

## Lymphatic Metastases of Bone Tumors

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Lymphology 3 (1971), 109-116

### *Abstract*

Lymphography was performed in 67 consecutive cases of bone tumors. The diagnosis of the type of bone tumor was confirmed by biopsy in all cases. Biopsy of the lymphnodes was performed 14 times. Metastases in lymphnodes were found in 24 cases (43,6%). Lymphatic metastases occurred mostly in osteogenic sarcoma, reticulum cell sarcoma and metastases of carcinoma into bones. There was a significantly shorter survival of patients with lymphnode metastases. It is argued, that in malignant bone tumors treatment of the regional lymphnodes should be considered at the same time as the tumor itself.

### *Introduction*

It has only been in the last 6 years, that papers on lymphogenous metastases of bone tumors began to appear. These papers were published mostly by pathologists, some by general and orthopaedic surgeons. *Mc Kenna* et al. (11) found on autopsies of 500 bone tumors in 32% of cases metastases in the lymphnodes. *Aegerter*, *Kirkpatrick* (2), *Abbes* (1) and recently *Baumann* (3) stress the significance of lymphogenic metastases of bone tumors, which in their opinion is equally important as bloodborne metastases. Till now there was no systematic lymphographic proof of lymphogenous metastases from bone tumors.

The aim of the present article is to examine malignant bone tumors by lymphography and to study the value of this procedure in the diagnosis and prognosis of the disease.

### *Material and Methods*

Lymphography was performed in 67 consecutive cases of bone tumors suspected of malignancy. In all cases the diagnosis was confirmed by biopsy taken from the tumor and examined by 3 pathologists. All cases were followed up by regular control examinations. In 14 cases the lymphnodes were excised and examined.

All lymphographies were performed by *Kinmonth's* technique of direct lymphography. In 15 cases we used the s.c. 2 stage lymphography introduced by *Málek* and *Belán* (16): in the first stage filling with a water soluble contrast medium, in the second stage an oily contrast medium (see case No. 1, Fig. 2, 3). We used an average of 15 ml of Urographin or Uromiro and 7-10 ml of Lipiodol in the lower extremity and 5-7 ml in the upper extremity. In 30 cases an arteriography was also done; in 10 cases radioactive lymphography was performed prior to contrast lymphography.

### Results

Histological examination of the 67 cases of bone tumors, 55 cases proved to be malignant. We found lymphnode metastases in 24 cases out of the 55 malignant tumors (43,6% – see Table 1). Lymphatic metastases were most frequently in osteogenic sarcoma, reticulum cell sarcoma and metastatic tumors. The survival of the patients with the more benign fibro- and chondrosarcomas was longer. In the Table 1 diagram we can also see that survival was significantly longer in patients without lymphnodes metastases.

Table 1

	Lymphography	
	positive	negative
Osteogenic sarcoma	7	7
Fibrosarcoma	5	10
Chondrosarcoma	3	6
Reticulum cell sarcoma	3	1
Ewings Sarcoma	1	4
Giant-cell tumours		3
Metastatic tumours	5	3
Others, benign tumours		9
Survival (months)	6,3	17

Our best correlation was when arteriography and lymphography were combined. With positive arteriography and negative lymphography the prognosis was relatively good, but with positive arteriography and positive lymphography it was poor (see case No. 4, Fig. 11, 12 and 13).

Despite the limitation of isotoplymphography the combination of contrast and isotope lymphography proved to be useful. The results will be discussed in detail in another publication.

### Illustrative Case Reports

*Case 1:* A 16-year-old boy with a fibrosarcoma of the tibia (Fig. 1). In the first phase of lymphography (Fig. 2) (with a water-soluble contrast medium-Urographin) and also in the second phase (with an oily contrast medium-Lipiodol UF – Fig. 3) we discovered a central defect in the lower inguinal lymph-node. Biopsy showed that this defect of the lymph node was a metastasis of the fibrosarcoma (Fig. 4). The patient died six months later with pulmonary metastases.

