

## Donor Site Morbidity Following Iliac Crest Bone Graft

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### ABSTRACT

**Objectives:** To evaluate the complications of harvesting autogenous bone from the iliac crest.

**Methods:** A retrospective review of patients undergoing iliac crest bone grafting at the University Hospital of the West Indies, during the period 2000–2004, was performed. One hundred and three patients were identified. Thirty-two patients were successfully contacted and 30 completed the questionnaire. There were 18 males (60%) and 12 females (40%). Their ages ranged from 13 years to 80 years (average 45.6 years).

**Results:** Of the 30 patients, 22 (73.3%) had complications. Fourteen (46.6%) patients had temporary pain; five (16.6%) had chronic pain. Two (6.6%) changed position of clothing due to discomfort at the graft site; five (16.6%) experienced difficulty walking, one reported itching of the scar, one had altered sensation and one was unhappy with the scar. Fourteen patients (46.6%) had minor complications and eight patients (26.6%) had major complications.

**Conclusion:** Autogenous iliac crest bone grafting is associated with significant complications.

## Morbilidad del Sitio Donante tras un Injerto óseo de Cresta Iliaca

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### RESUMEN

**Objetivos:** Evaluar las complicaciones de la cosecha de hueso autógeno de la cresta iliaca.

**Métodos:** Se realizó una revisión retrospectiva de pacientes a los que se les practicó el injerto de hueso de cresta iliaca en el Hospital Universitario de West Indies durante el periodo 2000–2004. Se identificaron ciento tres pacientes. Se logró contactar a treinta y dos de ellos, y 30 respondieron el cuestionario. Hubo 18 varones (60%) y 12 hembras (40%). La edad abarcó de 13 años a 80 años (promedio 45.6 años)

**Resultados:** De los 30 pacientes, 22 (73.3%) tuvieron complicaciones. Catorce (46.6%) pacientes tuvieron dolor temporal; 5 (16.6%) tenían dolor crónico. Dos (6.6%) cambiaron la posición de la ropa porque sentían malestar en el sitio del injerto; 5 (16.6%) experimentaron dificultad al caminar; uno reportó sentir comezón en la cicatriz; otro sentía alteración en sus sensaciones, y un último no se sentía satisfecho debido a la cicatriz. Catorce pacientes (46.6%) tuvieron complicaciones menores y ocho pacientes (26.6%) tuvieron complicaciones mayores.

**Conclusión:** El injerto de hueso autógeno de la cresta iliaca está asociado con complicaciones significativas.

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### INTRODUCTION

Historically, autogenous bone graft has been commonly used by orthopaedic surgeons to help promote bone healing and to provide structural support for reconstructive surgery. The iliac crest is the most common donor site because of easy access and procurement of a relatively large and safe supply of both cortical and cancellous bone (1, 2). Despite the

availability of bone-graft substitutes, conventional autogenous iliac crest bone grafts remain the “gold standard” because of their osteo-inductive, osteogenic, osteo-conductive and non-immunogenic properties (1, 3). Harvesting of iliac crest bone graft can be associated with significant morbidity (2, 4, 5).

The authors undertook this study to evaluate the morbidity of iliac crest bone graft harvesting in patients at the University Hospital of the West Indies.

## SUBJECTS AND METHODS

Permission for the study was granted by the Ethics Committee of The University of the West Indies/University Hospital of the West Indies. All patients who had iliac crest bone grafting (ICBG) performed between January 2000 and December 2004 were eligible for the study. The patients were identified from the database of operative procedures in the Department of Surgery as well as from the records in the operating theatre and recovery room. The patient files were reviewed to determine whether the bone graft was obtained from the iliac crest or elsewhere. All patients who had bone harvested from the iliac crest were eligible. Patients who had previous surgery on the same iliac crest were excluded.

All patients enrolled in the study were contacted by telephone. The authors identified themselves, explained the nature of the study and obtained verbal consent for their participation. A questionnaire was then completed.

Distinctions were made between minor, major, temporary and chronic complications. Minor complications were defined as self-limited events that did not require an additional surgical procedure, responded to non-operative management and did not cause any permanent disability. Major complications were those that led to prolonged hospitalization, required additional surgery or caused substantial disability. Temporary pain was defined as post-operative pain which resolved within six months of the surgery. Chronic or residual donor site pain persisted for at least six months or more and were considered major complications.

