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## Palliative Surgery of Metastatic Bone Disease: a Review of 83 Cases

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**Of a total of 83 patients with metastatic bone disease, surgery was performed in 17 cases at the prefracture stage, in 54 cases after complete fracture and in 10 cases to decompress the spinal cord. Positive short-term results were obtained in 75% of cases. 7 patients presented mild complications. In 2 cases, the patients had to be reoperated. 55% of the patients were still alive after 6 months, 31% after 12 months and 10% after 2 years.**

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### INTRODUCTION

THANKS TO the advances in cancer therapy and supportive therapy, the survival of patients with metastatic carcinoma has increased and their quality of life has significantly improved in recent years [1–3]. In the 1960s survival after onset of bone metastases was estimated at less than a year, but many patients today enjoy a life expectancy of over 2 years even after pathological fracture [4–7].

Bone metastases are very frequently observed in patients with carcinoma of the breast, lung, prostate gland and other sites, and although a grave occurrence, they are no longer considered to mark the beginning of the terminal phase of the illness. Pain, pathological fracture, neurological deficit and forced immobility, however, all significantly reduce patients' quality of life [8, 9].

When used in conjunction with other palliative therapies, "palliative surgery" of bone metastases is beginning to play an important role in providing both physical and psychological relief to these patients [10, 11].

The present study reports on more than 10 years of surgical treatment of bone metastases at a large general hospital.

### MATERIALS AND METHODS

A retrospective study was carried out on 349 patients with skeletal metastases hospitalised at the Divisione II di Ortopedia

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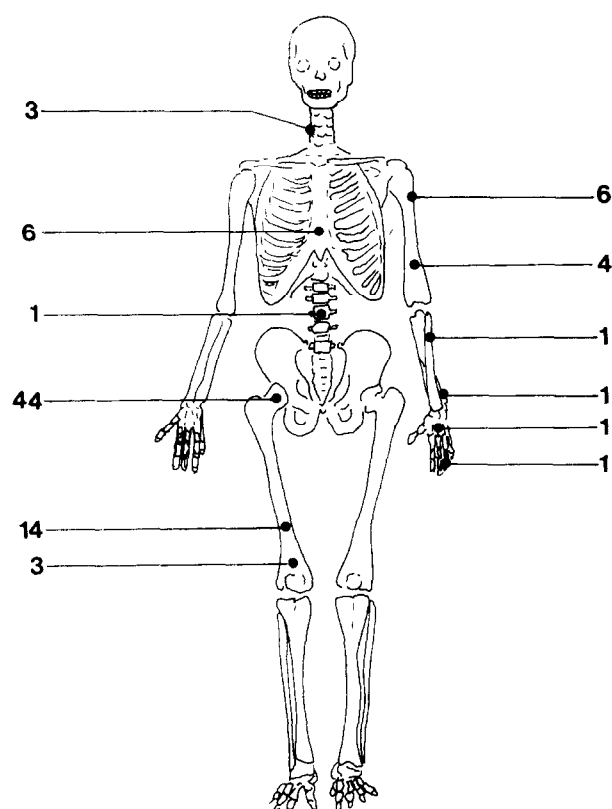


Fig. 1. Sites of bone metastases.

e Traumatologia dell'Ospedale Niguarda Ca' Granda, Milan, from January 1977 to December 1989. 83 of these patients (24%) underwent one or more surgical treatments, totalling 87 operations on skeletal metastases; their mean age was 68 (range 36–89 years), 41 were male (49%) and 42 female (51%). The site of origin was identified in 54 cases (77%), leaving 19 cases (23%) unidentified (Table 1). The sites of the bone metastases are shown in Fig. 1.

The decision to operate was based on the patient's general condition and the specific characteristics of the bone lesion, also taking into account expected duration and quality of life (with or without a successful operation). The final decision was taken by a team of orthopaedists, oncologists, radiotherapists and neurosurgeons (depending on the case). The surgical techniques used and the skeletal areas involved are shown in Table 2.

Table 1. Sites of tumour origin in 83 patients treated by surgery

Site	No. of cases (%)
Breast	29 (34.9)
Lung	15 (18.1)
Prostate gland	8 (9.6)
Kidney	7 (8.4)
Colon	2 (2.4)
Uterus	1 (1.2)
Bladder	1 (1.2)
Oesophagus	1 (1.2)
Unknown	19 (22.9)
Total	83 (100.0)

Table 2. Surgical techniques employed

Skeletal segment	Pin plate	Intra-medullary	Plate	Prosthesis	L + S	Other
Femur	23	13	6	21	—	—
Humerus	—	1	9	—	—	—
Forearm and hand	—	1	—	—	—	3
Rachis	—	—	—	—	10	—
Total	23	15	15	21	10	3

L + S = laminectomy plus spondylodesis.

The surgical procedures employed in cases of metastases to long bones were prosthetic replacement and fracture fixation.