*Case 2:* A 56-year-old man, with the diagnosis of chondroosteosarcoma of the scapula. Patient's symptoms dated back three years. Lymphogram demonstrates the metastatic axillary lymphnodes (Fig. 5). After scapulectomy a recurrence required disarticulation of the upper extremity performed. On biopsy a Histologic examination of axillary nodes showed metastasis of osteochondrosarcoma (Fig. 6) (with osteoid formation).

*Case 3:* A 22-year-old woman, who was treated by her local physician for two years for rheumatism, was referred to us because of intractable pain and cachexia. The lymphogram shows a large metastasis in an iliac node (Fig. 7). We also see the destruction of the hip joint. On biopsy  $\frac{2}{3}$  of the lymph node were filled with the metastasis of reticulum cell sarcoma (Fig. 8). There was another metastasis in a lumbar lymph node. The patient died at home four months later.

*Case 4:* A 61-year-old patient was sent to our department with the diagnosis of osteoarthritis of the hip joint. Radiographs show destruction of the hip and a sharply outlined metastasis in a nearby iliacal lymph node (Fig. 9, biopsy Fig. 10). Shortly afterwards we found that the primary tumor was in the kidney.



Fig. 1



Fig. 2



Fig. 3

Fig. 1 Roentgenograph of Case 1, showing a fibrosarcoma of the upper end of the tibia in a sixteen year old boy.

Fig. 2 Lymphogram of Case 1, using a water soluble contrast medium. Note the central defect in the lower inguinal lymph node (arrow).

Fig. 3 Lymphogram of Case 1, using an oily contrast medium. Note the central defect in the lower inguinal lymph node (arrow).

*Case 5:* A 16-year-old girl, with a diagnosis of recurrent, Ewing's sarcoma of the femur, and a pathologic fracture. The arteriogram shows (Fig. 11) a highly vascular tumor with a local metastasis into the muscles of the thigh. The lymphogram (Fig. 12) demonstrates a large metastasis in the outer iliacal lymph node. Follow up films taken after amputation show progression in the size of the metastasis in the lymph node (Fig. 13). The patient died two months later with generalized metastases.

### Discussion

Most well-known monographs on bone tumors (6, 7, 8, 9, 12) acknowledge primarily only the bloodborne metastases. In the second edition of his monograph about bone tumors *Coley* (6) refers to bloodborne and lymphatic metastases of bone tumors as equally important; he doesn't though mention lymphography as an aid in diagnosis. *Budzilovich* et al. (5) revealed tumorous giant cells in the regional lymph nodes in cases of recidivant giant cell tumors. *Aegerter* and *Kirkpatrick* (2) in their outstanding book "Orthopaedic diseases" in the chapter about osteogenic sarcomas refer to lymphatic metastases as more important than bloodborne. They stress

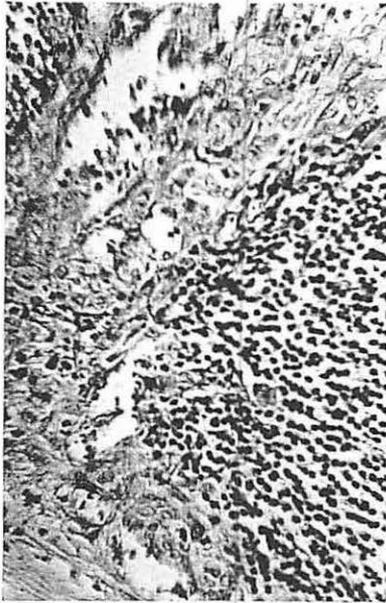


Fig. 4

Fig. 4 Biopsy of the lymph node (sec. fig. 2-3). Central defect caused by metastasis of fibrosarcoma in the center of the lymph node.

