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A less-invasive technique for harvesting autologous iliac crest grafts for cervical interbody fusion: technical note

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A less-invasive technique for harvesting autologous iliac crest grafts for cervical interbody fusion: technical note

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Abstract

Background: A new technique for harvesting autologous iliac bone grafts is described.
Technique: This technique is mainly based on performing carefully a limited subperiosteal dissection, obliquely directed bone cuts, and avoiding the stripping of the anterior thigh musculature.
Conclusion: This technique allowed to overcome almost all the problems that can occur when using the traditional technique for iliac crest graft harvesting and was used in over 100 cases of cervical discogenic disease with satisfactory results.

Keywords: Cervical disk disease; Anterior interbody fusion; Iliac crest autograft

1. Introduction

The iliac crest is the most commonly used donor site for autologous bone graft harvesting. There is widespread agreement that autografts produce better results than allografts in spinal fusion surgery [1]. However, a recent study has questioned the value of autologous iliac crest bone grafting because the incidence of persistent donor site pain appears to be not negligible as it affects one third of patients [3]. This would be a strong argument for promoting the use of modern, although expensive, cage and/or bio-implants technology [5].

The commonly recommended technique for harvesting iliac bone grafts requires adequate stripping of the pelvic muscles as well as of the anterior thigh musculotendineous attachment to expose fully the iliac crest. This extensive maneuver is required for obtaining tricortical grafts that are considered mandatory for achieving a good rate of solid fusion in cervical spinal surgery [2]. However, extensive subperiosteal dissection can cause postoperative bleeding and related complications and can be a primary cause of postoperative pain at the donor site. In particular, the detachment of the anterior thigh muscles can cause significant discomfort to the patient, which would require months to disappear, and in several cases would persist [3].

Since the year 2000, the present author started using a modified technique for harvesting iliac autologous bone grafts in patients undergoing cervical fusion, with the main aim of reducing postoperative discomfort. This technique, mainly based on limiting the extent of the superiosteal dissection to the pelvis musculature and performing oblique cuts into the iliac bone to not dissect the anterior thigh musculotendineous attachment, is here described in detail.

2. Surgical technique

A 5-cm linear skin incision is performed parallel and 2 cm inferior to the edge of the iliac crest. Appropriate use of handheld retractors by the assistant would make a longer skin incision unnecessary. Great care is taken to dissect adequately the subcutaneous fat to expose properly the fascial plane.

This maneuver is performed with particular care in overweight individuals, usually with the aid of bipolar cautery. The fascia is incised parallel the edge of the iliac crest and suspended with 4 interrupted silk sutures, 2 on each side of the incision (Fig. 1), to increase as much as possible the space for subsequent dissection without having to enlarge the skin incision. At this stage, the muscular plane is exposed. With extensive use of bipolar cautery, the pelvic musculature is detached from the posterior aspect of the ilium until the bone is exposed for approximately 7 × 5 cm

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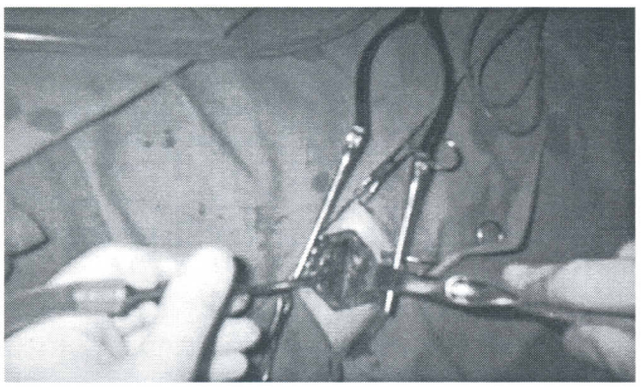

Fig. 1. Subperiosteal bloodless dissection is performed only on the superior-posterior side of the crest. The anterior musculotendineous attachment is not dissected.

