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FINE NEEDLE ASPIRATION BIOPSY OF BONE LESIONS: CLINICAL VALUE

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The clinical value of cytological aspiration biopsy in 85 patients with lytic bone lesions was studied. In 71 cases cytology was of diagnostic value, but in 14 cases it was inconclusive or misleading. The method is considered a simple primary diagnostic procedure especially in lytic bone lesions of uncertain nature.

Key words: metastases; cytodiagnosis; aspiration biopsy; fine needle aspiration

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Fine needle aspiration biopsy is well known as a safe diagnostic procedure and has been used in investigations of various organs for many years. However, aspiration biopsy of bone lesions has not been generally accepted, except in a few centres, where great experience has been gained (Hajdu & Melamed 1971, Ottolenghi 1955, Schajowicz 1955, Schajowicz & Derqui 1968, Snyder & Coley 1954 and Stormby & Åkerman 1973). For the past two years this method has been used in our institution and the purpose of this preliminary study has been to evaluate its significance in clinical work.

MATERIAL AND METHODS

Eighty-five patients, the majority with lytic bone lesions seen on X-ray, were referred for fine needle aspiration biopsy from various clinical departments (Municipal Hospital and Orthopaedic Hospital, Aarhus).

All punctures were carried out in the X-ray Department under fluoroscopic monitoring. After local anaesthesia in adults and as a rule universal anaesthesia in infants, a needle with an outer diameter of 0.9 mm equipped with an obturator was inserted into the lesion and, after withdrawal of the obturator, aspiration biopsy was performed through this needle by means of a finer needle (diameter 0.6 mm). Several aspirations were carried out and the material obtained was then placed on one or several slides and smears were made. These were air dried and stained according to the May-Grünwald-Giemsa method.

Where necessary, material collected was set apart for bacteriological examination.

All slides were revised and compared with the primary cytological reports. All clinical notes, autopsy reports and available histological material were reviewed.

The cytological diagnoses were verified in the following manner:

1. Tissue sections from the same lesion.
2. In patients with a known primary tumour, tumour cells in the slides were generally accepted as representing metastases from that tumour.
3. In patients with an unknown primary tumour or apparently successfully treated primary tumour the clinical course including

