Original Article

Orthopaedic

Results of Fluoroscopic Guided Percutaneous Needle Biopsy of Vertebral Pathologies in our Teaching Hospital

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ABSTRACT

Objectives: To determine the frequency of positive findings on Percutaneous Transpedicular biopsy via fluoroscopic guidance in clinically identifiable cases of vertebral pathologies

Study Design: Descriptive case series study

Place and Duration of Study: This study was conducted at department of Orthopedics, Nawaz Sharif Social Security Hospital, Lahore for a period of 06 months from 20th February 2012 to 20th August 2012.

Materials and Methods: 55 patients fulfilling the selection criteria were identified. Radiographs and MRI of spine were carried out on the basis of clinical examination, to document the site and type of pathology. Transpedicular biopsy was taken. Results were evaluated on the basis of biopsy report.

Results: A total of 55 patients were included in the study. 37 (67.3 %) were male and 18 (32.7 %) were female. The age ranged from 18–80 years. Mean age of patients was 53.54 ±16.99 years. Positive diagnosis was obtained in 38 (69.1 %) patients.

Conclusion: Percutaneous Transpedicular biopsy is a safe procedure without significant operative morbidity, with good diagnostic accuracy.

Key Words: Positive finding, Negative finding, Percutaneous, Transpedicular biopsy.

INTRODUCTION

The spine is the most common site for skeletal metastasis. Often in spinal lesions, the clinical and radiological features, results of laboratory tests and even of specialized investigative techniques are non-specific. Biopsy is required before commencing therapy. Percutaneous bone biopsy technique, in contrast to open procedure, has the advantage of minimal complications.[1,2] The surgeon is usually deterred from open approach by the hazards of deep bleeding which is difficult to control and the close proximity of a number of vital structures such as the aorta and the hemi azygous systems.[2,3,19] The first report of percutaneous spine biopsy was in 1935 by Robertson and Ball.[2,4,5] Their procedures, however, did not utilize imaging guidance. Fluoroscopy-guided spine biopsy was subsequently reported in 1969, and CT-guided spine biopsy was reported in 1981.[6,7,17]

The percutaneous image-guided procedure is faster and more cost-effective and has an overall lower risk of complications. Complications of this technique occur when the medial or inferior walls of the pedicle are violated, resulting in spinal cord damage or nerve root injury. Also, if the biopsy needle penetrates too deeply, it can puncture the aorta or inferior vena cava.[5] Decision for needle biopsy is a joint effort between the clinician, pathologist, radiologist, surgeon, and patient. This consultation will avoid unnecessary spine biopsies, ensure patient safety, and identify the optimal location and level for performing the biopsy procedure.[4,8,18]

Most of the patients with non–traumatic vertebral column pathologies are elderly, who often have multiple co–morbidities as well, which renders them unsuitable candidates for procedures done under prolonged general anesthesia. To this end, percutaneous biopsy procedure is a valuable technique, as it involves minimal procedural time and can be done under local anesthesia and/or conscious sedation, with minimal complications, in contrast to open biopsy procedures.

MATERIALS AND METHODS

Inclusion Criteria:

1. Patients of both sexes with age groups (18–80yrs).
2. Patients with vertebral pathologies .e.g., Tumor, Infection, Osteoporosis.

Exclusion Criteria

1. Patients with bleeding diathesis.
2. Decreased platelet count. (< 70,000).
3. Suspected vascular lesion in the thoracic vertebra

Data Collection Procedure: The study population consisted of patients attending the outpatient as well as emergency department of hospital. 55 patients fulfilling the selection criteria were identified. They were explained about the procedure and an informed consent was taken about their inclusion in the study. Risks and benefits of the procedure were discussed with the patients. The demographic profiles (i.e. age, sex) were recorded. The following laboratory parameters were assessed: hematocrit, hemoglobin, platelet count, Prothrombin Time (PT), Partial thromboplastin time

(PTT), International Normalized Ratio (INR), Blood Urea Nitrogen (BUN), and Creatinine. Radiographs and MRI of the spine were carried out according to clinical findings.