Femoral metastases were encountered most often and were treated according to their precise location and size. Transcervical lesions (21 cases) were treated by prosthetic replacement or by monocentric or bicentric hip hemiarthroplasty, because of the impossibility of consolidation. After curettage of metastatic tissue, osteosynthesis was achieved in cases of fracture and osteolysis of the trochanter (23 cases) by using McLaughlin's pin and plate technique, supplemented in most cases by acrylic cement. In diaphyseal supracondylar lesions of the femur (17 cases) a Kuntscher pin was used for internal fixation, or diaphyseal or condylar plates were employed (as seemed best in the operating surgeon's opinion), with the addition of acrylic cement as necessary. Metastases to the humerus (10 cases) were also dealt with by this technique.

In 19 cases of skeletal metastases to the long bones intervention was possible at the prefracture stage, while in 54 cases the operation was carried out after fracture had occurred. In the remaining 10 cases surgery was performed to relieve spinal cord compression or to stabilise spondylodesis.

In 52 cases (63%) surgery was associated with local postoperative radiotherapy. In 40 cases (48%) subsequent antitlastic treatment, chemotherapy and/or hormone therapy were administered.

Surgical outcome was evaluated using the criteria suggested by Sim [12] and Harrington [8, 9], being judged "good", "fair" or "bad" according to whether or not the synthesis was solid, pain disappeared and function and ambulation were regained.

## RESULTS

Table 3 shows an evaluation of the short-term results. None of the patients died in surgery. 5 patients died within 15 days of the operation from thromboembolism or heart failure.

42 patients were judged good (48%), 25 fair (29%) and 20 bad (23%), including the 5 deaths mentioned above.

Table 3. Evaluation of postoperative results

Skeletal segment	Results		
	Good	Fair	Bad
Upper limb	5	8	1
Lower limb	33	13	17
Rachis	4	4	2
Total	42 (48%)	25 (29%)	20 (23%)

7 patients presented mild complications: 3 had peripheral nerve paresis, 3 deep thrombophlebitis of the lower limb and 1 a local surgical infection. In 2 cases the intervention failed and the patients had to be reoperated.

Mean patient survival time was 11.4 months; as expected this varied greatly with the site of tumour origin: 16.4 months for breast carcinoma, 21 months for prostatic carcinoma and 12 months for renal carcinoma. Patients with tumours of unknown site of origin had a mean survival of 7.6 months while those with lung tumour survived 3.5 months.

Figure 2 shows the survival curve for the whole group (excluding the 5 postoperative deaths), compared to the survival curve for tumours of the most frequent sites of origin (breast and lung) and the curve for tumours of unknown site of origin.

### DISCUSSION

The treatment of bone metastases is usually a palliative measure and the best results are obtained by integrating it with other therapies. Chemotherapy and/or hormone therapy is particularly indicated for breast and prostatic tumours [2]. High energy radiotherapy provides partial or total control of the pain in 70–90% of cases [3].

In many instances orthopaedic surgery is a remedial or preventive measure. Surgery for bone stabilisation is often indispensable for setting pathological fracture or preventing it in high fracture risk metastases [14], and is most useful in patients with a fairly long life expectancy (most commonly in cases of breast and prostatic tumours).

Surgery is particularly indicated for limb metastases where it is important to restore the continuity and solidity of the bone without causing immobilisation in bed. Fracture healing is slowed by the proliferation of tumour tissue causing loss of osseous substance [15].

Conventional osteosynthesis does not always achieve secure bone solidity quickly. "Massive" osteosynthesis with, for example, acrylic cement to compensate for loss of osseous substance and the substitution of the injured bone epiphysis by prosthetic components is therefore a practical alternative.

In metastases to vertebral radiotherapy often provides good pain relief and local control of the tumour. The appearance of signs of medullary compression calls for urgent surgical decompression however, possibly associated with stabilisation of the affected vertebra [16, 17]. The decision to operate must be taken by a team of specialists. In the case of a single bone metastases amenable to surgical treatment, the decision is quite easy, but for multiple metastases it is important to identify which ones are "strategic" in order to achieve the most effective treatment.

Many authors agree [1, 5, 6, 9, 18] that in view of the grave nature of these pathologies and particularly since complications are usually slight, surgery for short-term benefit can be worthwhile.

Our study showed "good" or "fair" outcomes to surgery in about 75% of cases, although this result has to be set against considerable early mortality. Table 4 provides a summary of

literature data on survival after palliative surgery. Consideration of average survival times for each tumour type is useful not only for deciding whether or not to operate but also the most appropriate surgery/method to adopt.

A considerable proportion of our patients suffered from lung tumours (18%) or tumours of unidentified site of origin (23%). This could account for their lower mean survival rate compared to other case studies [6, 9] that included a larger proportion of breast tumour patients whose prognosis is more favourable.

Our experience does not therefore afford optimistic conclusions regarding the survival of patients with bone metastases. We feel, however, that surgery is justified in cases where the metastatic localisation and general condition of the patient indicated a successful outcome to surgery and where this might prolong life expectancy and would certainly be expected to improve the quality of life remaining to the patient.

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