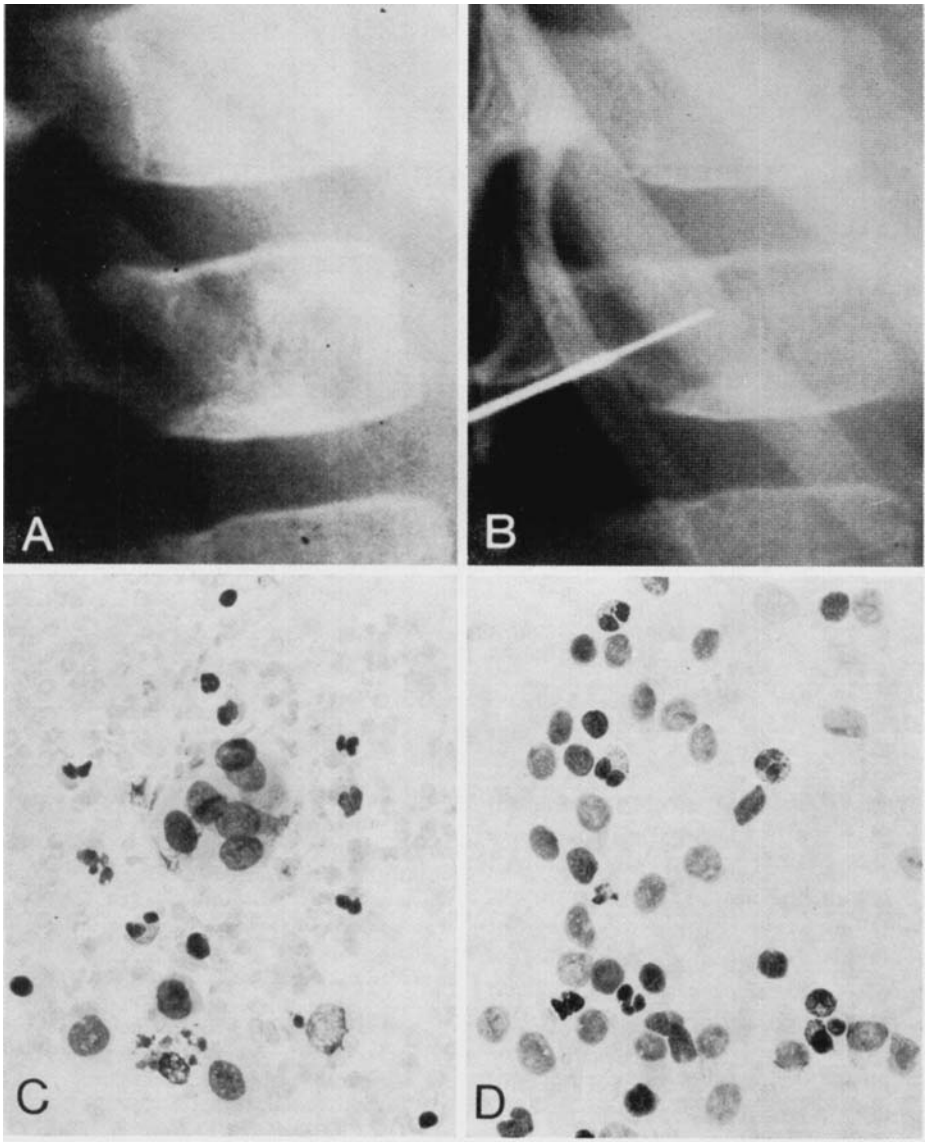

Figure 1. A 5-year-old girl previously treated for an angiosarcoma on the back; now complaining of lower back pain. A. Lytic and expansile lesion in the first lumbar segment also involving the pedicles. B. Aspiration biopsy of the lesion. C. Cells from the lesion were erroneously diagnosed as sarcoma cells, but later found to be cells from histiocytosis X. D. Smear from a typical case of histiocytosis X. The cells are quite similar to those illustrated in C. One year later spontaneous restoration of the first lumbar segment.

X-ray findings, laboratory tests and clinical examinations was used as verification.

4. Finally there were a few cases with no follow-up.

The clinical significance was evaluated according to the following four groups:

1. Decisive: leading directly to further diagnostic or therapeutic procedures.
2. Supportive: supporting but not changing the clinical diagnosis.
3. Inconclusive: no material or no malignant cells in the slides when malignancy was strongly suspected.

4. Misleading: true false positive or negative reports.

RESULTS

The anatomical sites of the punctured bone lesions are given in Table 1. Thirty-seven lesions were located in the spine or pelvis including eight in the dorsal spine.

Table 1. Punctured lesions.

Column	cervical	1
	thoracic	8
	lumbar	11
Pelvis		17
Chest		13
Extremities		35

Primary cytological reports and the results of the revision of slides, compared with the clinical diagnoses, are given in Table 2. Miscellaneous comprises spondylitis, arthritis and other cases. The specimens often contained only a few osteoclasts or osteoblasts or some leucocytes and other cells from the reticuloendothelial system (Figure 2). The verification of the cytological diagnoses is given in Table 3. Histological verification was obtained at autopsy in 8 cases, by surgical biopsy in 7 cases and by drill biopsy in 13 cases.

In 24 cases of metastases the primary malignant tumour was verified during

Table 2. The primary and revised cytological reports are compared with primary clinical diagnoses in patients subjected to aspiration biopsy. Figures in brackets indicate false positive and negative reports.

