

Role of Fluoroscopic Guided Percutaneous Transpedicular Biopsy in Diagnosing Spinal Pathologies

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Abstract:

Background and Objectives: Spine lesions are commonly seen in day to day practice. But diagnosing vertebral lesions are most of the time difficult and non-specific even with specialized investigations and hence the need for histopathological diagnosis is important. To evaluate the efficacy of the technique of fluoroscopic guided percutaneous transpedicular biopsy of vertebral bodies in spinal pathologies. To come to a sure histopathological diagnosis in vertebral body lesions.

Material and Methods: The study was conducted in Department of Orthopedics, Patna Medical College and Hospital Patna. Study duration of Eighteen Months. Selective patients with symptomatic vertebral body lesion were taken for the study.

Conclusion: Percutaneous transpedicular biopsy of spine under C-arm guidance is a safe, rapid, reliable, sensitive and cost effective method of obtaining a diagnosis in different spine lesions. Performed efficaciously as an outpatient procedure with high diagnostic success rate and minimal morbidity.

Keywords: Percutaneous transpedicular biopsy, C-arm guidance.

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Introduction

Spine lesions are commonly seen in day to day practice. But diagnosing vertebral lesions are most of the time difficult and non-specific even with specialized investigations and hence the need for histopathological diagnosis is important. [1-3] Histopathological diagnosis requires intervention. Earlier application of aspiration biopsy in lesions of the spine is of great interest because the vertebral bodies cannot be surgically approached in order to diagnosis. Open biopsy was the traditional method for diagnosing spine lesions. It is well known that the open biopsy maximizes tissue retrieval, providing the highest diagnostic success rate. Usually open biopsy follows a failed needle biopsy or it is done in patients with selected presumed primary bone or cartilaginous tumors. Open method of biopsies has the drawback as it is a major procedure with its antecedent complications like hematoma, infection, tumor seedling in the biopsy tract and additional morbidity. Hence there is a need for closed biopsy techniques. [4-6] The standard approach for obtaining a percutaneous biopsy sample of the thoracolumbar lesion is a posterolateral one. Standard posterolateral approach involves passing the needle lateral to the transverse process, with

the needle penetrating the skin 6-7cm lateral to the midline and following 45° angle to the vertebral body. Although this approach has been generally effective, technique related difficulties and complications like nerve root injury, pneumothorax, hematoma particularly in the thoracic region were common. Concerned about the length of the biopsy tract Filder and Neers[4] performed open transpedicular biopsy technique. Percutaneous transpedicular biopsy of the vertebral lesion is considered an alternate to paraspinal biopsy for lesions involving the vertebral bodies of the thoracic and lumbosacral spine. It has been reported to be an efficacious, safe and cost effective approach. In most cases it can be done with the patients under local anesthesia with fluoroscopic guidance. [7-9]

Objectives

To evaluate the efficacy of the technique of fluoroscopic guided percutaneous transpedicular biopsy of vertebral bodies in spinal pathologies. To come to a sure histopathological diagnosis in vertebral body lesions. [10,11]

Materials and Methods

The study was conducted in Department of Orthopedics, Patna Medical College and Hospital Patna Bihar. Study duration of Twenty months. Selective patients with symptomatic vertebral body lesion were taken for the study. The relevant history was taken and salient clinical findings were noted in all patients. General examination with detailed clinical, neurological and orthopaedic examination was done to arrive for a provisional clinical diagnosis. Non radiological investigations including E S R, Mantoux test and serum alkaline phosphatase was done. Bleeding time and clotting time was done in all cases. Radiographs pertaining to the site of lesion obtained for all cases with anteroposterior and lateral views. Chest X ray, ultrasonogram of

abdomen, CT, MRI scan was done in selected patients. The information from the clinical examination and various imaging modalities were noted and provisional radiological diagnosis was made. All patients were informed of the study and explained about the importance of this investigation in the management of his or her disease and written consent was obtained from each of these patients. All patients were put under pre-procedural antibiotic cover. Specially designed trocar with cannula of inner diameter 2mm, to obtain an adequate tissue for diagnosis. Bone awl to identify the pedicle of vertebra and entry point. C arm image intensifier for guidance.

Relton Hall frame for positioning the patients.



Cannula with trocar and bone awl

A C-arm image intensifier is used for continuous monitoring of the needle track during biopsy. The patient is put in a prone position on Hall frame. The diseased vertebra was identified by A-P and lateral view. In the A-P view, the C-arm is angled along the

inclination of the pedicle selected for biopsy until an end-on view of the center of the pedicle (the bull's eyes) is obtained. Bone awl was positioned on pedicle and confirmed with image intensifier for the determination of the track of the trocar to avoid violation of the pedicle margins.



Pedicle broached with bone awl

The trocar is removed and the cannula advanced through the pedicle into the body towards the lesion intended for biopsies determined by the fluoroscopy on A-P and lateral views.

Results

The following were the observation made in the present study. Out of 20 cases 60% were male and 40% were female. Sex incidence

Male	Female
60%	40%
(12)	(8)

The figures in the bracket show the number of cases. The number of patients split according to the age group is shown below. Age incidence

Age	No. of Cases	Percentage	Male	Female
21-30	7	35	5	2
31-40	4	20	3	1
41-50	5	25	2	3
51-60	3	15	1	2
61-70	1	5	1	-

The youngest age is 22yrs and oldest is 68yrs. High incidences of 16 cases were seen in the age group between 20yrs and 50yrs. Pain was the constant symptom that made patients to seek medical advice which was found in all cases. Local tenderness in the spine was found in most of the patients.

