



RESEARCH ARTICLE

EVALUATION OF PERCUTANEOUS SPINAL BIOPSY IN DORSOLUMBAR SPINAL LESIONS
UNDER IMAGE GUIDANCE

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ABSTRACT

Background and purpose: The presence of a spinal lesion, whether symptomatic or not, presents a diagnostic challenge as many a times clinicoradiological diagnosis differs from tissue diagnosis. Percutaneous transpedicular spinal biopsy (PTSB), along with advanced diagnostic methods in pathology, enable 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: Image-guided PTSB was performed in 50 patients with osseous spinal lesions as a day care procedure. Basic blood investigations of all patients were obtained prior to procedure. All the biopsies were done in operating room under sterile conditions, under local anaesthesia. In all patients biopsy was performed using 13-gauge Jamshidi needle. Biopsy specimens were sent for histopathological/cytopathological analysis depending upon the nature of tissue retrieved. Haemorrhagic fluid obtained along with the specimens was sent for microbiological studies when clinically indicated.

Results: The patients were between 10 years to 78 years, with a mean age of 49 years. 27 patients were male and 23 were female. The level of biopsy was thoracic in 22, lumbar in 27 and sacral in 1. In 46 patients, bone tissue was obtained and in the remaining 4, soft tissue was obtained. Haemorrhagic fluid was also aspirated along with biopsy specimens. In 38 patients, a clinicoradiological diagnosis of infective pathology was made. The biopsy report confirmed infective pathology in 16 patients, while in 2 patients the report suggested of neoplastic pathology. In the remaining 12 cases, clinicoradiological diagnosis was neoplastic pathology. The biopsy report confirmed neoplastic pathology in 8 patients, while in 1 patient report suggested of infective pathology. The remaining 17 reports suggested inflammatory pathology. Overall, the biopsy was positive in 44 (88%) cases, out of which diagnosis was confirmed in 27 cases (61.4%). In the remaining patients, 4 samples were suggestive of necrosis and 2 were inadequate to provide a diagnosis.

Conclusion: Image-guided PTSB is an important tool in the evaluation of spinal lesions. It is technically easy, quick, reliable, safe, cost-effective, can be done as an outdoor procedure by any orthopaedic surgeon 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 clinicoradiological diagnosis may differ from histological diagnosis.

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INTRODUCTION

Incidence of vertebral diseases is increasing nowadays. Vertebral osteomyelitis affects an estimated 26,170 to 65,400 people annually (Hideki Nagashima et al., 2010). Tuberculosis of the spine is one of the most common pathology of spine in India. It constitutes about 50 % of all cases of skeletal tuberculosis. Metastatic disease in the skeleton occurs in up to 85% of patients with the three most

common types of cancer – breast, prostate and lung (Kurup et al., 2010). In spite of the advances in medical field, spine still remains an inaccessible region for majority of orthopaedic surgeons. Percutaneous biopsy of the spine is a well-recognized and effective technique for diagnosis of vertebral lesions and in addition, it is a quick and minimally invasive technique (Bender, 1986). In our Indian setup, it is not a regular procedure taken up by orthopaedic surgeons in their clinical practice. This study was to evaluate the efficacy of percutaneous needle biopsy of the spine so that it can be taken up regularly for diagnosis of spinal lesions.

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MATERIALS AND METHODS

This study was conducted in our institute after getting clearance from ethical committee, over a period of 1 year. A total of 50 subjects were included, out of which 27 were males and 23 were females. The subjects ranged from extremes of age groups, youngest being 10 years old and oldest being 78 years old. The mean age was 49 years. Before the procedure basic blood and radiographic investigations were obtained in form of CBC, ESR, coagulation profile, X-rays and/or MRI. All biopsies were performed as a day care procedure in operating room, using a 13-gauge Jamshidi needle, under C-arm intensifier guidance, under local anaesthesia.

Approach

Transpedicular approach was used for percutaneous spine biopsy. It is a posterior approach and was performed with the patient in prone position. All specimens underwent a histopathological / cytopathological examination, depending upon material yield, and specimens with strong suspicion of infection were also examined microbiologically.

RESULTS

50 patients were taken up for percutaneous spinal biopsy under image guidance. 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%). Osteolytic lesion with or without a paraspinal soft tissue mass was seen in 47 cases (94%) and mixed lesions with both lytic and sclerotic components, with or without a paraspinal soft tissue mass in 3 cases (6%).

Table 1. Histopathological diagnosis on biopsy

Diagnosis	No. of cases n=50
Infective pathology	17 (34%)
Neoplastic pathology	10 (20%)
Inflammatory pathology	17 (34%)
Inconclusive	6 (12%)

In 46 cases (92%) bone pieces with soft tissue and haemorrhagic fluid was retrieved. In the remaining 4 cases (8%) only soft tissue and haemorrhagic fluid could be retrieved. In 38 cases (76%), a clinicoradiological diagnosis of infective pathology was made. However, we could not differentiate between tubercular and pyogenic pathology on clinical and radiological basis. In the remaining 12 cases (24%), a clinicoradiological diagnosis of neoplastic pathology was made. As shown in table 1, a definitive histopathological diagnosis could be made in 27 (54%) out of 50 cases. Of these, 17 patients were of infective pathology while 10 patients were of neoplastic pathology. Pott's spine was the commonest encountered infective pathology (22 %).