Diagnosis 85 patients Lesion			Primary cytological reports		Revision	
			Benign	Malignant	Benign	Malignant
Primary	benign	13	9	(4)	13	0
	malignant	12	(1)	11	(1)	11
Metastases		43	(9)	34	(8)	35
Miscellaneous		17	17		17	

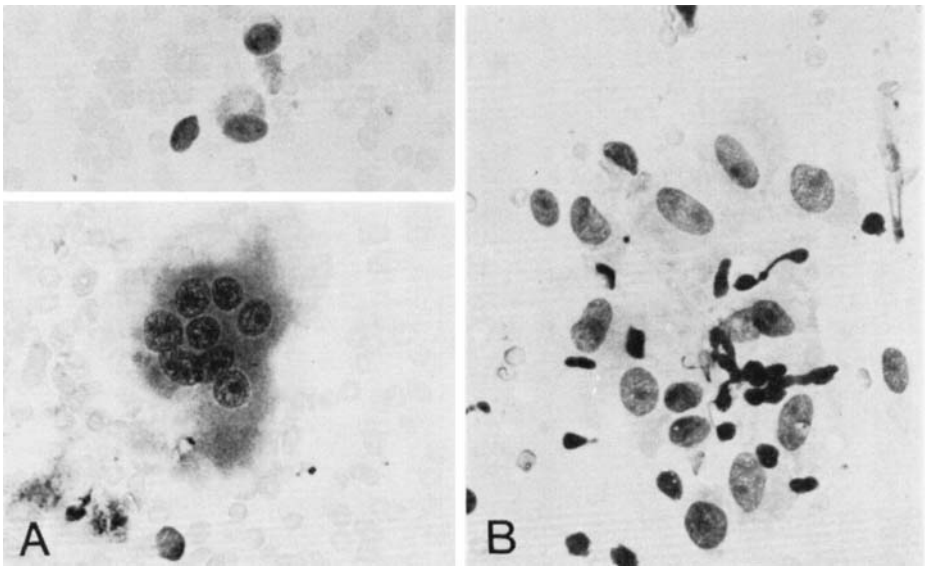

Figure 2. A. Osteoblasts (top) and osteoclasts (bottom) were common cytological findings. B. Benign cells (epitheloid) from a case of sarcoidosis. Similar cells were seen in other cases of arthritis.

