

AUTOGRAFT DONOR SITE MORBIDITY IN SPINAL SURGERY

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Autogenous cancellous or cortical bone grafts are widely used in spinal surgery. To assess the donor site morbidity after these operations, out of 89 surgically treated scoliosis patients between 1.1.1986 and 31.12.1991, 22 patients in whom autografts had been harvested from posterior iliac crests and with a follow-up period of longer than 1 year were reevaluated clinically and radiologically in regards of cosmetic appearance, pain, excessive bone formation, iliac crest regeneration and ilian epiphysis disturbance. 5 of these patients were male and 17 female. Mean age at the time of operation was 15.5 and mean follow-up period was 37.8 months.

The donor sites were not detectable when compared with contralateral iliac bones except one from which bicortical graft had been taken. There was a palpable defect in this patient without herniation. Neither epiphyseal disturbance, nor excessive bone growth were observed in any of the patients. Two patients had mild subjective pain of the operation site and in another patient paresthesia was found on the incision site in physical examination. Based on the radiological data, reharvesting was found to be possible in 21 of 22 patients (% 95.4) and satisfactory spinal fusion was obtained in all patients.

INTRODUCTION

Posterior iliac crest is the major donor site for obtaining bone grafts in spinal surgery. Because of its high osteogenic potential this region can be ready for reharvesting after a short period. The rarity of published data on the subject of donor sites led us to investigate the final outcome of posterior iliac crests of our scoliosis patients where spongy bone grafts were taken.

PATIENTS

89 scoliosis patients were treated surgically between 1.1.1986 and 31.12.1991 in our clinic. 22 out of 74 of these patients, with follow-up periods of longer than 1 year and in whom autografts were taken from posterior iliac crest were included in this study. 5 (% 22.7) of these patients were male and 17(% 77.3) of them were female. Mean age at the time of operation was 15.5 (11-27). Mean follow-up period was 37.8 months (12-55). Patients were evaluated clinically and radiologically with regard to 40 cosmetic appearance, pain, excessive bone formation, iliac crest regeneration and iliac epiphysis disturbance.

Unicortical bone grafts were taken in all patients but one in whom bicortical graft was collected. During unicortical graft harvesting outer cortices were used while inner cortices were preserved. A second oblique incision was used for obtaining iliac bone grafts in patients with high thoracic curves. On the other hand, ini-

tial incision was adequate to reach the donor sites in most of the patients with thoracolumbar curves.

Corticospungious grafts were taken from the outer cortices after elevating the periosteum without damaging the epiphysis. Bone-wax was used to cover the walls of the defects in the donor sites after graft harvesting. Hemovac drains were placed into the donor sites during the operations and they were removed after 48 hours. Patients with a follow-up of longer than 1 year were called back and they were evaluated by the same staff. A standard anteroposterior pelvis radiograph and both 45° oblique views of the donor iliac bone were used for radiographic evaluation.

RESULTS

In physical examination, a palpable defect was found in a patient from whom bicortical graft had been taken. Paresthesia was found on the incision site in another patient and two patients had mild subjective pain on this region. No pathological finding was present in the physical examination of other patients.

In radiological evaluation neither epiphyseal disturbance, nor excessive bone growth were observed in any patient. In 13 patients iliac epiphysis were found to be closed in the latest radiologic evaluation, 4 of these patients had Risser scores of 5 in their preoperative radiographs, and the remainder showed harmonious progressing with their follow-up periods. In 9 patients Risser scores during our evaluation were 4 or less. Epiphyseal growth in these patients were found to be normal according to the Risser classification when their scores in the follow-up were compared with the

scores in the latest preoperative radiographs. Except the patient with bicortical defect, donor sites were found to be regenerated and no difference in homogeneity between the donor site and adjacent bone was present in the other 21 patients (% 95.4).

Neither sex, nor the side of the iliac bone from which the graft had been taken were found to have any significant effect on the results.

DISCUSSION

The best source of bone grafts to be used for the aim of fusion in spinal surgery is the patient himself (or herself) and posterior iliac crest is the ideal region for immunologic reasons and possibilities of transmitting various diseases could not gain popularity. Autogenous grafts in regards of these points are ideal, but they create some questions about the donor site, such as: "Can the donor site be regenerated completely?", "Is there any significant epiphyseal damage during harvesting procedures?", "Does the harvesting procedure have a delaying effect on the mobilization of the patient?".

Various factors affecting the regeneration process must be known to answer these questions. Periosteum is one of these factors. The contribution of periosteum to the repair of bone defects was found to be minimal in Johnson's study and Psillakis reported that in no case, in his study about regeneration of donor areas of bone grafts, did bone tissue form directly from the periosteum. According to him, it seems that the periosteum acted in the role of a conductor for the deposition of the newly formed tissue. For this reason the periosteum must be stripped without demagign it and donor site must be covered with the preserved periosteum after graft collecting.

Regeneration of the donor site is a similar process with the endosteal fracture healing. At first vascular proliferation occurs within the medullary cavity. Immature bone is then laid down, interspersed with fibrocartilage. Then this internal callus gains trabecular structure after remodelling process. The time needed for donor site regeneration in human bone is not known exactly. Trabeculation and sclerosis were reported to be finished within 9-12 months in distal radial donor sites by Mc Grath and Watson. Regeneration period in dogs are reported to be at least two times faster than in humans.

Regeneration occurs more rapidly and afficiently in young patients. Psillakis (3) reported that only patients under 30 showed complete regeneration of donor areas

of bone grafts in his study. He found that patients over 30 always achieved partial regeneration and according to his conclusion, donor areas of bone grafts may be reused in young patients and with complete assurance in those under 20. Montgomery and Moed noted donor sites should be a potentially reliable source of additional cancellous bone after 24 months in humans. In our study, mean age at operation was 15.5 and the age of our oldest patient was 27. Our mean follow-up period was 37.8 months. Complete regeneration ratio of % 95.4 in our patients (according to the radiological examination) supports both of these studies.

In our study we also investigated post-operative growth disturbance. Our findings indicate that if epiphysis is preserved sufficiently during the procedure, obtaining iliac bone grafts have no delaying effect on the epiphyseal growth and normal increase of Risser scores of the patients.

According to Grillon et al lateral approach to ilium for grafts creates severe pain and prolonged limp as it involves stripping the periosteum off the crest of the ilium and reflecting the gluteal muscles laterally. For this reason they suggest medial approach for this procedure. We didn't observe severe post-operative pain after lateral approaches. Only 2 out of 22 patients had mild pain on this region in the follow-up.

As a result posterior iliac crest is an ideal donor site for bone grafts in spinal surgery. In our study a good regeneration capacity of this region was observed and local morbidity was found to be very low.

REFERENCES

1. Montgomery DM, Moed BR: Cancellous Bone Donor Site Regeneration. *J. Orthop Trauma*, 3(4), p.290, 1989.
2. Grillon GL, Gunther SF, Connole PW: A New Technique for Obtaining Iliac Bone Grafts. *J.Oral Maxillofac Surg.* 42:176, 1984.
3. Psillakis JM, Woisky R: A study of Regeneration of Donor Areas of Bone Grafts. *Ann Plast Surg.* 10:319, 1989.
4. Johnson KA: Histologic Features of the Heahup of Bone Graft Donor Sites in Dogs, *Am J Vet Res*, 49(6) 885, 1988.
5. Cochin J: Autogenous Bone Grafting-complications of the Donor Site. *J Bone Joint Surg.* 53 B:153, 1971.