of unerupted teeth) and radiologically up to one year follow up, eleven cases (11/18) had good graft uptake , four case (4/18) had mild graft uptake and regrafting was done, three cases had no graft uptake (graft failure)

of these one case had regrafing and two cases refused other surgical interference and they asked for fixed dental restoration. All possible complications have been tabulated in table no 2 .

Figure 1: preoperative OPG

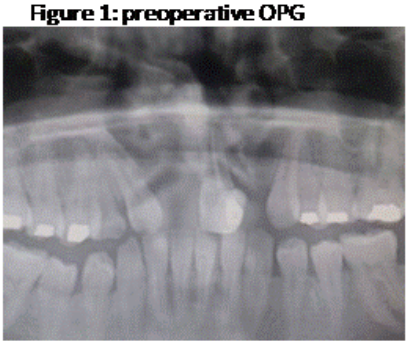

Figure 2: recipient site preparation

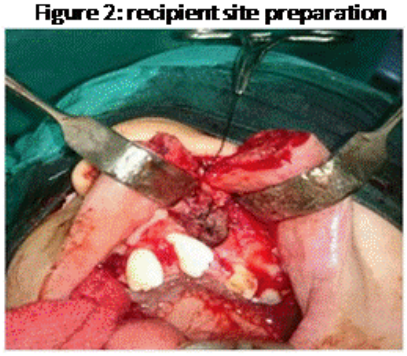

Figure 3: donor site exposure

Figure 4: graft preparation

Figure 5: graft insertion

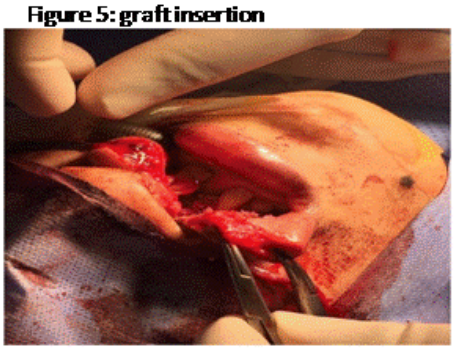

Figure 6: postoperative OPG

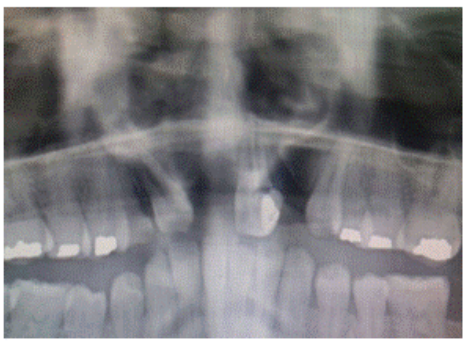

Table 1 clinical data of the patients

Total number of patients		18
Age range		6-22
Male to female ratio		10:8
Side of cleft	Left	11
	Right	7

Table 2 complications and incidence

Complications		No of cases	Incidence
Minor complications	Mild bleeding	2	11%
	Superficial infection	2	11%
	Prolonged serous discharge	2	11%
	Transient gait disturbances	6	33%
	Scar dysesthesia	3	16%
	Local numbness/tenderness	3	16%
	Hypertrophic scars	3	16%
Major complications	Hip fractures	0	0%
	Persistent chronic hip pain	2	11%
	Deep infections	0	0%
	Sacroiliac joint injury	0	0%
	Nerve injury	0	0%
	Pelvic instability	0	0%
	Incisional hernias	0	0%

Discussion

The untreated alveolar cleft may be associated with concomitant oronasal fistulae, crowded dentition, and lack of bony support for the anterior teeth [9].

It has been shown in many studies that bone grafting can reestablish the continuity of the dental arch, stabilize the premaxilla, provide bony support for tooth eruption, and close the oronasal fistulae. Autogenous bone from the iliac crest is the gold standard by which other types of alveolar grafts should be compared. It is easy to access and can supply adequate volume of cancellous bone with pluripotent or osteogenic precursor cell that support osteogenesis. Because of its higher content of osteogenic cells, cancellous bone is thought to be superior to corticocancellous bone.

ICBG IS the most acknowledged grafting material for alveolar cleft reconstruction, although it still has some disadvantages, such as inevitable bone resorption and severe donor site morbidity at the iliac crest[10-12].

Usually, the complications after iliac crest graft harvesting are classified as major and minor, depending on the severity or the need for further management and sequalae. Minor complications include those complications that don't require any surgical intervention and respond to nonoperative management, such as temporary pain, transient gait disturbances, superficial hematomas, seromas, scar dysesthesia, local numbness and tenderness, hypertrophic scars, superficial infection and prolonged drainage. Major complications are those requiring further surgery causing chronic donor site pain for more than 6 months, such as deep infection, iliac fracture, sacroiliac joint injury, nerve injury, meralagia paresthetica, pelvic instability, hernias and major hematomas. A wide range of major (0.76-25%) and minor complications (10-39%) have been reported [13-16].

Ahlmann etal, mentioned that, the most common complications at the donor site are pain and sensory disturbances, including hyperesthesia, dysesthesia, or diminished sensitivity. In their analysis, the incidence of chronic donor site pain and sensory disturbances were7.75% and 4, 81%respectively [17].

But in our study the most common complication was postoperative hip pain (88%) that improved gradually by the fifth week in (77%) of cases and persisted in (11%) of cases as chronic hip pain. Transient gait disturbances seen in 6 patients (33%) and improved gradually Scar dysesthesia seen in 3 patients (16%) and managed conservatively. Hypertrophic scars seen in 3 patients (16%) and managed by local creams. There were no other major complications at the donor site, meaning that the anterior iliac crest is reliable as a donor site for secondary alveolar bone grafting in cleft patients. May be bone substitutes will be better choice in the future.

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