The benefits of surgery in the treatment of pelvic metastases

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Summary. *This retrospective study analyses the benefit of surgery to patients with pelvic metastases. Forty-three patients were operated on between 1980 and 1992, 37 having intralesional and 6 extralesional resections. Thirty-nine had peri-operative adjuvant therapy. Survival time was calculated by the Kaplan-Meier method. Clinical evaluation used the Karnofsky performance status which showed improvement from 55% before operation to 74% at 3 months ($p = 0.0001$) and 77% after 6 months ($p = 0.0001$). Those having an intralesional resection had a median survival time of 13 months, a complication rate of 24% and a local recurrence rate of 19%. The comparable figures for those with extralesional resection were 16 months survival, complications in 3 out of 6, and no local recurrences. The quality of life was improved by operation and intralesional resection is preferable in most of these patients.*

Résumé. *Étude rétrospective des résultats de divers types d'interventions chirurgicales réalisées sur des patients présentant des métastases pelviennes. Nous avons opéré 43 sujets entre 1980 et 1992, 37 ayant subi une curetage des tumeurs, six une résection dans le tissu sain. L'espérance de vie a été calculée selon le procédé Kaplan-Meier, l'état clinique étant évalué au moyen de la méthode de Karnofsky. L'indice Karnofsky est passé de 55% avant l'intervention à 74% trois mois après l'opération ($p = 0,0001$), et à 77% à six mois*

($p = 0,0001$). *L'espérance de vie des sujets ayant subi une curetage de la tumeur s'est avérée être de treize mois en moyenne, avec un taux de complications de 24% et un taux de récides locales de 19%. Les sujets traités par resection dans le tissu sain ont survécu en moyenne de seize mois. Nous avons vu des complications dans trois cas sur six, sans qu'il y ait eut récive. Le traitement chirurgical a nettement amélioré la qualité de la vie de nos patients. Compte tenu du taux de complications et de l'espérance de vie de nos malades après intervention, la curetage de la tumeur semblerait être la méthode de choix dans le traitement de ces sujets.*

Introduction

The pelvis is affected in 40% of patients with bony metastases and is the second commonest site of metastases after the spine [7, 27]. An interdisciplinary approach by oncologists, orthopaedic surgeons, radiologists and general surgeons has increased the survival time of these patients. In the 1960s, the mean survival time after the first pathological fracture was 7 months [8, 11, 17, 22]. In contrast in 1981 it was 19 months, depending on the primary tumour [11]. The survival time of those with metastases from carcinoma of the lung was reported as 3.6 months, compared with 11.8 months for carcinoma of the kidney, 22.6 months for the breast and 29.3 months for the prostate cancer [8, 11, 14].

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Table 1. Patients. Age and gender distribution ($n = 43$, mean age 58.6 years; range 22 to 77 years)

Age (Years)	<i>n</i>	Sex m/f
20–30	1	–/1
31–40	2	1/1
41–50	5	3/2
51–60	11	6/5
61–70	15	9/6
71–80	9	3/6
Total	43	22/21

Table 2. Diagnoses of the primary tumors with metastases in the pelvis and sacrum

Diagnoses	<i>n</i>
Renal carcinoma	15
Thyroid carcinoma	8
Prostate carcinoma	5
Breast carcinoma	4
Colon carcinoma	3
Uterine carcinoma	3
Others	3
Unknown	2
Total	43

Surgical treatment of pelvic metastases aims to maintain or restore mobility and the quality of life. There are several reports on surgical technique and management [7, 8, 11, 19, 23, 27], but there is no information on the functional outcome and life expectancy of these patients.

The aim of our study was to calculate the median survival time after surgical treatment of pelvic metastases; to investigate the effect of operation on the quality of life and mobility, and to evaluate the value of intralesional or extralesional resection on the survival time, complications and local recurrence.

Patients and methods

Between 1980 and 1992, 43 patients underwent surgical treatment for pelvic and sacral metastases; 30 (70%) had multiple and 13 solitary lesions. The mean age at operation was 58.6 years (range 22 to 77) and there were 22 men and 21 women (Table 1).

The indications for operation were an estimated life expectancy of more than 6 months, depending on the primary tumour, the state of the underlying disease and the clinical condition of the patient. Further indications were metastases which did not respond to radiation, chemotherapy or embolisation, and impending pathological fracture regardless of the histology. The most frequent primary tumour in our patients was renal, followed by carcinoma of the thyroid (Table 2).

