

HISTOPATHOLOGICAL STUDY OF PERCUTANEOUS CT GUIDED SPINAL BIOPSY

Abstract:

Introduction: Histopathologic examination of tissue obtained by percutaneous spine biopsy is the cornerstone of appropriate patient management for various lesions involving the spine.

Aim: A cross-sectional analysis of CT guided percutaneous biopsies performed over a period of 3 years. Material and methods: 43 patients who underwent percutaneous spinal biopsies from June 2021 to August 2024 were evaluated.

Result: There were 28 males and 15 females in the study. 23 of the cases were seen in thoracic area and 20 cases in the lumbosacral area. Histologic examination revealed tuberculosis in 18 cases, chronic nonspecific inflammation in 6 cases, metastasis in 6 cases, multiple myeloma in 5 cases, and acute suppurative lesion in 4 cases.

Conclusion: Histopathologic examination of tissue obtained by percutaneous spine biopsy is the cornerstone of appropriate patient management for various lesions involving the spine.

Keywords: Spinal lesion, percutaneous CT guided biopsy, histopathology.

Introduction:

Spinal lesions are most often secondary to some other disease process occurring elsewhere in the body.^{1,2} Spinal diseases can be of varying etiologies namely benign/ malignant tumors, pyogenic/granulomatous infection or pathological fractures.³ The most common lesions affecting the spine are metastatic deposits, infections & primary tumors.^{2,4} Following the lung & liver, spine is the 3rd most common site for metastatic disease.⁵ Proper management of these lesions depends on an accurate histopathological diagnosis which in turn affects the prognosis of the patient. CT guided percutaneous biopsy has been established as a safe and advantageous method for obtaining tissue samples from the spine. It is less invasive and more cost effective and avoids the morbidity associated with open biopsies.^{2,6} The method of percutaneous bone biopsy was first described in the early 1930s by Coley and Martin and used for spinal tumors by Robertson and Ball in 1935.^{7,8,9}

Aim and Objectives:

The study was undertaken to analyse the spectrum of histopathological findings in spinal lesions where tissue was obtained by CT guide percutaneous biopsy.

Materials and Method:

The study is a cross-sectional study conducted over a period of 4 years from January 2020 to December 2023 in the department of Pathology, JNIMS, Manipur, India. The study was approved by the Institutional Ethics Committee. All identifiers were removed and strict confidentiality was maintained for all data collected. Preliminary CT scan was obtained for all patients and the most appropriate approach to the lesion was chosen depending on the location and the area of the vertebrae affected. Prior consent was taken from all the patients. Procedure was performed under CT guidance by a trained spine surgeon or radiologist under local anaesthesia. Tissues obtained were sent in 10% formalin and processed in the histopathological section of Department of pathology, JNIMS, Manipur. The tissues sections were stained with Haematoxylin and Eosin and Z-N stain was done for cases with a clinical diagnosis or suspicion of tuberculosis.

Inclusion Criteria: All patients who presented to the spine clinic of JNIMS hospital, Imphal, Manipur with the evidence of spinal lesion on imaging studies and subsequently underwent CT guided percutaneous biopsy as part of their management. The lesions encountered were either osteolytic, sclerotic, with or without para spinal soft tissue masses.

Exclusion Criteria: All patients who did not undergo spinal biopsy as part of their disease management and who did not consent to be part of the study.

Results:

A total of 43 cases were studied & included 28 males and 15 females with a male to female ratio of 1.8:1 (table 1).

Table 1

Sex	No of cases
Male	28
Female	15

The anatomic distribution of the lesion was thoracic region, 23 cases and lumbosacral region, 20 cases (table 2).

Table 2

Location	No of cases
Thoracic	23
Lumbosacral	20

In our study the age of the patients ranged from 15-71 years and the mean age of presentation was 50 years. The most common histopathologic pattern observed was tuberculous lesion (18/43, 41.8%). Out of the 18 cases of tuberculosis, ZN stain for AFB was positive in 8 (44.4%) cases of biopsy and negative in 10 (55.6%) cases (figure 1a,1b). Considering the 10 AFB negative cases, diagnosis was made histologically based on presence of well-formed epithelioid cell granulomas, Langhans and foreign body type giant cells with or without caseous necrosis.