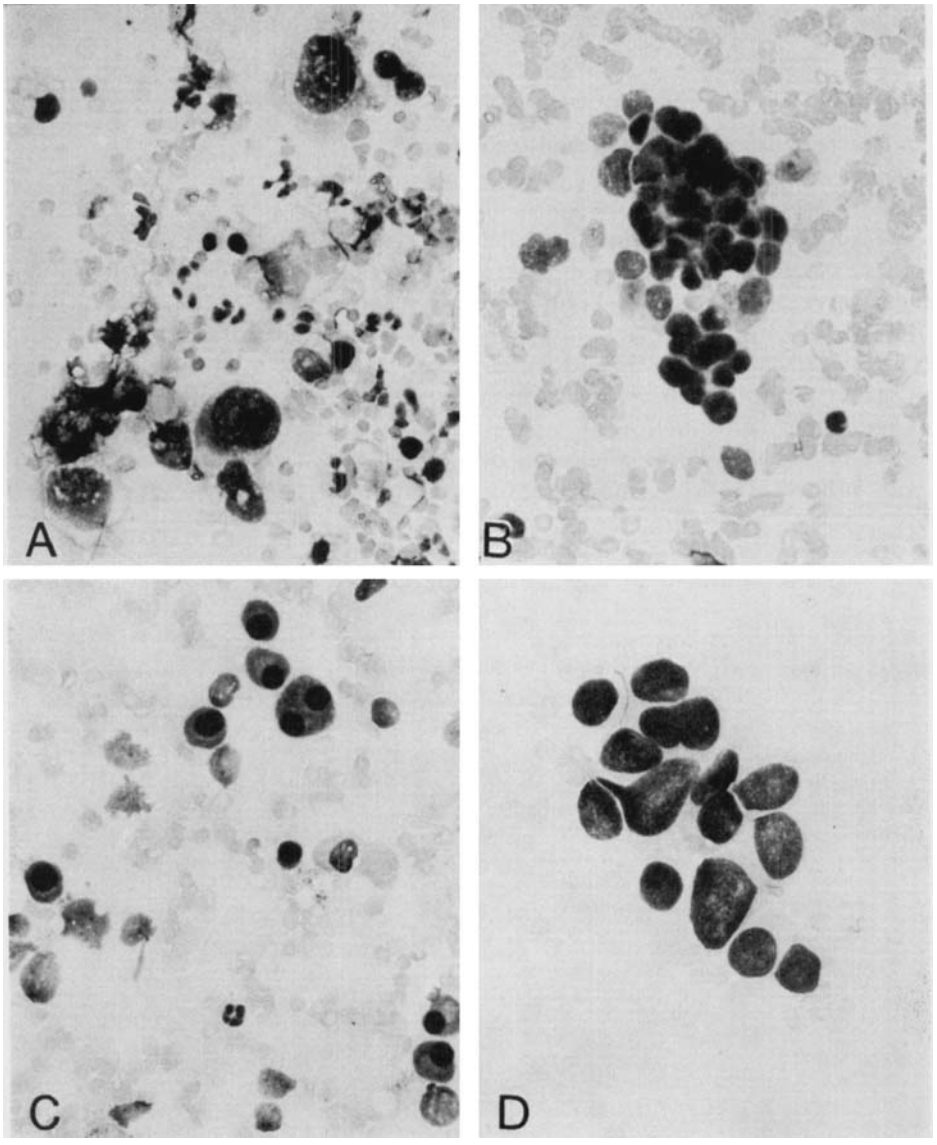

Figure 3. A. Smear from a case of osteogenic sarcoma. Isolated highly malignant cells with huge nucleoli. B. Smear from a case of Ewing's sarcoma. Cluster of small highly malignant cells with scanty cytoplasma. C. A typical case of plasma cell myeloma. D. Carcinoma cells from metastasing mammary carcinoma.

Table 3. Verification.

Histology	28
Known primary tumour	24
Clinical course	28
No follow-up	5

Table 4. Clinical value.