The extent of the tumour was determined before operation by radiography, CT and MRI imaging. Localisation was classified according to Enneking [5]. A single site was affected in 23 patients, the iliac wing (P1) in 12, the periacetabular

	Localisation (according to Enneking)	Resection without stabilisation	Osteo-synthesis	Endoprostheses		
				Saddle	Hip	Pelvis
involvement					
	single	8	4			
	P ₁ + P ₂ + P ₃		2			
	+ P ₂ + P ₄		1
single				3	1
	+ P ₁		3	1		
	+ P ₃	3		3	1
single	5				
	+ P ₂	2
single	3				
	+ P ₁	1	2			
total 43 patients		22	12	4	4	1

Fig. 1. Enneking's localisation of pelvic metastases with single and multiple involvement of adjacent regions, and the type of surgical treatment. P₁, iliac wing; P₂, periacetabular; P₃, pubis and ischium; P₄, sacrum

Fig. 2A, B. Man, 35 years of age, with multiple myeloma. **A** Metastasis in right iliac wing (*P1*). **B** 3½ years after resection and reconstruction with methylmethacrylate cement and wires

Fig. 3A, B. Man, 55 years of age, with thyroid carcinoma. **A** Periacetabular (*P2*) metastasis spreading to *P1*. **B** Three years after resection and reconstruction with a saddle prosthesis

Fig. 4A, B. Woman, 67 years of age, uterine carcinoma. **A** Bilateral involvement of ischio-pubic (*P3*) region. **B** 2½ years after resection

Table 3. Survival time (months) of patients with pelvic/sacral metastases (total, and detailed in metastases of renal and thyroid carcinomas)

	Pelvic metastases total (n = 43)	Renal carcinoma (n = 15)	Thyroid carcinoma (n = 8)
No evidence of disease			
1 (84 mo)	1 (84 mo)	—	
1 (17 mo)			
1 (33 mo)			
1 (63 mo)			
Alive with disease			
1 (55 mo)	—		1 (55 mo)
1 (12 mo)		1 (12 mo)	1 (81 mo)
1 (81 mo)			
1 (42 mo)			
1 (73 mo)		1 (73 mo)	1 (127 mo)
1 (127 mo)			
Died	33 (median 12 mo)	12 (median 9.5 mo)	5 (median 30 mo)
Median survival time	14 mo	13 mo	35 mo

region (P2) in 3, the pubis and ischium (P3) in 5, and the sacrum (P4) in 3 (Fig. 1). In 20 patients, two or more sites were affected.

Surgical treatment

The method was determined by the site and the extension of the metastases. Stabilising operations were carried out in 21 patients when the defect interrupted the force transmitted from the femur towards the spine; osteosynthesis was used in 12, and endoprostheses in 9 (Fig. 2, 3). When stability was maintained (Fig. 4), resection was carried out without stabilisation in 22 patients.

Extraleisional resection was intended in 10 patients, and was achieved in 6 of them. Intralesional resection was done in 37, usually after preoperative embolisation of the tumour vessels, with enucleation of the metastasis followed by power reaming until tumour-free margins were reached. The internal iliac artery and vein were ligated in large tumours to avoid excessive bleeding. Extraleisional resection was performed by en bloc removal of the metastasis. Extraleisional-marginal resections were defined by histologically tumour-free margins, and extraleisional wide resection had to show a safe distance from the tumour of at least 1 cm.

Perioperative therapy

Twelve patients had preoperative embolisation to reduce blood loss. An average of 8.4 units of blood (range 0 to 40 units) were required during operation.

Twenty-seven patients had postoperative adjuvant therapy. Resection was followed by external radiotherapy or radioiodine therapy in 15. Six had postoperative chemotherapy according to the nature of the tumour, and 6 received combined chemo- and radiotherapy.

Fig. 5. Overall Kaplan-Meier survival curves of patients with pelvic metastases, and patients with renal and thyroid carcinoma

Four patients, who had an endoprosthesis inserted, were immobilised in a spica cast for an average of 5.5 weeks (range 4 to 6 weeks) to avoid dislocation of the hip.

Statistical evaluation

The median survival time was calculated by the Kaplan-Meier method [15] using BMDP 1L software [3].

Follow-up

The patients were followed clinically and radiologically every 3 months during the first year after operation, and thereafter every 6 months.

Results

In the 6 patients who had an extraleisional resection, this was marginal in 3 and wide in 3; the sites of the tumour were: 4, P3; 1, P1; 1, P1 + P2.

The median survival time of the 43 patients was 14 months (range 2 to 127 months). By November 1993, 33 were dead and 10 were alive, 4 with no evidence of disease and 6 with known tumour (Table 3). The median observation time of these 10 patients was 59 months (range 12 to 127 months). Twenty-three of the whole group had metastases from renal or thyroid carcinoma (Table 3 and Fig. 5).

