Extraleisional resection for tumours of the pelvic bones

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Summary. *A retrospective analysis of 92 patients with tumours of the bony pelvis is presented. Limb-sparing operations may be adequate or inadequate. Adequate operations are those in which the excision is extraleisional and the function of the limb is preserved as far as possible. An operation is inadequate if either oncological principles are abandoned or if carried out with no regard for them, but function is preserved to a greater extent. The postoperative mortality in 92 patients was 1.2%. In 12, oncological principles were not fulfilled. Long term results were available in 78 patients: 42 are alive and free of disease after more than 5 years, 17 of them for more than 10 years and 2 for more than 25 years. One patient with recurrence and metastases to the lungs is alive after 12 years.*

Résumé. *Présentation d'une analyse rétrospective de 92 patients présentant des tumeurs osseuses pelviennes qui ont été traitées par résection large. Les interventions ont été réparties en adéquates et inadéquates. Les interventions adéquates sont celles effectuées en suivant les règles carcinologiques tandis que la fonction du membre opéré est conservée au maximum. Les interventions inadéquates sont celles où les principes carcinologiques n'ont pu être suivis avec une fonction qui a pu être préservée. La mortalité post-opératoire fut de 1,2%. Pour 12 patients les règles carcinologiques n'ont pu être suivies au cours de l'intervention. Les résultats à long terme sont rapportés pour 78 patients. 42 patients sont vivants sans signe de ma-*

ladie tumorale à plus de 5 ans (17 d'entre-eux sont en vie depuis plus de 10 ans et 2 patients depuis plus de 25 ans). 1 patient atteint d'une récurrence tumorale et de métastases pulmonaires est vivant 12 ans après l'intervention.

Introduction

The pelvic bones may be affected by any type of growth, but cartilaginous tumours are the most frequent and there is no alternative to surgical treatment [3, 5, 6, 13, 14, 17]. The difficulty in this type of procedure is related to the closeness of the major vessels, nerves, ureter, bladder, urethra and rectum.

The pelvic bones are divided into anterior (pubis and ischium) and posterior (the iliac wings and sacrum) bony rings. The middle part of the iliac body takes part in both these rings.

The present paper discusses problems of limb-sparing operations in patients with bony tumours of the pelvis.

Patients and methods

Ninety-two patients with such tumours were treated by operation and the results analysed retrospectively. The pathological diagnoses were: chondrosarcoma (80), osteosarcoma (3), giant cell tumour (6 [3 malignant]), recurrent liposarcoma of pubis and ischium (1), parosteal sarcoma of iliac wing (1), fibrosarcoma (1) and synovial sarcoma (1).

The nature of the tumour was identified by histological examination.

A resection of the anterior pelvic ring was carried out in 52 patients, the posterior ring in 35 and in 5 half of the pelvis was removed.

Surgical technique

Resection of the anterior pelvic ring

A wide retroperitoneal approach was made to the pelvic cavity and the common iliac artery mobilised distally to the upper third of the femoral artery. The femoral nerve was exposed throughout the length of the operative field. The iliolumbar muscle was cut at the level of the sacroiliac joint and below the ischiopubic ramus from which the adductors were dissected. A Gigli saw was introduced from the false pelvis through the ischial foramen to the external surface. The ilium was cut through above the acetabulum, and the symphysis pubis and the femoral neck divided. The very dense sacrospinous and sacrotuberous ligaments were dissected out and the deep flexors which insert into the ischial tuberosity divided.

In some obese patients and in those with strong muscles, the operation was carried out in two stages. Firstly, using an anteroposterior Kocher approach, the hamstring insertion was dissected free. Then, 2 or 3 weeks later, the major part of the operation was performed leaving the femur free in the soft tissues. The wound was drained and closed tightly. Later, a new joint developed with satisfactory movements and weight-bearing. Alternatively, the femur could be transposed towards the residual segment of the ilium so that consolidation between femur and the ilium occurred. Three cases are reported.

Case 1 (Fig. 1a–d). A man, 19 years of age, had an operation for osteogenic sarcoma of the left pubic bone in 1966, followed by radiotherapy (36 Gy). Pain continued and resection of the anterior pelvic ring was carried out with transposition of the upper end of the femur. A plaster cast was used for 8 months and bony consolidation occurred slowly. There was no evidence of recurrence 29 years later. He limps slightly, but walks without any support and can drive an ordinary car.

Case 2 (Fig. 2a+b). A woman, 57 years of age, had a primary chondrosarcoma affecting the pubis and ilium. A two-stage interilio-abdominal resection was performed. First, the tendons of the hamstring muscles which insert into the tuberosity of the ischium were dissected free. Fifteen days later, an en bloc resection including the ischium, pubis and femoral head, with surrounding soft tissues, was carried out. In spite of the large size of the tumour, oncological principles were followed and the procedure was successful with only slight blood loss. She was discharged after 6 weeks when she was able to walk with crutches. After 3 months she could manage with a stick, but did not use it indoors. There was no evidence of recurrence or metastases 10 years later.