All patients were kept nil per mouth for six hours before procedure. All patients received single dose antibiotics preoperatively. Patient's position was kept prone. After all aseptic measures, pathological lesion was identified under image intensifier and the needle biopsy was taken and sent to laboratory for histopathological examination. All procedures were performed under supervision. Patients were nursed in supine position, keeping spine in extension for 24 hours and were mobilized with the help of hyperextension brace on second post-operative day. Post-operatively patients were assessed for respiratory distress, hypotension, nerve injury, wound infection. Patients were kept in ward, till the arrival of biopsy report.

Data Analysis: All the collected information was entered into SPSS version 15.0 Qualitative variables i.e. gender and biopsy findings were presented as descriptive statistics, calculating their frequencies and percentages. Quantitative variables i.e. age was presented as numerical statistics, calculating its mean and standard deviation.

RESULTS

A total of 55 patients were included in the study. Out of 55 patients, 37 (67.3 %) were male and 18 (32.7 %) were female.

The age ranged from 18 to 80 years, Mean age of patients was 53.54 ± 16.99 years. Out of 55 patients, 8 (14.5 %) were in age group of 21-30 years with positive diagnosis made in 4 patients. 5 patients (9.1 %) were in age group of 31-40 years with positive diagnosis made in 3 patients. 7 patients (12.7 %) were in age group of 41-50 years with positive diagnosis made in 4 patients. 12 patients (21.8 %) were in age group of 51-60 years with positive diagnosis made in 8 patients. 14 patients (25.5 %) were in age group of 61-70 years with positive diagnosis made in 11 patients. 9 patients (16.4 %) were in age group of 71-80 years with positive diagnosis made in 8 patients (Table 1, 2).

table No.1: Frequency of age in groups (n=55)

Age groups (in years)	Frequencies	%age
18-20	0	0
21-30	8	14.5
31-40	5	9.1
41-50	7	12.7
51-60	12	21.8
61-70	14	25.5
71-80	9	16.4
Total	**55**	**100**

table No. 2: Positive diagnosis in different age groups (n= 55)

Positive Diagnosis	Age Groups In Years						Total
	21-30	31-40	41-50	51-60	61-70	71-80	
Yes	4	3	4	8	11	8	38
No	4	2	3	4	3	1	17
Total	8	5	7	12	14	9	55

Positive diagnosis was made in 38 out of 55 patients (69.1%). The result was negative in 17 (30.9%) patients.

Out of 38 positive cases, 28 (50.9 %) were of tumor/Mets, 8 (14.5 %) of infection, 2 (3.6%) of osteoporosis (Table 3).

Table No.3: Diagnosis of Pathological Lesions

Diagnosis	Percentage
Infection	8 (14.5 %)
Tumor/Mets	28 (50.9 %)
Osteoporosis	2 (3.6 %)
Negative result	17 (30.9 %)

Remaining 17 patients (30.9%) were variously reported as chronic non-specific inflammation, benign bone marrow or necrotic tissue and diagnosis was found to be inconclusive. No single patient had bleeding, infection, nerve/cord injury, fracture, and pneumothorax.

The pathological lesions were localized to thoracic spine in 41 cases and lumbar spine in 14 cases. Out of the 41 thoracic spine lesions, positive diagnosis was established in 27 cases (65.9 %). Out of the 14 lumbar spine lesions, positive diagnosis was established in 11 cases (78.6 %).

The diagnosis for female patients and male patients was positive in 12 (66.7 %) and 26 (70.3 %) and negative in 6 (33.3%) and 11 (29.7 %) cases respectively (Table 4).

Table No.4: Comparison of Diagnosis in Male and Female

Gender	Diagnosis	
Male	**Positive**	**Negative**
	26 (70.3%)	11 (29.7%)
Female	12 (66.7%)	6 (33.3%)

DISCUSSION

Spine lesions are frequently secondary to disease processes elsewhere in the body. Infections, primary tumors, and metastases are the most common lesions of the vertebrae.

