ORIGINAL ARTICLE

DONOR SITE MORBIDITY AFTER BONE HARVESTING FROM ILIAC CREST FOR MAXILLOFACIAL REGION

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ABSTRACT

This study was conducted to determine postoperative donor site complications after bone harvesting from iliac crest for maxillofacial reconstruction in patients presented at Pakistan Institute of Medical Sciences (PIMS Hospital Islamabad). One hundred and ten patients having bony defects in maxillofacial region had undergone iliac crest grafting over a period of one year. The data were recorded on a strurctured proformas and were entered in SPSS version 17.0 (SPSS,Inc, Chicago, IL,USA). Analysis was done to determine the frequency and percentages for all variables. Morbidity to donar site (Illiac crest) was evaluated postoperatively at 3rd month.. Among 110 patients, male to female ratio was 1:1.2. Out of total 16.4% had mild pain , 0.9% had gait disturbances with walking aid needed. It was concluded that complications after iliac crest harvesting was found to be moderate to low, but the procedure was still necessary and frequently used with predictable results in terms of pain and gait disturbance at donor site.

Key Words: *Maxillofacial reconstruction, iliac crest graft, Autogenous bone grafts, Postopertive pain, Gait disturbance.*

INTRODUCTION

In maxillofacial surgery autologous bone grafting for the treatment of bone defects attributable to tumors, trauma, inflammation or age related atrophy of the jaws is a standard procedure.1 There are various sites for harvesting bone.[1,2,3]

Many reports suggests that autogenous bone graft from the iliac crest is the gold standard.[3,4,5] because of its easy accessibility, comparatively abundant quality and the ability to perform simultaneous oral procedure.[1,4,5] However the use of autogenous bone grafts is always accompanied by the risk of transient or permanent donor site morbidity and possible surgical complications and the number of available bone grafts is limited as well.[1]

Some authors have suggested that the iliac crest as donor site produce an unacceptably high degree of postoperative morbidity such as pain, functional disorders, hemorrhage, visible scar, contour deformity and sensory loss.[2] The ilium is still the first choice donor site and should not be rejected solely because of concerns regarding postoperative morbidity.

Much of the data regarding morbidity following harvesting from the iliac crest has been published in orthopedics literature and complication rate of over 15% been reported6.[21] In maxillofacial literature 16.6% patients had pain and 16.6% experienced difficulty in walking.[7]

Other studies shows contrasting results 4% patients suffered from persistent pain.8 and 1% suffered pain and walking difficulties respectively after 2 -6 months.[9] Limited data is available nationally as for at donor site morbidity is concerned after harvesting the iliac crest bone graft. The rationale of this study was that by knowing the postoperative complications in donor site (iliac crest) will help the surgeons to decide whether to opt for anterior iliac crest as harvesting site safely or to use other alternative approach for maxillofacial reconstruction. It will also help them to know whether these complications are short termed or long termed. The hospitalization time, cost of procedure or any functional disability can also be assessed. After knowing all these parameters one can safely decide whether to consider this modality for maxillofacial reconstruction or not.

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METHODOLOGY

This descriptive case series was carried out at Pakistan Institute of Medical Sciences (PIMS Hospital Islamabad) on the basis of history, clinical and radiographic examination for a period of one year (June 9 to December 9, 2010). Patients requiring bone graft for reconstruction of osseous defect in oral and maxillofacial region of both genders, 18 years ≥ age group with systemically fitness for surgery under GA no fulfilled the inclusion criteria. Patients with gait disturbance and those not giving informed consent or not interested in study were excluded from this study. Approval of ethical committee of PIMS hospital was obtained.

All the patients fulfilling the inclusion criteria was selected from the ward of Oral and Maxillofacial surgery, Study protocol, use of data for research and risk-benefit ratio was explained to the patients to take an informed and understood consent.. A structured proforma was used to record the Patients demographic details like name, age and gender.

After history taking, clinical, radiographic examination and base line investigation patient surgery was planned under General Anesthesia. Anterior iliac crest was exposed and graft was harvested with the help of bur and chisels. Anterolateral approach was used in relation to the anterosuperior margin of anterior iliac crest. The anterior osteotomy was placed 2 cm distal to the anterior super iliac crest spine to avoid any weakening of the pelvic ring. A corticocancellous bone was harvested from the iliac crest. All muscular attachments were preserved.