Site	No. of cases	Percentage
Dorsal	4	20%
Lumbar	15	75%
Sacral	1	5%

Diagnostic accuracy of percutaneous transpedicular biopsy in different spinal segments is shown below:

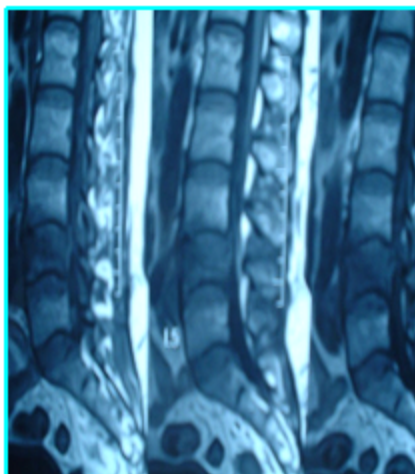
Biopsy Site	No. of cases	Positive results	Percentage
Dorsal	4	4	100%
Lumbar	15	12	80%
Sacral	1	1	100%

Biopsy diagnosis

No. of Cases	Infective	Non-Infective		
		Benign	Malignant	
			Primary	Secondary
	Tuberculosis- 8	3	2	4

The final diagnosis were tuberculosis (n=8), Aneurysmal Bone Cyst (n=1), Giant Cell Tumor (n=1), Paget's disease (n=1), Multiple Myeloma (n=2), Metastatic **Adenocarcinoma** (n=4) and **inconclusive** results in 3 cases.

Diagnosis	No. of cases
Tuberculosis	8
Aneurysmal Bone Cyst	1
Giant Cell Tumour	1
Paget's disease	1
Multiple Myeloma	2
Metastatic Adenocarcinoma	4
Inconclusive	3



Osteolytic Lesion L4



Specimen: Fragile Bits



Lesion in lower part of L5 body



Discussion

The skeletal system particularly the spine is the repository for metabolic, infectious and neoplastic disease. [12]

Patients with such involvement often present with roentgenographically visible, but otherwise obscure lesions. Benign bone lesions sometimes resemble metastasis, metastasis lesion simulate infection and extensive metastasis may be seen in other bones with solitary lesions involving the spine. [13] The proper treatment for these patients depends with the accurate diagnosis by means of histopathological identification. In our study of 20 patients, positive histopathological diagnosis was possible in 85% of cases. This study corresponds well with the literature [1,16]. Many cases presented with osteolytic lesion which is a common presentation as seen in literature. Incidence of Tuberculosis was more in our study (40%) Metastasis was noticed in patients from fifth to sixth decade (20%). Tuberculosis infection was seen at all ages and with equal sex incidence. The area of involvements favored the lumbar region which is commonly seen 75%. [14,15] The reduction of intervertebral disc space was the

commonest presentation in cases of tuberculosis. Biopsy always permitted us to obtain sufficient material for histopathological examination, which led to an accurate diagnosis in 17 cases (85%). In the remaining 3 cases, conclusive results were not obtained. In one of these, lesion was located predominantly located in the intervertebral disc space. Hence transpedicular biopsy provided sample which is not representative of the lesion. With empirical antituberculous treatment patient showed clinical improvement and he is under follow-up. Laurent Pierot and Anne Boulin [16], laid down the indication for using either the posterolateral or transpedicular approach depend on the location of the lesion. If the lesion is located predominantly in the disc space, as in cases of infectious disease, the posterolateral approach should be used. This approach is also mandatory when a lesion is located in the lower part of the vertebral body; however, if the lesion is located in the posterior half of the vertebral body or if the pedicle is involved the transpedicular approach is an effective method of biopsy. In case of lesions of the entire vertebral body, transpedicular approach is usually preferred. In other case of inconclusive result patient died before further evaluation. In another

case repeat biopsy was done by the same technique. In most of our cases (n=17) biopsy was done under GA. In rest of the cases (n=3) biopsy was done under LA and conscious sedation. This provides monitoring of nerve root function during the procedure and helps to minimize its morbidity. With a CT guided biopsy continuous monitoring is not possible whereas with fluoroscopic monitoring, real time positioning of the needle is possible during intraosseous insertion of the biopsy instrument more comfortably in difficult anatomic location [1]. The risk involved in the percutaneous vertebral biopsy has been variously estimated at 0-7.6% in the literature [7,14]. The most frequently reported complication was pulmonary, neurology and infective disorder. In our small series of percutaneous transpedicular biopsy no complications were encountered. Neurological examinations were unchanged after the biopsy procedure. No back or radicular pain was observed; either immediately after biopsy or during the days that followed and no pulmonary complications were observed. In most of our cases post operative hospital stay lasted at least 24 hrs. All patients returned to their prebiopsy level of daily activities the next day. The integrity of the medial and inferior borders of the pedicle must be preserved at all times. This principle is important to prevent the spread of hematoma, infection or tumor inside the spinal canal and to prevent damage to the dura and nerve root.

Conclusion

Percutaneous transpedicular biopsy of spine under C-arm guidance is a safe, rapid, reliable, sensitive and cost effective method of obtaining a diagnosis in different spine lesions. Performed efficaciously as an outpatient procedure with high diagnostic success rate and minimal morbidity. Use depends on accurate placement of the trocar and qualified interdisciplinary clinical co-operation. Study requires further evaluation with a larger sample for comprehension.

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