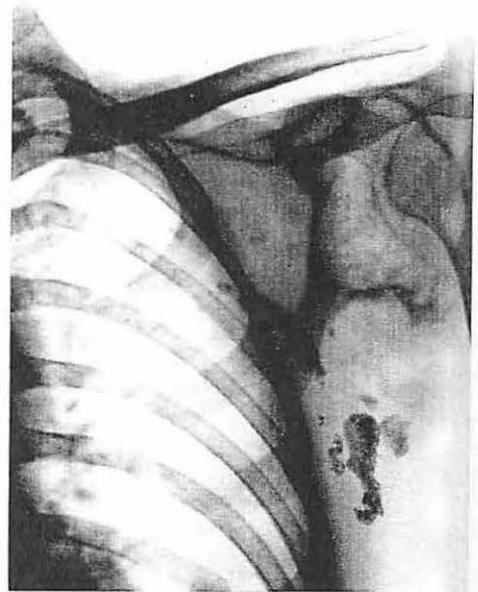


Fig. 5

Fig. 5 Metastatic involvement of axillary lymph nodes from Case 2.

the danger of lymphatic metastases mostly during operations, when in the surroundings of the tumor, multiple lymphatic channels are opened. *Abbes et al.* (1) repress this point. We started to perform lymphographies in bone tumors in 1961. Our findings, as presented in Table 1, are in contrast with the statements of most above named monographs about bone tumors. Our work is in full agreement with the publication of *Mc Kenna et al.* (11), who criticises the absence of radical lymphnode resection or irradiation after operations of bone tumors. They found at autopsies of 500 patients with bone tumors that 32% of the patients had lymphnode metastases. Osteogenic sarcoma was the tumor which most frequently had metastases. This finding is similar to our lymphographic observations. We did not have any false negative lymphograms. Early in this series we had 2 cases of unsatisfactory filling of lymphnodes with contrast material, resulting in 2 false positive interpretations (both in the lower inguinal lymphnodes, where there are so many unspecific inflammatory and degenerative changes!). Our data suggest that the survival of patients with osteogenic sarcomas with lymphatic metastases was according to Student's T-test significantly shorter, than the survival of patients with chondrosarcomas. The degree of invasion with increased potential of breakthrough into lymphatic vessels and the expansion of the tumor were not decisive factors in regional lymphnode metastases as *Baumann* already pointed out in 1969 (3).

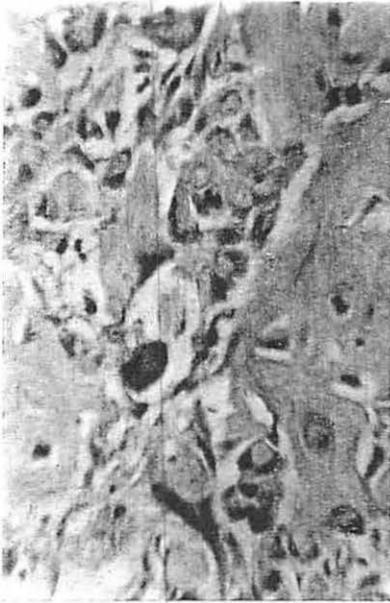


Fig. 6

Fig. 6 Biopsy of Case 2 - metastasis of osteochondrosarcoma with osteoid formation in the lymph node.



Fig. 7

Fig. 7 Lymphogram of Case 3. Large metastasis in an external iliac lymph node (arrow).

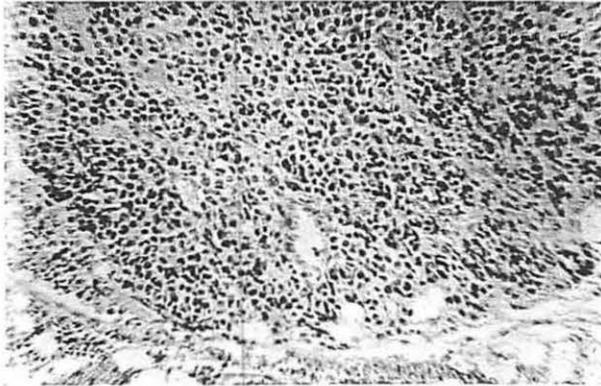


Fig. 8

Fig. 8 Biopsy of Case 3 - metastasis of reticulum cell sarcoma in the lymph node.

