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Morbidity at the iliac crest donor site following bone grafting of the cleft alveolus☆

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Abstract

We retrospectively analysed all cases of iliac crest bone graft harvest for secondary grafting of the cleft alveolus during an 11-year period. The casenotes were reviewed and postal questionnaires sent to all patients. Of 73 consecutive patients, 57 (78%) were male, and the mean (S.D.) age at operation was 10 (1) years. A completed questionnaire was received from 72 patients (99%). The median stay in hospital was 3 days (range 2–5). The median time until the child could walk "normally" was 7 days (range 0–56). Thirty-seven patients (51%) had a postoperative limp, which resolved after a median of 7 days (range 3–56). There were two (3%) superficial donor site infections. The median length of scar was 60 mm (range 40–100) and patient satisfaction was high, with a median visual analogue scale of 9/10 (range 2–10). Harvesting bone from the iliac crest for alveolar bone grafting is well tolerated by patients, has few important complications, and gives an aesthetically acceptable scar at the donor site.

Keywords: Alveolar cleft; Bone graft; Iliac crest

Introduction

Secondary bone grafting of the cleft alveolus is now widely accepted,[1] but the optimal donor site remains open to debate. Recognised sites include ilium, calvarium,[2] tibia,[3] rib,[4] and mandible.[5]

Bone from the ilium may be harvested by a traditional "open" approach,[6] or by a minimally invasive operation.[7] It has been described as being the gold standard for secondary grafting,[8] with an acceptable degree of postoperative discomfort.[9]

Much of the data regarding morbidity following harvesting from the iliac crest has been published in the orthopaedic literature, and complication rates of over 15% have been reported.[10] However, techniques of harvesting, the nature of the patient population, and the amount of bone graft harvested all differ greatly between orthopaedic and maxillofacial surgery.

Specific complications exist for each donor site. In one study, harvesting of rib was associated with a pleural tear requiring a postoperative chest drain in 9% of cases.[11] In 75 consecutive cases of grafts taken from the proximal tibia, 2 patients sustained a postoperative tibial fracture.[12] We undertook the present study to determine the morbidity after harvesting grafts from the iliac crest for secondary grafting of the cleft alveolus.

Patients and methods

All patients who had had an alveolar bone graft between 1 January 1991 and 31 December 2001 at the Radcliffe Infir-

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mary, Oxford, were included in the study. The casenotes were reviewed and a postal questionnaire was sent to each patient.

Operation

All operations were performed by a single consultant plastic surgeon, usually with a plastic surgical trainee in assistance. The bone was harvested with the patient supine, thereby allowing simultaneous preparation of the recipient site. Prophylactic antibiotics (co-amoxyclav, or a cephalosporin and metronidazole if the patient was sensitive to penicillin) were given intravenously on induction of general anaesthesia. The area of the anterior superior iliac crest was infiltrated with bupivacaine (Marcaine) 0.25% containing adrenaline 1:200,000. The incision was made parallel and approximately 1 cm inferior to the prominence of the iliac crest to ensure that the resulting scar did not lie directly over the crest. The aim was to harvest bone from where the ilium is thickest, namely between the iliac tubercle and the anterior superior iliac spine (ASIS). The immediate vicinity of the ASIS was avoided to prevent damage to the lateral femoral cutaneous nerve and the main growth centre of the bone.

There is a distinct anatomical junction, corresponding to the cartilaginous cap of the ilium, between the insertion of the external oblique muscle fibres and the origin of the gluteus medius muscle. This was readily breached with a scalpel without the need for substantial dissection to form a medially based "trapdoor" flap. The outermost layer of cancellous bone was discarded because of inevitable "contamination" with chondrocytes. A block of cancellous bone can be harvested with a narrow osteotome. If further graft was required, a gouge or von Volkmann's spoon was employed.

Before closing the trapdoor, a paediatric feeding tube was inserted within the ilium to allow the infusion of bupivacaine postoperatively (through an Epifuser™ device). Although a vacuum drain (Redivac™) was used in the first 40 cases, this was considered unnecessary and was subsequently abandoned without a single haematoma forming. Wounds were closed in layers with absorbable 3/0 and 4/0 polyglecaprone (Monocryl™). Steristrips™ and a Mepore™ dressing were used in all cases.

Postoperative care

Patients were encouraged to mobilise on the first postoperative day with support from the nursing staff and physiotherapy department. Bupivacaine infusions were continued for 24–48 h, and patients were discharged as soon as they were comfortable. We gave advice on oral hygiene, and patients were recommended to abstain from school for two weeks, and to avoid contact sports for six weeks.

Postal questionnaire

Questionnaires were sent to the parents of all but a single family who had emigrated to the USA after an initial follow-up period of 18 months. If no reply was received within four weeks, a further questionnaire was sent. If a response remained forthcoming after a further month, a telephone reminder was made. Seventy-two questionnaires were returned (100%).

The questions (Appendix A) were aimed at determining postoperative convalescence and return to normal activities of daily living. Parents were asked whether their child had had a limp postoperatively and whether a walking aid was required. They were also questioned about complications (including wound infection, persistent pain, swelling, and altered sensation) and whether they had had to seek the advice of their general practitioner or local emergency department. We enclosed a ruler so that the length of the scar could be measured. A visual analogue scale (VAS) was used to establish the satisfaction of patients with the appearance of the scar at the donor site. The VAS was based on a scale of 0–10, 10 being deemed an excellent result.

Results

Of the 73 patients in the study, the questionnaire was returned by 72 (99%). Of the clefts, 57 (78%) were unilateral, 15 bilateral (21%), and there was a single midline cleft (1%). Of the unilateral clefts, 36 were left-sided (63%) and 21 right-sided (37%). Fifty-seven patients were male (78%) and 16 female (22%).

The mean (S.D.) age of the patients at the time of operation was 10 (1) years (range 7–14, median 10). The age at operation was dictated by the stage of mixed dentition: after eruption of the central incisors, but before the eruption of the permanent maxillary canines, as assessed by the orthodontic team.

Tissue was harvested from the left iliac crest in 45 patients (62%): a decision normally left to the patient's discretion. No patient required bilateral graft harvest. The number of cases varied from 1 to 12 per year. The follow-up ranged from 2 years 10 months to 13 years 4 months.

The median length of stay in hospital was 3 days (range 2–5). The median time taken to walk "normally" was 7 days (range 0–56). Thirty-seven patients (51%) reported a postoperative limp, which had a median duration of 7 days (range 3–56). Of those with a limp, three patients (8%) required a walking aid.

For those children whose operation occurred within the school term, the median number of school days missed was 14 (range 4–30). The median time to return to normal activities, including contact sports, was 28 days (range 7–180).

The complications are shown in Table 1. Five patients (7%) reported a persistent ache at the donor site, but all resolved within six months. There were two (3%) superfi-