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ORIGINAL ARTICLE

Surgical management of pelvic primary bone tumors involving the sacroiliac joint

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KEYWORDS

Pelvic neoplasms;
Bone neoplasms;
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Limb salvage;
Hemipelvectomy;
Sacroiliac joint

Summary

Introduction: Pelvic primary malignant bone tumours, especially when involving the sacroiliac joint are difficult to treat. Abdominoperineal amputations are today used, only in life-threatening situations.

Hypothesis: A precisely planed surgical technique can save the affected extremity without compromising the resection quality and subsequent patient survival.

Objective: To assess the procedures used for resection and reconstruction of bone tumours invading the sacroiliac joint as well as their effects on cancer outcome and functional results.
Materials and methods: This is a continuous and retrospective analysis of 24 patients treated between 1986 and 2003. Six tumours affected the sacral body and 18 tumours involved the wing of the ilium. The joint articular surface was invaded in only six cases. Seventeen patients received neoadjuvant chemotherapy. The procedure was performed through an enlarged iliac crest incision, giving access to two sections of the pelvic ring. Six cases required neurological sacrifice. Initial tumour grading was based on the Enneking classification, and the functional results, on the Musculoskeletal Tumour Society (MSTS) scoring system.

Results: The average operation lasted 5.27 hours. Reconstruction was performed with bone autograft and instrumentation. Resection was large with adequate margins 11 times, marginal 12 times, and contaminated once. Average follow-up was 4.77 years. The 5-year survival rate was 50%. Twelve patients either died from their disease or were in the metastatic stage at final follow-up. Survival was linked to the quality of resection and initial tumour staging. Hemisacrectomy did not affect patient survival. Local recurrences had a poor prognosis with eight cases of secondary metastases out of 11. Bone healing occurred in 13 patients, 10 of whom survived. Of the 12 patients who survived and were in complete remission at final follow-up, the average MSTS score was 61%. The score was at 38.6% in cases involving neurological sacrifice, and at 77.1% for the rest of the group. It was at 64% in healed cases and 13% in nonunion cases.

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Discussion: The survival of patients presenting with a sacroiliac joint tumour is substantially related to both tumour histology and resection quality. Local recurrences carry a poor prognosis with a high rate of secondary metastatic dissemination. In situations where disease control can be achieved, the proposed method of reconstruction allows, satisfactory bone healing and fair functional recovery, provided no major neurological sacrifice has taken place.

Level of evidence: level IV: Retrospective Therapeutic Study.

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Introduction

Malignant tumours of the pelvic ring often have a poor prognosis because of late diagnosis and difficult treatment. Generally affecting young and physically active subjects, the treatment should meet a double objective: first and foremost, cancer management, but also functional maintenance. External hemipelvectomies (inter-ilio-abdominal disarticulation) are justified, by most authors, only in cases of an unresectable tumour due to its size or the invasion of visceral, vascular or nerve structures [1,2]. Tumour location imposes technical constraints on surgical technique, particularly its position with respect to the acetabulum. The most widely used classification for defining this type of tumour resection is that of Enneking and Dunham [3].

Tumours invading the sacroiliac joint do not pose coxofemoral reconstruction problems, but they require extensive dissection of the two sections of the pelvic ring, which explains the significant number of complications involving scar tissue formation found in the literature [4–7]. Numerous reconstruction procedures have been proposed: nonvascularised or vascularised autografts [8], allografts [9] or modular implants [10]. Some, however, regard any type of reconstruction as pointless [11].

We present a surgical technique that we use for resection-reconstruction of the sacroiliac joint, as well as the long-term oncological and functional results based on a study of 24 patients.

Materials and methods

Inclusion criteria

This retrospective, monocentric, continuous study was conducted between 1986 and 2003 on 24 patients treated for primary malignant pelvic bone tumours involving the sacroiliac joint in Surgical Orthopaedics Department B of Cochin Hospital. We excluded patients presenting with a tumour invading the acetabulum to maintain homogeneity of the surgical technique. Intrasacral tumours requiring total sacrectomy were not included. All histological types were included. The inclusion and exclusion criteria are summarized in Table 1. This study includes only operated cases.

Surgical technique

This major surgery is associated with heavy blood loss and requires good collaboration with the anaesthesiology team.

It is useful to insert a double-J ureteral catheter before the procedure to facilitate intraoperative visualization of the ureter. The patient is placed in the lateral decubitus position. Support placed under the thorax makes it possible to put the patient's pelvic area into a three-quarter anterior and posterior pelvic tilt during the intervention.

The incision is started along the contours of the iliac crest in a curvilinear manner and ends in the back with a vertical portion on the sacroiliac joint. Ideally, biopsy is performed first along this trajectory and its scar is removed with the tumour resection.

The wing of the ilium and the sacrum are exposed, allowing for safety margins around the tumour, which may extend into the soft tissue. The iliac muscle is sectioned or detached from the endopelvic side of the ilium. The iliac vessels, ureter, lumbosacral trunk, sacral roots and sciatic nerve are located and protected. On the exopelvic side, the gluteus muscles are moved as a unit with their fascia and skin, creating a lower myocutaneous flap. During dissection, it is necessary to preserve, whenever possible, the superior gluteal artery, which provides the primary vasculature to this flap, and also the accompanying superior gluteal nerve. The ischial notch is finally exposed and examined on both sides of the pelvic ring.

At the level of the sacrum, the posterior cortex is exposed and the sacroiliac ligaments are sectioned. If the tumour is contained within the sacral ala, access via the sacral canal is not necessary. The cut is made from back to front outside the sacral foramina. In the event of tumour expansion into the sacral body, hemisacrectomy is performed. After completely exposing the anterior section of the sacrum and after hemostasis of the presacral venous plexus, spatulas are placed in the anterior sacral foramina, from S1, S2 and

Table 1 Inclusion and exclusion criteria.

Inclusion	Exclusion
Primary tumour	Secondary tumour of metastatic origin
Affects the iliac bone or sacrum	Affects the acetabulum or the obturator area
Invades the sacroiliac joint or adjacent area	Unresectable tumour
Conservative surgical treatment	Healthy margins cannot be foreseen
Resection interrupts continuity of the pelvic ring	

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