## RESULTS

A total of 103 patients were identified. Thirty-two patients were successfully contacted of which 30 agreed to participate in the study. The age range was 13 years to 80 years (average 45.6 years). There were 18 males and 12 females. Fourteen patients had bone graft harvested from the left iliac crest and 16 patients had it from the right. Twenty-five patients had bone graft harvested from the anterior aspect of the iliac crest. Five patients had no documentation of the site on the iliac crest.

Twenty-two (73.3%) patients had complications. Twenty (66.6%) of the 30 patients reported pain immediately following ICBG procedures. In 14 of 20 patients, the pains lasted for an average of 7.0 weeks, with a range of 2 days to 6 months. One patient had pain that lasted one year but

resolved prior to being interviewed. The other five patients (16.6%) had pain which was present at interview one year following ICBG procedures. The only minor complication was temporary pain. Therefore, minor complications were 46.6% (14 of 30 patients). The other complications included, difficulty walking in five patients, altered sensation at the graft site in one patient, change in the position of the clothes due to discomfort at the graft site in two patients, itching of the scar in one patient and an unsightly scar in one patient. Of the five patients, two required walking aids, one a cane and the other a walker. The patient who required the walker also had a failed total hip arthroplasty and this may also have contributed to the difficulty in ambulation. The remaining three patients limped but required no walking aids. Overall, there were 16 major complications in eight patients (Table 1).

Table 1: Complications of iliac crest bone graft

Complications	Patients (n = 30) (%)
Residual pain	6 (20%)
Difficulty walking	5 (16.6%)
Change in position of clothing due to discomfort at the graft site	2 (6.6%)
Itching of scar	1 (3%)
Altered sensation	1 (3%)
Unsightly scar	1 (3%)
Overall major complications	16/30 (53.3%)

## DISCUSSION

The reported incidence of donor site complications after iliac crest bone grafting ranges from 2% to 39%, with the most frequent complaint being that of pain at the donor site (6, 7). Other complications include neurovascular injury, avulsion fractures of the anterior superior iliac spine, haematoma, seroma, infection, herniation of abdominal contents, gait disturbance, cosmetic deformity, instability of the sacroiliac joint, urethral injury and tumour transplantation (2). Major complications have been reported to be less common (rates ranging from 0.7% to 25%) than minor ones [rates ranging from 9.4% to 24%] (4, 6, 7). Harvest of iliac crest bone graft for use in the spine has been associated with rates of major complications ranging from 2.8% to 10% and rates of minor complications ranging from 5.6% to 39% (5,8). In our series, the incidence of major and minor complications was 26.6% and 46.6% respectively.

Donor site pain, the most common complaint after surgery, often interferes with early mobilization. The reported incidence of temporary pain ranged from 2.8% to 17% (8). Fernyhough *et al* reported a 29% incidence of chronic pain (9). The precise cause of donor-site pain is unclear but it is believed to result from nerve injury or destabilization of the muscular origin at the time of harvest (10, 11). In our series, the incidence of temporary and chronic pain was 46.6% and 20% respectively.

Nerve injury is a common complication associated with iliac bone grafting (5). Since the nerves at risk are

sensory, the characteristic symptoms include pain, paraesthesiae, numbness and dysaesthesias in the distribution of the affected nerve. Damage to the nerves adjacent to the ilium most likely results from direct transection or excessive traction. The lateral femoral cutaneous nerve is at risk of injury during harvesting of the anterior iliac bone (12). The superior cluneal nerves are most vulnerable to injury during harvesting of the posterior iliac bone (13). The ilio-inguinal, iliohypogastric, superior gluteal, sciatic and femoral nerves are also potentially at risk. Only one patient in our series had chronic altered sensation at the iliac bone graft site.

There was no haematoma formation or infection in any of our patients. Reported rates of donor-site infection have ranged from 0% to 3% in contemporary series (8). Haematoma formation has been reported in 1% to 10% of patients following harvesting of iliac crest bone graft (8).

Technical considerations to reduce the morbidity include the use of local anaesthetic agents (14); vertical or oblique skin incisions within a 6 cm distance from the posterior superior iliac spine to avoid the cluneal nerves (13); a skin incision made parallel and just above or below the iliac crest, beginning at least 3cm posterior to the anterior superior iliac spine to avoid injury to the lateral femoral cutaneous nerve(15); subperiosteal dissection with careful haemostasis and a unicortical cancellous graft harvest technique (16).

The weakness of this paper is the small number of patients for whom complete data were available. In addition, the patients who completed the questionnaires were required to recall events which occurred one year following the ICBG procedure and the accuracy of their recollection could therefore be challenged.

Harvesting of iliac crest bone graft is an apparently simple procedure but may result in numerous complications.

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