The median survival time of the 6 treated by extraleisional resection was 16 months (2 to 127) and of those with intralesional resections was 13 months (3 to 81); 7 were alive at follow up (range 12 to 81 months). Figure 6 shows their respective survival curves.

The quality of life and activity was improved by operation. The Karnofsky score increased from an average of 55% (range 20% to 90%) before operation to 74% (range 50% to 90%) at 3 months

Fig. 6. Kaplan-Meier survival curves with intra- and extralesional resection of metastases

($p = 0.0001$) and to 77% (range 40% to 100%) 6 months after operation ($p = 0.0001$).

The score of those treated by extralesional resection improved from 55% before operation to 84% at 3 months and 84% at 6 months after operation. Those who had an intralesional resection had a score of 55% before operation, of 73% at 3 months and 76% 6 months after operation.

Seven patients with an intralesional resection had a local recurrence (19%), whereas 6 with an extralesional resection had no local recurrence. The treatment of local recurrence was by radiotherapy 5, chemotherapy 2, and repeated resection 4.

Twelve patients had complications with pelvic vein thrombosis in 3, dislocation of the endoprosthesis in 3, deep infection in 2, superficial infection in 2, and fracture of the pelvis and with loosening of a wire after osteosynthesis in one. The incidence of complications was higher after extralesional compared with intralesional resection. Three out of 6 of the former had complications with deep infection in 1, deep vein thrombosis in 1 and fracture of the pelvic ring in 1; they needed an average of 14 units of blood (range 5 to 40 units). There were 9 complications out of 37 extralesional resections and they needed an average of 6.8 units (range 0 to 18 units).

Three postoperative dislocations occurred in the 9 patients who had endoprostheses inserted because of the extensive resection of soft tissue, and since 1989 we have used a spica cast for 4 to 6 weeks after operation.

Discussion

The surgical treatment of pelvic metastases aims to maintain or improve activity and mobility [7, 8, 27]. In most cases resection of pelvic tumours is

technically more difficult than those of the lower limb [9, 13, 28, 19, 23, 24, 25, 26] and it is reported that extralesional resection of primary tumours, which is more important than in cases with metastases, is achieved in two-thirds of cases only [6, 10, 23]. We achieved the intended extralesional resection in 6 of our 10 cases.

Local recurrence rates are as high as 85% for limb-saving resections of the pelvis [10, 20]. Our patients with a median survival of 14 months developed local recurrences in 16%; these are to be expected mainly in pelvic intralesional resections [10], and all the recurrences in our series were in this group.

Tumour resections in the pelvis have a high rate of complications of between 31% and 65% after limb-saving hemipelvectomy, mainly performed for primary tumours [6, 12, 21, 29]. Our complication rate was highest in extralesional resections.

In spite of these problems, the surgical treatment of pelvic metastases improved the quality of life and mobility of our patients. The aim should be rapid restoration of function by a careful surgical procedure. Most resections are intralesional which have a good functional outcome, a lower complication rate, a reduced need for blood and a difference in median survival time of 13 months compared to 16 months after extralesional resection. Nevertheless, wider resection has fewer recurrences and better survival, and so should be attempted in solitary metastases with a good prognosis which are manageable surgically.

Metastases which respond poorly to conservative treatment should be treated surgically. The largest number of our cases were suffering from renal, followed by thyroid, carcinoma; removal of the metastasis is indicated in the latter to improve the effectiveness of radio-iodine therapy. Localisation is another determining factor for choosing surgery [1]. In the periacetabular region (P2) operation is indicated regardless of the histological type because of the difficulty in walking and the danger of intra-articular fractures [7, 11, 27]; we prefer to implant a cemented hip endoprosthesis. P2 metastases spreading into the ileum (P1) or pubic and ischial (P3) areas require more extensive surgery. We implanted a saddle prosthesis in 4 patients and one pelvic endoprosthesis. Additional methods, such as resection without implants and iliofemoral arthrodesis, have been described [1, 2, 4, 6, 12, 28, 29].

Metastases in the pubic and ischial (P3) areas were treated by resection without stabilisation and the short survival time allows good functional results without interfering with the sacroiliac joint

[1]. We were able to carry out an extralesional resection in 4 out of 7 metastases in this area.

All the sacral (P4) metastases were resected intralesionally with or without stabilisation. We chose this type of procedure because an extralesional resection would have involved the sacral nerves. Metastases in the iliac wing (P1) are easily accessible [1, 10] and we performed extralesional resection on the 2 cases in our series.

The goals of surgical treatment are best achieved by intralesional resection which has a lower incidence of complications, although there is a higher recurrence rate. Extralesional resection should be considered for solitary metastases with a good prognosis.

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