Fig. 1a–d. *Case 1.* Osteogenic sarcoma of the left pubis. **a** Radiograph before operation. **b** Radiograph after operation. **c** Photomicrograph of tumour (HE, $\times 300$). **d** Photomicrograph showing primitive bone structure (HE, $\times 300$)

Fig. 2a, b. *Case 2.* Primary chondrosarcoma of pubis and ilium. **a** Radiograph before operation. **b** Radiograph after operation

Case 3 (Fig. 3a+b). A man, 36 years of age, underwent resection of the pubis and ischium for secondary osteosarcoma in 1968. A recurrence in the gluteal muscles was detected 11 years later. This tumour was removed together with the soft tissues. He is free of disease 16 years after this procedure and 27 years after treatment of the original tumour. He limps slightly, but walks without any support.

Resection of the posterior pelvic ring

A similar surgical procedure is used but, after cutting through the ilium above the acetabulum, the sacroiliac joint or lateral sacrum is osteotomised. The defect is not repaired and there was no disturbance of function of the operated limb, although subluxation of the symphysis and slight upward displacement of the pelvis occurs producing moderate shortening of the limb.

Case 4 (Fig. 4a–c). A man, 21 years of age, had a secondary chondrosarcoma of the wing of the left ilium with extensive involvement of the gluteal region. In 1982, resection was carried out preserving the hip joint. The tumour had spread into the sacrospinous ligament and a partial lesion of the sciatic nerve occurred when the ligament was divided. There was no recurrence or metastasis after 12 years. Weightbearing and function of the hip was not affected. The leg is 5 cm shorter, he limps slightly and walks without support.

Results

In 12 patients the operation was performed without regard to oncological principles as the tumour was opened. Recurrences followed in every case and in 9 there were lung metastases. Two patients had interilio-abdominal exarticulation; one died soon after the operation, the other is alive and well.

Oncologically correct extralesional resections were carried out in 80 patients and only 2 developed soft tissue recurrences. In one of these, who had a chondrosarcoma, the nodes were excised 11 years after the first resection of the pubis and ischium; the patient was alive with recurrence 17 years after the second operation. The second patient underwent a resection for a recurrent chondrosarcoma of the pelvis 8 years after the primary resection of the tumour; 4 years later there was a further recurrence and lung metastases. Two patients (1.2%) in this group died in the early postoperative period.

Twelve patients were lost to follow up so that long term results were available in 78 cases: 29 died of lung metastases; 49 are alive without recurrences, 24 for less than 5 years, 8 between 5 to 10 years, 9 between 10 and 15 years, 5 between 15 and 20 years and 2 are free of disease after more than 25 years.

Fig. 3a, b. Case 3. Secondary chondrosarcoma of pubis and ischium. **a** Radiograph before operation. **b** Radiograph after operation

Fig. 4a–c. Case 4. Secondary chondrosarcoma of the wing of the left ilium. **a** Photograph before operation. **b** Radiograph before operation. **c** Radiograph after operation

Discussion

The results of amputation have been compared with limb-sparing resection [7]. In the pelvis, interilio-abdominal amputation or exarticulation is needed. Whether or not the limb is removed, the operation must be radical in every case [4], but this principle may be violated by resection or amputation. Nevertheless the oncological requirements and the functional outcome must both be considered [11].

The operation is regarded as adequate when both these criteria are fulfilled. Extralesional resection is achieved by using the zonal and sheath principles [16]. The tumour may be growing along the fascial sheath between muscles so that its bulk is increased by new tumour layers [2, 15]. Consequently, the muscle sheath must be removed in a wide resection; if this is not possible the total zone of surrounding soft tissues must be removed in a radical excision [4].

The principle of radical limb-sparing procedures was laid down at the beginning of this century and the first step is the exposure of the great vessels and nerves on which the peripheral part of the limb depends [1, 19]. Soft tissues at a sufficient distance above and below the lesion are dissected to their full thickness and removed together with the tumour. The Tikhov-Linberg procedure applies these principles to the humeroscapular region [8, 9, 10, 18, 19]. Bogoraz operated on tumours of the thigh; the femur was shortened 20 cm or more [1], so this procedure was not widely practised.

We used this principle for tumours of the bony pelvis performing interilio-abdominal resection. In 5 cases hemipelvectomy was undertaken when there was widespread involvement, but the results were unsatisfactory and the function of the limb is worse than after interilio-abdominal resection [12, 20, 21] provided strict oncological principles are maintained.

In our experience when the excision was not adequate, recurrences developed, but when oncological principles were observed the long term and functional results were satisfactory.

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