(Fig. 1). To this purpose, a long Langebeck retractor should be wisely placed and moved by a well-instructed assistant. This is a clue maneuver for adequate visualization of the bone space where dissection is to be performed later. Self-retaining retractors are of little help because of the limited space for acceding to a narrow surgical field. The thigh musculotendineous attachment is left untouched.

Only a few millimeters of the anterior-superior aspect of the iliac crest are exposed. The bone space prepared for graft harvesting is cleaned from muscle debris with low-power monopolar cautery, which is used only for this purpose. Then, a high-speed drill with a 1-mm tip is used for making obliquely directed sequential holes into the ilium in an anterior-posterior direction. Each tract would measure approximately 4 cm (Fig. 2). Holes are then made along the exposed surface of the iliac bone until a rectangular configuration is completed. At this time, an osteotome is used to complete the bone dissection initiated by the high-speed drill (Fig. 3). Careful dissection with the osteotome allows a good bicortical bone graft to be elevated from the iliac bone.

The graft is then divided into 2 pieces of approximately the same size using a minisaw. Each piece is subsequently

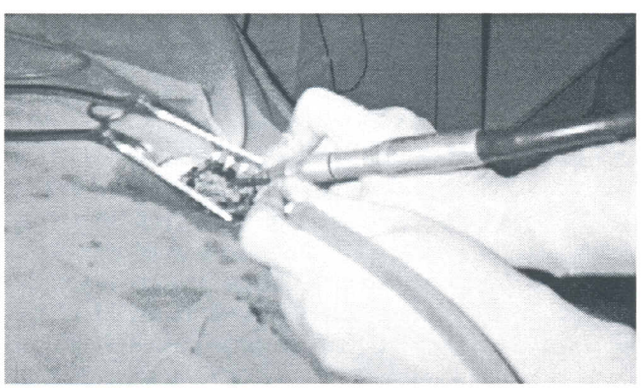

Fig. 2. Sequential oblique cuts are performed within the exposed iliac bone.

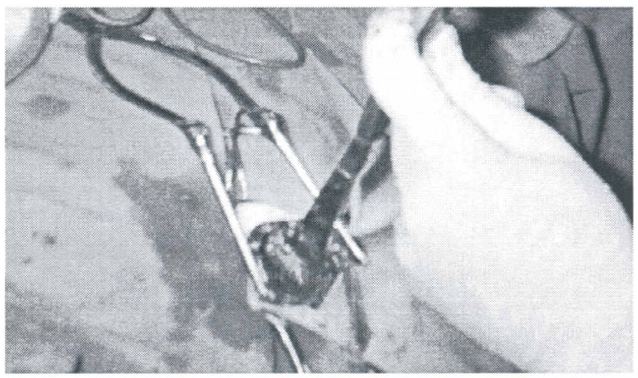

Fig. 3. A straight osteotome is used for completing bone dissection.

shaped appropriately using either a drill or a chisel (Fig. 4) and placed into the requiring interspaces. To help achieve subsequent fusion, the cortical surfaces are placed in contact with the vertebral and plates, which have been previously scratched with microcurettes.

Iliac crest bone hemostatis is carefully achieved using a large diamond burr that will also shape smoothly the surface of the incised bone. Bone wax is used only occasionally. Musculohemostatis is carefully achieved with bipolar. The wound is closed in layers without using a suction drain. The patient is asked to wear subsequently a Shantz collar without removing it for 2 months. Removal is authorized after plain X-rays control.

3. Discussion

The technique described here is rather simple and, as a rule, was very well tolerated by the patients. Experience will help in acquiring skills to overcome the problems that would occur when performing this surgery in overweight individuals. In fact, enlarging the skin incision and/or soft tissue dissection was never required in these cases. Postoperative discomfort disappears within a week and was not reported