This was followed by chronic nonspecific inflammation (6/43, 13.9%) and metastatic deposits (6/43, 13.9%). Rest of the diagnoses included multiple myeloma (5/43, 11.6%), acute suppurative lesion (4/43, 9.3%), and 2 (4.6%) cases of Schwannoma. In 2 (4.6%) of the cases, the tissue was inadequate for a definitive diagnosis. The metastatic deposits were one each from epithelioid sarcoma, mantle cell lymphoma and undifferentiated sarcoma (figure 2) and 3 cases of adenocarcinoma (figure 3a,3b,3c). From the 4 acute suppurative lesions, culture revealed staphylococcus in 2 cases whereas it was sterile in 2 cases. Table 3 depicts the different histopathological pattern in spine biopsies.

Table 3

Sl. No.	Histologic type	No. of cases	Percentage
	Tuberculous type	18	42%
	Chronic non-specific inflammation	6	14%
	Metastatic deposits	6	14%
	Multiple myeloma	5	11%
	Acute suppurative lesion	4	9%
	Schwannoma	2	5%
	Inadequate	2	5%
	TOTAL	43	100%

Discussion:

CT guided percutaneous biopsy of spinal lesions is a safe and cost-effective procedure for study of these lesions. There are very few studies in India as well as other countries for comparison. Spinal disease poses a diagnostic challenge as different aetiologies may present with similar clinical and radiological findings. Patient management depends on an accurate histopathological diagnosis; hence a tissue biopsy is almost always necessary before initiating treatment.

In our study, tuberculous lesion(41.8%) was the most common pathology encountered, which is similar to the studies conducted by BR Dave et al¹⁰ (29.5%) , M.kang et al⁶ (37.9%) and Hima Bindu Gurram¹¹ (32/64, 50%). AFB was demonstrated in 8 /18 (44.4%) of the cases while R Kelly et al¹² observed positive ZN stain in 30 % of their subjects. Histologically the cases showed epithelioid granulomas, giant cells and caseous necrosis. Our study emphasises the value of indirect histopathological evidence of tuberculosis which was also the opinion of A Kelly et al¹².

Chronic nonspecific inflammation was noted in 6 patients (13.9 %). Such patients were offered prophylactic antitubercular therapy & followed up for a period of 6 months. BR Dave et al¹⁰ reported 8/71(11.26%) cases of chronic inflammation while M. Kang et al⁶ reported 1/77(1.29%) case of chronic non- specific inflammation.

We encountered (4/43) cases of acute suppurative inflammation with positive culture in 2 cases (staphylococcus species) while M. Kang et al⁶ found (2/77, 2.59%) cases of acute suppurative inflammation. All of the cases demonstrated one or more neutrophil per high power field on an average on histology.

We also reported (3/43, 6.97%) cases of Multiple myeloma. Microscopy revealed marrow replacement by neoplastic plasma cells associated with area of fibrosis. On IHC plasma cells were positive for CD138 and CD58. A. Kelly et al¹² also reported (4/55, 7.27%) cases of multiple myeloma. BR Dave et al¹⁰ (3/71,4.22%) cases, M. Kang et al⁶(7/77, 9%) cases and Hima Bindu Gurram¹¹ reported 5/200 (2.5%) cases of multiple myeloma.

We had 6 cases of metastatic deposits, one case each of mantle cell lymphoma, epithelioid sarcoma, and an undifferentiated sarcoma and 3 cases of metastatic

adenocarcinoma. Hima Bindu Gurram¹¹ reported 32/200 (16%) cases of spinal metastatic deposits (20 cases of adenocarcinoma and 11 cases of squamous cell carcinoma along with 1 case of non-Hodgkin's lymphoma). BR Dave et al¹⁰ found one case of round cell tumour and one case of non-Hodgkin's lymphoma. 17 cases of metastatic deposits were reported by M.Kang et al⁶. In this study 2 cases showed inadequate tissue for definite diagnosis

Conclusion:

The evidence of a spinal lesion is a cause for concern and poses a diagnostic challenge. In spite of advances in modern imaging methods, in many cases only a differential diagnosis which may include both malignant and benign lesions is possible. Hence, histopathological examination of percutaneous spinal biopsies for various spinal lesions is becoming the foundation for adequate patient management by providing an accurate diagnosis in most of the cases with minimal complication.