In the remaining 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 suggested necrotic tissue inconclusive of any diagnosis.

Table 2. Distribution of cases according to clinicoradiological diagnosis and histopathological diagnosis

Clinicoradiological diagnosis	Histopathological diagnosis	No. of cases
Infective pathology (38 cases)	Tubercular spondylodiskitis	11 (28.9%)
	Pyogenic spondylodiskitis	5 (13.15%)
	Multiple myeloma	1 (2.63%)
	Plasmacytoma	1 (2.63%)
	Inflammatory pathology	16 (42.1%)
	Inconclusive	4 (10.5%)
Neoplastic pathology (12 cases)	Metastasis	6 (50%)
	Multiple myeloma	2 (16.67%)
	Pyogenic spondylodiskitis	1 (8.33%)
	Inflammatory pathology	1 (8.33%)
	Inconclusive	2 (16.67%)

Table 2 shows distribution of cases according to clinicoradiological and histopathological diagnosis. 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. In 22 cases, culture report was inconclusive. None of the patients who underwent the procedure had any complication during or after the procedure.

DISCUSSION

The presence of a spinal lesion, whether symptomatic or asymptomatic, presents a diagnostic challenge and is always a cause of concern to the treating clinician. Despite the availability of modern radiological investigations, it is still difficult in many cases to give a definitive diagnosis. Since definitive therapy depends upon the histopathology of the lesion, a tissue diagnosis is invariably necessary (Kang *et al.*, 1999). Percutaneous biopsy under fluoroscopic or CT guidance is a safe and almost painless procedure, and is preferred for lesions that have a soft-tissue component or are located close to vital structures (Daniel Yaffe *et al.*, 2003). But, for CT guided biopsy we are dependent on radiologist and usually we do not get tissue for histopathological analysis. In our series, in 48% of patients, percutaneous transpedicular biopsy gave a concordant diagnosis with the clinicoradiological diagnosis. Thus biopsy procedure proved to be a complimentary adjunct to clinicoradiological assessment. Phadke *et al.* (2001) opined in his study that correlating fine needle aspiration biopsy with the clinical and radiological findings, a definitive diagnosis can be made in most cases.

In 8% of patients, percutaneous transpedicular biopsy gave a non concordant diagnosis with the clinicoradiological diagnosis, that is, the cases in which we suspected neoplastic pathology clinically were proved to have infective pathology on biopsy and vice-versa. Also, out of 17 patients who were positive for infective pathology, biopsy and aerobic culture confirmed pyogenic infection in 6 patients. These 6 cases would otherwise have been treated as tuberculosis. This non concordance between clinicoradiological and histopathological diagnosis has also been emphasized by Kang *et al.* (Kang, 1999), who, in their study confirmed tubercular infection of spine in 26.7% of patients with known extra-spinal malignancy with suspected metastatic lesions in the spine. This is a significant number of patients and certainly proves beyond

doubt that percutaneous transpedicular biopsy is an important tool for the confirmation of diagnosis of the lesions of the spine. Kang *et al.* (1999) stated that the overall accuracy of percutaneous spinal biopsy is 88.5%. Ottolenghi *et al.* (1948) quoted a 73% positive diagnostic yield in his series. In our study, the accuracy of this procedure was 88%. Hill *et al.* (1992) reported that fluoroscopically directed percutaneous needle biopsy was cost effective compared to open biopsy and computer tomography directed percutaneous biopsy. This view has been supported by Fyfe *et al.* (1983), Ghelman *et al.* (1990), Bender *et al.* (1986), Phadke *et al.* (2001), Jayakumar *et al.* (1994), Kishore *et al.* (1994) and Kang *et al.* (1999). We too are of the same opinion. Microbiological studies were performed whenever the sample seemed to be of infective nature. Out of 31 samples sent for bacteriological analysis only 6 were positive for pyogenic organism. We also sent sample for TB culture which was positive in only 3 patients. Armstrong *et al.* (1978) could culture the organism in 11 out of 19 patients, Ambrose *et al.* (1996) obtained infecting organism in 8 out of 16 patients and Garcia and Grantham (1960), in 5 out of 10. They were of the view that low success rates were achieved in patients who had received antibiotic therapy prior to procedure. However, we would like to emphasise that culture should be done in suspected cases of infective pathology to distinguish between pyogenic and tubercular infections.

Conclusion

- It is necessary to get a histopathological diagnosis before starting a definitive treatment.
- Percutaneous transpedicular spinal biopsy provides a definitive histopathological diagnosis. It 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.

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