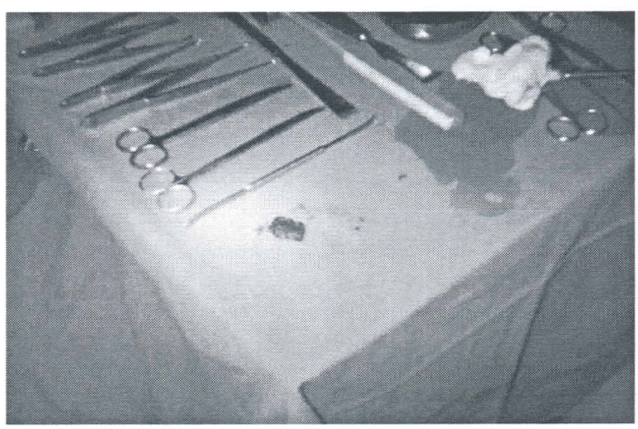

Fig. 4. The autologous transplant is appropriately shaped and made ready to use.

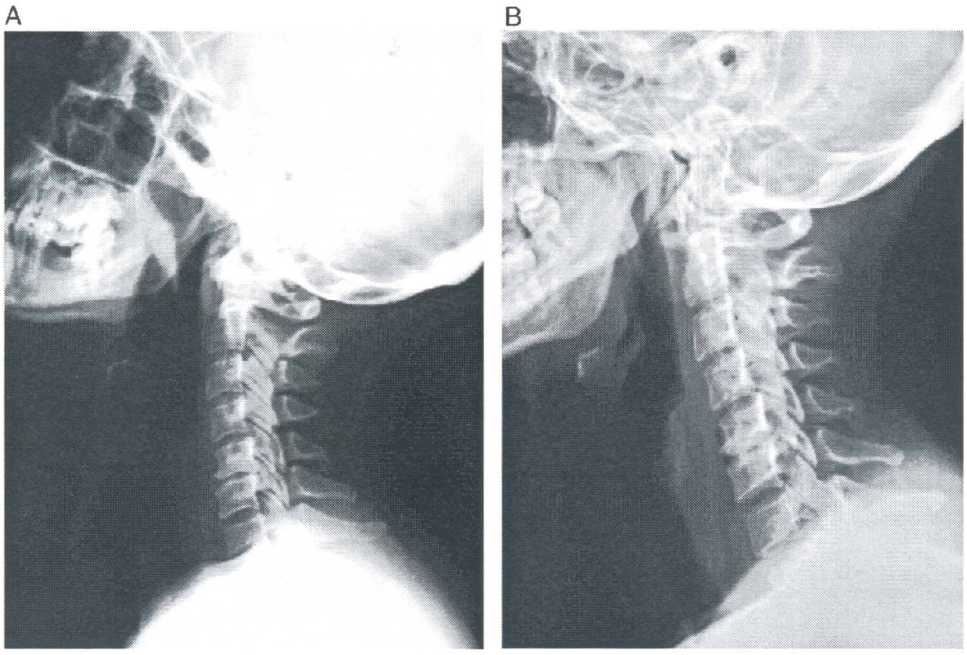

Fig. 5. Preoperative (A) and postoperative (B) plain x-rays of a middle-aged woman with a C_5-C_6 lesion. Appropriate segmental realignment is obtained immediately after surgery.

by slim individuals. The size of the harvested grafts is sufficient for plugging 2 interspaces. Grafts for 2-level corpectomy and/or for 3-level interbody fusion may also be obtained, but this is not possible in all instances. Therefore, patients necessitating more extensive grafting procedures should be warned that this "mini-invasive" technique could prove to be inadequate, and that the traditional, more invasive technique should be used if required.

Bicortical iliac grafts obtained using this technique have proven to be adequate, if appropriately shaped and inserted into the interspaces to be fused (Fig. 5A-B), in approximately 100 cases operated on in the last 5 years [4].

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Commentary

The author describes a technique to reduce graft site morbidity by harvesting a bicortical rather than tricortical graft. Graft site morbidity is a common problem and would likely be reduced with this technique. It is not clear whether the bicortical graft is structurally sufficient, but the authors do not note problems in a series of 100 cases. Some iliac crests are also too small for a bicortical graft to be adequate.

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