Core needle biopsy in the diagnosis of bone lesions

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Core needle biopsy (CNB) has been recognized and used as a reliable method in the diagnosis of bone lesions. The use of needle aspiration smears was recommended by Coley et al. (1931) and Stewart et al. (1933) at the Sloan-Kettering Memorial Institute in New York. Ellis et al. (1947) in the United States and 1948, Valls, Ottolenghi and Schajowicz et al. in Argentina, reported the use of paraffin-embedded material for the histological study of bone lesions.

Despite these articles, very few institutions use CNB for diagnosis in patients with bone lesions. Ayala et al. reported that CNB and fine-needle aspiration (FNA), had not gained sufficient popularity among the bone and soft-tissue tumor specialists in the United States to be used on a routine basis and “this is in contrast to European and Argentinian specialists, who regularly use these procedures”.

In 1976, Schajowicz and Hokama reported the results of 7,165 puncture biopsies during a 33-year period with about 73% positive results. In 1981, Schajowicz described more than 8,000 CNB, including approximately 2,200 vertebral punctures.

Since 1970, CNB has been used at the M.D. Anderson Cancer Center for the diagnosis and follow-up of bone lesions. In 1995, these workers reported their experience of over more than 800 CNB and FNAs performed from 1976 to 1992 on patients with bone and soft-tissue lesions.

The value of core needle biopsy (CNB) in the diagnosis bone lesions has been widely discussed. In contrast to open biopsies that require a surgical excision to remove tissue for diagnosis, CNB do not and are referred to as closed biopsy procedures. One of the main objections to the technique has been the degree of confidence that can be inspired by a diagnosis based on relatively small particles of tissue. In skilled hands, needle biopsy has a definite use, particularly in cases where the site of the lesion (such as the vertebra) or the treatment to be adopted makes open biopsy difficult or undesirable.

The application of CNB to a patient’s bone lesion is a multidisciplinary approach that involves a team of medical specialist working together to evaluate and manage the patient. This team includes an orthopedic surgeon, a radiologist and a pathologist. Before performing a CNB procedure, the medical team makes a clinical and radiographic evaluation, determines the stage of the disease and explains the procedure to the patient. The biopsy site was determined in accordance with the planned subsequent resection surgery. Because limb saving surgery is the local treatment of choice in diverse malignant bone tumors, the biopsy site must be carefully thought about and the needle track should always be removed ‘en blod’ in the surgical procedure.

Several different types of needle are used in a needle biopsy procedure. Needles with serrated ends produce fragmentation of bone dragging along the bone dust, which results in unsatisfactory specimens. In our experience, we prefer a 2-mm needle or a Jamshidi needle.

Using fluoroscopic guidance, and more recently computerized tomography, it is possible to reach small lesions in the spine or iliac bone.
It is rarely difficult or impossible to extract sufficient material even with dense, sclerosing lesions which the needle cannot penetrate and it is often possible to extract the material after perforation with an electric or manual trephine.

We perform the combined cytologic study of the smears and the histological study of the paraffin-embedded material. We consider the smear to be a supplementary method of great value in studying the line details of cell structure, especially in conditions that involve the hematopoietic system. Moreover, it often permits differentiation of Ewing's sarcoma from osteomyelitis and eosinophilic granuloma. In many cases, however, a smear is not sufficient for accurate classification of either benign or malignant tumors or for differentiation between primary and metastatic malignant tumors. On the other hand, in some neoplastic growths, in Pagets disease, or in other lesions in which the fibrous connective tissue or bone-forming stroma predominates, smears have little or no useful cell content and consequently we do not take smears in these cases.

Moreover, with sufficient material obtained by percutaneous biopsy in adequate conditions, bacteriological and other complementary studies at present utilized and necessary for a more accurate diagnosis (histochemistry, immunohistochemistry, electron microscopy, cytogenetic, DNA image analysis and flow cytometric analysis) can be performed.

Although open biopsy provides an adequate and representative sample of tissue for diagnosis, our experience as well as that of others, (M.D. Anderson Institute in Houston; Rizzoli Institute in Bologna), justifies the recommendation of CNB. It is technically simple, is a less extensive procedure with minimum trauma, involves no risk to the patient and makes it possible to extract material from a tumor at different depths and to reach sites that are otherwise only accessible by major surgery. It saves time and money and can usually be carried out in the outpatient department, except in young children, when general anesthesia is often necessary.

Although technically a simple method, CNB nevertheless does require experience on the part of the orthopedic surgeon, radiologist and pathologist. We have observed that results from medical centers where this procedure is used regularly are superior in terms of the quantity and value of the material submitted to the results from clinics where lack of opportunity deprives the orthopedic surgeon or the radiologist of the necessary experience. Likewise, the pathologist's competence increases the diagnostic accuracy of the method.

In our laboratory, we counted 3,394 CNB from 1986 to 1997 with a diagnosis accuracy of 83%.

Although we use both methods (CNB and FNA), we give priority to the histopathological interpretation of the embedded material, with which we have obtained more satisfactory results.

Though open biopsy provides an adequate and representative tissue sample for diagnosis, our experience, as well as that of others, justifies the recommendation of this method, which has become the method of choice in our laboratory.

References


Osteosarcoma of the bone

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Osteosarcoma can be defined simply as a malignant neoplasm in which the tumor cells can be shown to produce a matrix, either osteoid or bone. Experience over the last 20 years has shown that osteosarcoma of bone is not one clinicopathological entity but includes a variety of tumors with distinct clinical, roentgenographic and histological features. The most common type can be referred to as conventional osteosarcoma. This type occurs predominantly in children and adolescents, involving the metaphysis, and is almost always highly malignant in its histological appearance.

Although, by definition, all of these tumors produce an osteoid or bony matrix, the amount of matrix is quite variable. Approximately half of all conventional osteosarcomas produce abundant osteoid matrix and may be termed osteoblastic osteosarcoma. About a quarter of all osteosarcomas produce a prominent chondroid matrix and may be termed chondroblastic osteosarcoma. Chondroblastic osteosarcomas generally look more malignant than conventional chondrosarcomas. Bony matrix may be seen at the periphery of chondroid lobules or in the center. About a quarter of all osteosarcomas will have prominent spindle cell proliferation with only focal matrix production. These may be termed fibroblastic osteosarcoma. This distinction between osteoblastic, chondroblastic and fibroblastic osteosarcomas probably has no prognostic significance.

Most osteosarcomas apparently arise in normal bone. However, osteosarcomas may arise in a preexisting condition, such as Paget's disease. The incidence is probably less than one percent. Most osteosarcomas arising in Pagets disease are high-grade malignant tumors and are associated with a very poor prognosis.

It has been known for a long time that radiation therapy may be associated with the development of sarcoma after a latent period. This latent period is usually over 5 years but may be as delayed as 50 years. Most postradiation osteosarcomas are also high-grade malignant tumors. Postradiation sarcomas tend to involve surgically inaccessible sites such as the sternum, the pelvis and the spine. This