According to the defect size the graft was placed and the donor and recipient sites were closed in layers. Postoperative pain was assessed on visual analogue scale (zero representing no pain, ten representing severe pain). Gait disturbance was recorded subjectively by asking the patient for ease of walking with aid (walking stick) or without Aid. Gait was checked by asking the patient to walk for 20 feet with or without walking Aid and was asked for ease in walking or disturbance. These measurements were done on 3rd month. Telephone number was taken to ensure regular follow-ups.

All the data were entered in statistical package for social sciences (SPSS) version 17.0 (SPSS, Inc, chicago, IL, USA).The qualitative variables like gender, gait were expressed using frequency and percentages. The quantative variable like age was expressed using Mean ±SD. Effect modifier like age and gender were controlled by stratification.

RESULTS

In this study iliac bone grafting was done in one hundred and ten patients for reconstruction of various maxillofacial bony defects. Mean Age of patients was 34.35±11.24 years with age range 18 to 60 years. Among these, 60 (54.5%) were male and 50 (45.5%) were female with male to female ratio of 1:1.2. (Table 1 & 2)

Pain was the outcome variable which was observed postoperatively at 3rd month (Table 4). There were 88 (80%) patients who were found having no pain including 46 male and 44 females, 18(16.4%) including 10 males and 8 females patients were having mild pain and 4(3.6%) including 4 male and no female patients had moderate pain as shown in (Table 2 & 3). Similarly gait disturbance was also checked at 3rd month (Table 5). Ninty nine (90%) including 55 males and 44 females

TABLE 1: AGE CHARATERISTICS

No. of patients	Min	Maximum	Mean±SD
110	18	60	34.35±11.24

TABLE 2: CROSSTABULATION OF GENDER WITH POSTOPERATIVE PAIN AFTER BONE HARVEST

Gender of patients	Pain			Total N (%)
	No pain	Mild pain	Moderate pain	
Male	46	10	4	60(54.5%)
Female	42	8	0	50(45.5%)
Total (n %)	88(80%)	18(16.4%)	4(3.6%)	110(100%)

TABLE 3: CROSSTUBULATION GENDER WITH GAIT DISTURBANCE AFTER BONE HARVEST

Gender	Gait disturbance after bone harvesting			Total N (%)
	No	Yes (walking aids not needed)	Yes (walking aids needed)	
Male	55	4	1	60(54.5%)
Female	44	6	0	50(45.5%)
Total n (%)	99(90.0)	10(9.1)	1(0.9)	110(100%)
Total n(%)				

TABLE 4: POSTOPERATIVE PAIN AFTER BONE HARVESTING FROM ILIAC CREST

Postoperative pain	Frequency	Percent	Valid Percent	Cumulative Percent
No pain	88	80.0	80.0	80.0
Mild pain	18	16.4	16.4	96.4
Moderate pain	4	3.6	3.6	100.0
Total	110	100.0	100.0	

TABLE 5: GAIT DISTURBANCE AFTER BONE HARVESTING FROM ILIAC CREST

Gait disturbance	Frequency	Percent	Valid Percent	Cumulative Percent
No	99	90.0	90.0	90.0
Yes (walking aids not needed)	10	9.1	9.1	99.1
Yes (walking aids needed)	1	.9	.9	100.0
Total	110	100.0	100.0	

patients had no gait disturbance, 10(9.1%) including 4 males and 6 females patients had gait disturbances but didn't need any walking aid and 1(0.9%) patient that was male had gait disturbance and needed walking aid as shown in (Table 2 & 3).

In 88 patients with no pain 1 patient had walking difficulty but didn't need any aid, in 18 patients having mild pain, 7 patients were having walking difficulties but didn't need any walking aid. In 4 patients with moderate pain, 3 were having walking difficulties with no walking aid needed and 1 patient with walking difficulty needed walking aid in terms of stick.

DISCUSSION

The non vascularized bone grafts are often taken from endochondral bone e.g iliac bone, ribs or from membranous origin e.g the skull, obtaining split-thickness calvarial grafts, or from the jaw, especially for fire arm injuries, post ablative reconstruction after tumour surgery, secondary alveolar bone grafting dentoalveolar surgery, implantology and complex craniofacial defects.[10,11]

It is suggested in various studies that the iliac crest is the most suitable donor site for autologous bone because of its ready accessibility, amount and quality of bone. In fact, use of cancellous bone induces a rapid revascularization of the graft, unlike cortical bone that maintains volume by creeping substitution.[12]

The main criticism of iliac crest harvesting is postoperative pain that makes patients unable to walk and causes prolonged hospital recovery. However, pain after an intervention tends to be overstated by patients. Clarke A et al reported 11% of their 33 patients had pain even in the third postoperative month.[13]

