

# Image Guided Percutaneous Transpedicular Spinal Biopsy

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**Abstract:** ***Background:** The presence of a spinal lesion presents a diagnostic challenge as many times clinico-radiological diagnosis differs from tissue diagnosis. Percutaneous transpedicular spinal biopsy (PTSB), along with advanced diagnostic methods in pathology, enables accurate diagnosis of pathological spinal lesions. Our goal was to determine the accuracy and clinical usefulness of this procedure in patients with suspected pathology of spine. **Method:** C-Arm guided PTSB was performed in 50 patients with osseous spinal lesions as a day care procedure. Basic blood investigations were obtained prior to procedure. Biopsy was performed using 13-gauge Jamshidi needle under local anesthesia. Haemorrhagic fluid obtained along with the specimens was sent for microbiological studies when clinically indicated. **Results:** The level of biopsy was thoracic in 22, lumbar in 27 and sacral in 1. In 46 patients, bone tissue was obtained while in 4 patients, soft tissue was obtained. Haemorrhagic fluid was also aspirated along with biopsy specimens. In 38 patients, a clinico-radiological diagnosis of infective pathology was made. Overall, the biopsy was positive in 44 (88%) cases, out of which diagnosis was confirmed in 27 cases (61.4%). **Conclusion:** C-Arm guided PTSB is an important tool in the evaluation of spinal lesions. It is technically easy, quick, reliable, safe, cost-effective procedure and can eliminate need for open biopsy of the spine. It should be done in all patients with suspected osseous spinal pathology to avoid mismanagement as in many cases the clinico-radiological diagnosis may differ from histological diagnosis.*

**Keywords:** Percutaneous transpedicular spinal biopsy, PTSB

## 1. Introduction

An open biopsy is a major procedure which naturally has its own potential complications and morbidity. An open biopsy is usually performed after a negative result following the radiologist's CT-guided or C-Arm guided needle biopsy; or in selected presumed tumors mainly affecting the posterior elements of the spine. The technique of a percutaneous transpedicular biopsy of spinal lesions has been shown to be a useful alternative to paraspinal biopsy for vertebral body lesions in the thoracic and lumbosacral spine. The versatility of this efficacious, safe and cost-effective technique is further enhanced by the possibility of using local anesthesia, with C-Arm or CT guidance.

## 2. Material and Methods

The study was conducted on minimum of 50 patients. Patients attending outpatient department (OPD). Selective patients with symptomatic vertebral body lesion were taken for the study. Relevant history was taken and salient clinical findings were noted in all patients. General examinations with detailed clinical, neurological and orthopaedic examination were done to arrive for a professional clinical diagnosis. All patients were examined radiologically by X-Ray and MRI prior to percutaneous biopsy. Before the procedure, preoperative lab tests were obtained, including CBC, ESR, RBS, BUN and coagulation profile. All biopsies were performed in operating room, using C-arm intensifier guidance, under local anaesthesia or IV sedation. Transpedicular approach was preferred for percutaneous spine biopsy because in certain lesions, it was difficult to access the target with a paravertebral approach since the transverse process, iliac crest or rib may obstruct the needle path. All specimens underwent a histopathological / cytopathological examination, and specimens with strong

clinico-radiological suspicion of an infection were also sent for microbiological and gene-based studies (CB-NAAT).

## 3. Technique

The pedicle selected for the vertebral biopsy depends on the location of the lesion within the vertebrae. A review of the patient's X-rays, CT or MRI scans is mandatory. A C-Arm image intensifier is used for continuous monitoring during the procedure. The patient is placed in the prone position on the fluoroscopy table. The chosen vertebral level is first visualised in the AP view. In the AP view, the C-arm is manipulated along the inclination of the pedicle until an end-on view of the pedicle is obtained. For cases done under local anesthesia, the needle track is anesthetized using 1% lignocaine, and the periosteum surrounding the pedicle and the area at the junction of superior facet. A Steinmann guiding pin (2-mm diameter) is positioned in an end-on view of the pedicle and a stab incision is made. The guide pin is then tapped gently with a mallet through the pedicle into the intended area of the vertebral body. The track of the guide pin is kept within the margins (medial, lateral, superior, and inferior) of the pedicle. The lateral view on fluoroscopy ensures the correct anterior trajectory. The guide pin is then removed and Jamshidi needle was placed along with trocar. Later on trocar was removed and syringe was connected to Jamshidi and specimen was obtained.

## 4. Result

The maximum numbers of biopsies were conducted at the lumbar spine level in 27 cases (54%), followed by thoracic spine in 22 cases (44%) and sacral in 1 case (2%). The most common site for biopsy was L5 vertebrae (20%). Bone pieces, soft tissue and haemorrhagic fluid were the contents of biopsy material from the site of lesion. In 92% cases bone pieces with soft tissue and haemorrhagic fluid was retrieved. In the remaining 8% cases only soft tissue and haemorrhagic

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fluid could be retrieved. Pott's spine was the commonest encountered pathology. In 17 cases (34%) biopsy suggested inflammatory pathology. Overall, the biopsy was positive in 44 cases with accuracy of 88%. In the remaining 6 cases (12%) the biopsy report was inconclusive. Biopsy sample was also sent for bacteriological studies whenever the sample appeared to have infective material. In 6 cases, culture was positive for pyogenic pathology while in 3 cases, culture was positive for M. tuberculosis. Table 1 depicts the number of cases according to histopathological diagnosis.

**Table 1:** Biopsy-based histopathological diagnosis

Diagnosis	No. of cases
Infective	17 (34%)
Neoplastic	10 (20%)
Inflammatory	17 (34%)
Inconclusive	6 (12%)

## 5. Discussion

Biopsy of bone is resorted to when histological/ cytological or bacteriological evidence of disease is required before appropriate treatment can be planned. In skeletal pathology, the radiological features are non-specific and only a differential diagnosis can be given. A combined approach, utilizing the strengths of the clinical, radiological and pathological evidence together, is the best way of reaching the correct diagnosis. 27 males and 23 females were affected, which emphasises the fact that spinal pathologies have no sex predilection. Infection of the spine had a male preponderance. It was observed that lumbar spine (44%) was the commonest involved vertebral level, followed by thoracic spine (34%) and sacrum (2%). In 10% patients, lesion was dorsolumbar and in 4% patients, lesion was lumbosacral. In rest 6% patients, skip lesions were encountered. In our study, 94% of the lesions were osteolytic and 6% were mixed. Osteolytic lesions in 85.05% patients and mixed lesions in 14.95% patients. Fluoroscopically directed percutaneous needle biopsy was cost effective compared to open biopsy and computer tomography directed percutaneous biopsy.

## 6. Conclusion

After completing this study, we conclude that, it is necessary to get a histopathological diagnosis before starting a definitive treatment. Percutaneous transpedicular spinal biopsy is technically easy, can be done by any orthopaedic surgeon, does not require sophisticated radiological equipments and has less morbidity as compared to open biopsy of spine. It is cost effective and can be done as a day care procedure. We suggest that all orthopaedic surgeons dealing with spinal lesions in their clinical practice should take up percutaneous transpedicular biopsy as the first line of investigation in all radiologically evident lesions of spine, before starting any definitive therapy.