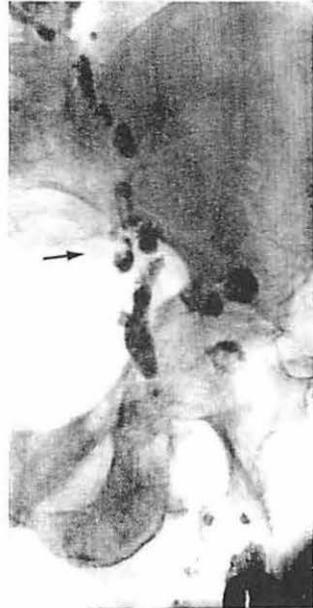


Fig. 9

Fig. 9 Lymphogram of case 4 - note the destroyed left hip joint and a sharply outlined metastasis in a nearby iliac lymph node (arrow).

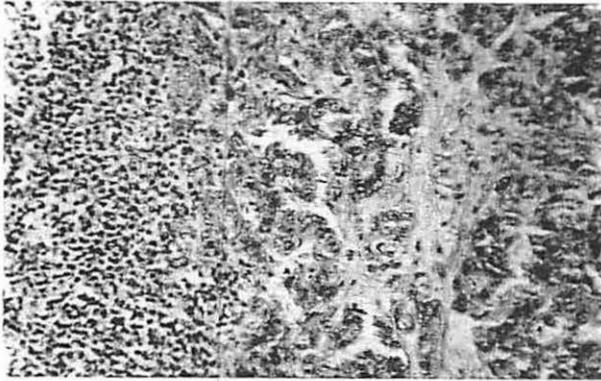


Fig. 10 Biopsy of Case 4 – metastasis of carcinoma into the lymph node.

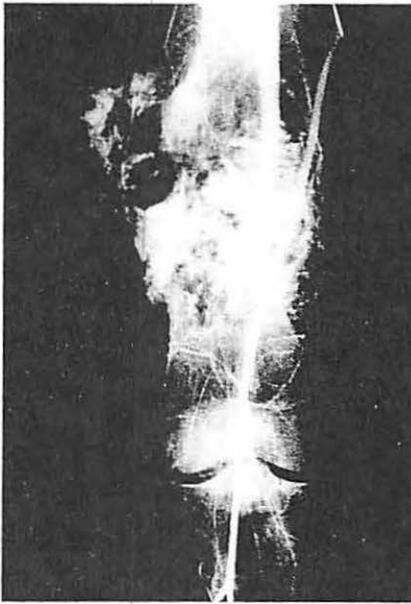


Fig. 11

Fig. 11 Arteriogram of Case 4, showing the highly contrast filled malignant tumour of the lower end of the femur proved pathologically to be Ewing's sarcoma.



Fig. 12

Fig. 12 Metastasis in the left external iliac lymph node as revealed by lymphography of Case 5.

### *Conclusion*

In contrast to other investigators, which acknowledge metastases of bone tumors to be mostly haematogenous, we found regional lymph node metastases in 24 cases of 67 patients with bone tumors (43,60% out of the 55 malignant tumors). Lymphogenous metastases were present mostly in osteogenic sarcoma, reticulum cell sarcoma and meta-

stases of carcinoma into bones. The survival of patients with lymph node metastases was significantly shorter. We had best results with the combination of arteriography and lymphography and combining contrast and isotope lymphography. When treatment is contemplated, one should expect regional lymphnode involvement, and consequently surgery or irradiation should be planned in such a way to include these regions.



Fig. 13 Further enlargement of the metastasis in the lymph node of Case 5.

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