Much of the data regarding morbidity following harvesting from the iliac crest has been published in orthopedics literature and complication rate of over 15% been reported.[21] In maxillofacial literature in a study 16.6% patients had pain while some studies shows contrasting results, 4% patients suffered from persistent pain.[8,9]

However Schaaf et al found that pain was reported by 84% (n=63) of patient immediately after the procedure.[14] In the another study, 21% of patients complained of pain after 4 to 6 weeks in donor site after iliac crest bone harvesting.[15] In this study pain after iliac crest bone harvesting was obseved by visual analogue scale at 3rd month postoperatively. There were 88 (80%) patients who were found having no pain 18(16.4%) patients were having mild pain, which is consistent to study Kalk el al in which pain was found in 13% of patients at 1 to 3rd month follow up postoperatively.[13] Many studies have reported an incidence of chronic pain ranging from 0% at 6 months to 33% at 12 months.[16,17,18,19] Similar results were observed by Eufinger and Leppänen[12] who reported that 38% (n=19) of patients found the hip pain more annoying than oral pain. The present study showed changes in pain perception over time, with complete resolution of pain after 3 month in 80 % of patients. Concerning pain intensity, the present 3.6% patients indicated their pain as moderate (on VAS). This agrees with many studies that have observed that, after iliac crest bone harvesting, pain is not severe and is readily alleviated with small quantities of analgesics.[13] However, it should be emphasized that comparing such different studies results can have only a speculative meaning. The other variables like dissimilar techniques used from a surgical point of view, the age of a population

and the amount of bone harvested, should be discussed taking into account, as it may have an effect on complications

Gait disturbance is the most common complication observed next to pain. Much of the data regarding morbidity following harvesting from the iliac crest has been published in orthopedics literature and complication rate of over 15% been reported.[7] In previous literature, in one study 16.6% experienced difficulty in walking while other studies shows contrasting results and reported 1% suffered walking difficulties respectively after 2-6 months.[8,9] Previous studies by Rawashdeh et al[19] showed no patient gait disturbance four weeks post-operatively.

Harvesting cancellous bone from anterior iliac crest in young patients is well tolerated, allows early resumption of normal activities, has no effect on growth, has minimal morbidity and a reasonable aesthetic outcome.[20] Limping was reported in 19 patients in a study conducted by Zaid et al.[21] In another study, 50% of the patients had gait disturbances after 14th post– operative day.[23] In our study the Ninty nine (90%) patients had no gait disturbance, 9% showed gait disturbance but did not need any walking aid like stick etc, only one patient (0.9%) that was male had gait disturbance and needed walking aid. However, it should be underlined that the patient involved (gait disturbance with walking aid needed) had anorexia and low weight in addition to osteoporosis, which likely contributed to this complication.

Therefore, the present data support view that this approach decreases postoperative morbidity and prevents nerve injuries. Damage to the sensory nerves at the hip region, while harvesting the graft has been mentioned by many authors. Sudhakar KN et al, repoted the incidence of altered sensation in the distribution of lateral femoral cutaneous nerve was 8.3% (out of 12 patients) and it was restored in two months.[23] Harvesting bone from the anterior ilium do not result in greater donor site morbidity in early term.[24]

Different bone harvesting sites including the iliac crest, proximal tibia, and calvarium are currently used for reconstruction of oral and maxillofacial defects. Salawu O et al Compared the iliac crest with the proximal tibia for complications such as primary haemorrhage, pain and surgical site infection. They reported less complication with proximal tibia however graft harvested from both the proximal tibia and the iliac crest have good healing properties.[25] Autogenous bone graft from the iliac is considered the gold standard graft material in maxillofacial defects. The morbidity after anterior iliac bone graft harvesting is found to be low due to the technique, utilizing the proper instruments, gentle and minimal mobilization of the graft.[26]

CONCLUSION

Anterior iliac crest bone harvesting is a safe procedure with less patient morbidities. However, it should be taken into account that the surgical technique employed has an important role in determining post-operative morbidity. Although future improvements in bone substitutes may change this situation.

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RECOMMENDATIONS

The present study supports the view that iliac crest a harvesting site for maxillofacial reconstructions continues to be a unique donor site for reconstruction of bony defects after fire arm injuries, post ablative reconstruction of facial bones and in secondary alveolar bone grafting.

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3 Jamal, Zahid:	Helped in discussion writing.
4 Saifullah, Asim & Wali:	Helped in proof reading.