References:

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Figure 1a,1b (H&E stain showing many langhans type giant cells and epithelioid granulomas at 100X & 400X)

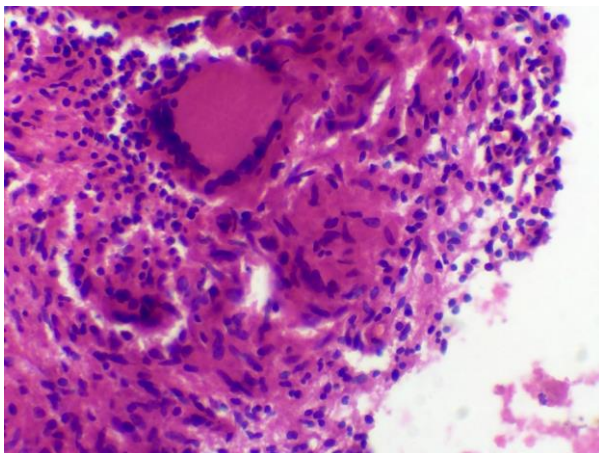
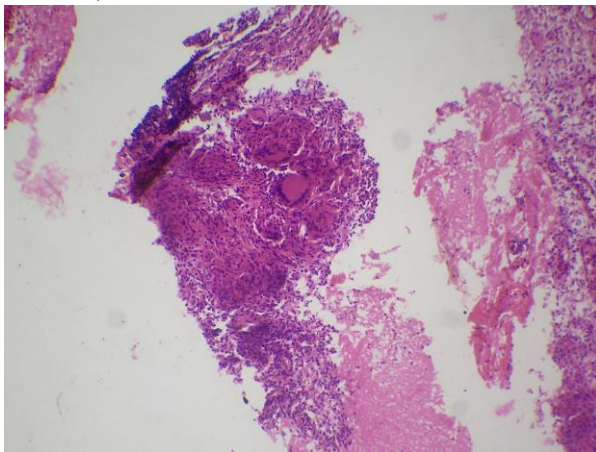


Figure 2 (H&E stain of undifferentiated sarcoma, 400X)

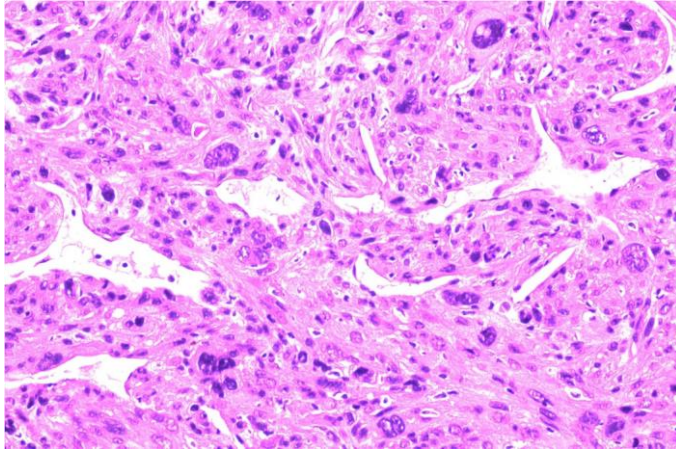


Figure 3a (H&E stain of metastatic carcinoma, 100X)

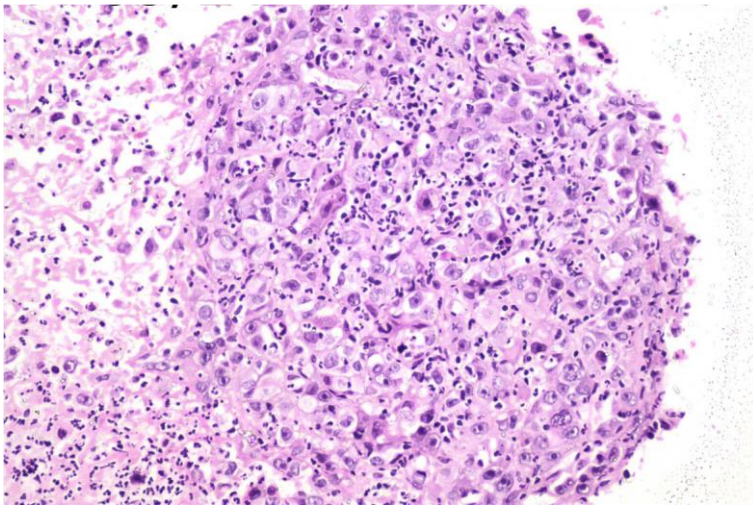


Figure 3b & 3c (IHC showing desmin negative and CK(AE1/3) positive)