Decisive	19
Supportive	52
Inconclusive	7
Misleading	7

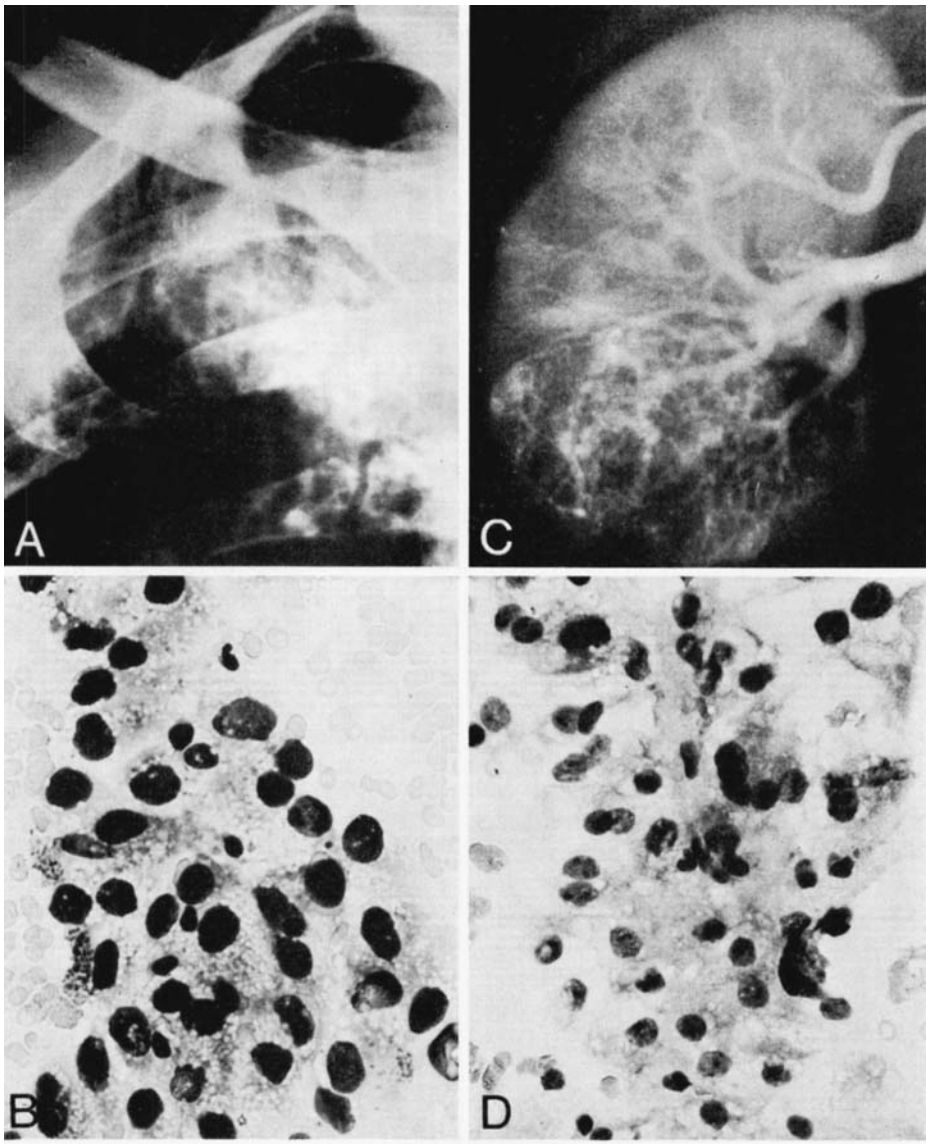

Figure 4. 70-year-old man with pain in the right first rib. A. X-ray showed expansile osteolytic lesion in the right first rib suggesting chondroma or chondrosarcoma. B. Aspiration biopsy from the lesion in the first rib revealed hypernephroma cells. C. Angiography 1 week later showed malignant tumour in the right kidney. D. Aspiration from the renal lesion showed hypernephroma cells. Operation confirmed the diagnosis.

hospitalization. The 28 cases, where the clinical course was used, included patients with both malignant and benign diseases. Finally in five cases follow-up was not possible.

The clinical value of the primary cytological reports is given in Table 4.

Decisive: These included patients with myeloma and cases of metastases where the cytological report led directly to the

primary tumour (Figures 3, 4). Cases where treatment was based on the cytological report only were also included. Finally, aspirations from the spine where bacterial cultures were positive.

Supportive: These included cases with a known primary tumour with some lesions strongly suggestive of metastases, with carcinoma cells in the aspirates. The majority of the miscellaneous cases were also included in this group.

Inconclusive: These comprised specimens with insufficient material to support a diagnosis.

Misleading: There were four false positive and one false negative reports from primary tumours and two false negative reports from metastases.

No severe complications occurred; however, one patient developed pneumothorax a few hours after puncture of the dorsal spine.

DISCUSSION

The advantages and disadvantages of fine needle aspiration biopsy have been discussed in many papers and will not be discussed further. However, it must be emphasized that by using this method with a larger needle equipped with an obturator we have minimized the chances of missing the target. This justifies the consideration of even scanty material as diagnostic.

The dorsal spine has previously been regarded as too risky a target for puncture (Ottolenghi 1955, Sneppen et al. 1974). When our single complication of pneumothorax occurred, it was after aspiration biopsy from the seventh thoracic vertebral body in a patient with severe kyphosis following TB-spondylitis.

By revision of the primary cytological reports (Table 2) we were able to identify four false positive results in primary tumours all comprising histiocytosis X. Two were very cellular specimens and two contained rather scanty but sufficient material to exclude a primary malignant report (Figure 1). The one false negative report could not be changed by revision and the scanty material in this specimen should have indicated repuncture or surgical biopsy. However, in most cases it was possible to differentiate between sarcoma and carcinoma (Figure 3). Furthermore in some cases it was possible to classify the carcinomas (Figure 4). By revision of slides from lesions suspected of being metastases, malignant cells were found in 35 cases, i.e. 80 per cent. This is in accordance with the findings of Stormby & Åkerman (1973). In the cases where no tumour cells were found probably two were false negative. This finding stresses the importance of repuncture also in cases suspected of having metastases where cytology is inconclusive.

CONCLUSION

The most valuable clinical information was gained from the lesions suspected of being metastases. This is in contrast to aspiration biopsy of primary tumours where both false positive and negative reports occurred. However fine needle aspiration biopsy is a simple method for a primary diagnostic approach especially in metastatic lesions.

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