In our study, mean age of the patients at the time of procedure was 53.54±16.99 (Range 18–80 years). In study by Sucu HK et al.[6], mean age at the time of procedure was 57 years (Range 11-81 years). In study by Ashizawa R et al.[9] mean age at the time of procedure was 61 years (Range 29–85 years). In study by Langer–Cherbit A et al.[10], mean age at the time of procedure

was 55.9 years (Range 22–88 years). So there is no significant difference as regards of age.

In present study, 37 patients (67.3%) were male and 18 (32.7%) were female. In study by Dave BR et al.[11], 51 patients (71.83%) were male and 20 (28.16%) were female. In study by Hadjipavlou AG et al.[12], 41 patients (60.29%) were male and 27 (39.70%) were female. In study by Sucu HK et al.[6], 115 patients (57.21%) were male and 86 (42.78%) were female. In study by Ashizawa R et al.[9], 14 patients (53.84%) were male and 12 (46.15 %) were female. So there is no significant difference regarding the gender.

Kattapuram et al.[13] found the mean age of the diagnostic group (56 years) older than the non-diagnostic group (54 years) and proposed that there was a trend toward better results in female patients (97%) than in male (86%). In our study, positive diagnosis was established in 70.3 % of male patients and 66.7 % of female patients. The mean age in non-diagnostic group was 45.76 years, compared to 57.02 years in diagnostic group. Inferior results in female patients may be due in part to the fact , that most of the patients when assessed clinically and Radiographically were categorized as having an infectious etiology , the pathogen of which biopsy could not confirm. Reasons of which may be:

1) Biopsy of infectious spondylitis in patients who are already on broad-spectrum antibiotics.
2) Improper specimen handling,
3) Failure to perform microbiologic testing, or failure to follow specific cultures (e.g., Mycobacterium tuberculosis) for an extended period of observation.

In present study, diagnosis was established in 38 out of 55 patients (69.1%). In study by Dave BR et al.[11], diagnosis was established in 63 of 71 patients (88.7%). In study by Ashizawa R et al.[9], diagnosis was made in 24 out of 26 patients (92 %). In study by Stoker DJ et al.[14], diagnosis was made in 120 out of 135 biopsies (88.9 %). In study by Hadjipavlou AG et al.[12], diagnosis was made in 67 out of 71 biopsies (94.36%). In study by Ottolenghi CE[15] diagnosis was made in 73 % of biopsies. In study by Chauhan V et al.[16], positive diagnosis was made in 76 out of 103 patients (73.8%). In study by Langer-Cherbit A et al.[10], positive diagnosis was made in 80 % of percutaneous biopsies.

The inferior results of the present study can be explained as

First, Only 1 core / cutting type of needle were used to take biopsy. As per literature, selection of a needle is dependent on lesion type (soft tissue or osseous), location (vertebra, disc, paraspinal soft tissues), and method of specimen acquisition. In a meta-analysis by Nourbakhsh A et al., the conclusion was that in situations in which the use of a needle with a small inner diameter is highly effective (for example, in cases of metastatic lesions), the clinician should first consider using a needle with a smaller inner diameter to obtain the biopsy specimen because of the higher complication rate associated with large-bore needles. However, in cases of sclerotic lesions, in which obtaining an adequate sample can be difficult, the use of a needle with a larger inner diameter is desirable. Secondly, we did not follow up on negative biopsies. Most of the studies in literature went on to have open biopsy to confirm the diagnosis and compare the finding with that of percutaneous technique. Third, aspiration biopsy was not performed in the present study; the two techniques of core/cutting and aspiration biopsy have been shown to be complementary and to increase the diagnostic accuracy of the procedure. Fourth, there are procedural pitfalls to the transpedicular technique. If the lesion is located predominantly in the disk space, as in cases of infectious disease, the postero lateral 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 preferred.

Present study showed that transpedicular biopsy technique is a safe procedure, as no patient reported any complication like bleeding, nerve/cord injury, infection, and pneumothorax. In study by Dave BR et al.[11], no complications were identified. In study by Sucu HK et al.[6], 1 out of 201 patients had retroperitoneal hematoma, which required surgery. In study by Hadjipavlou AG et al.[12], 1 out of 68 patients had the complication of retained drainage tube, which required removal at a subsequent setting. Majority of the studies including the present study prove the safety of transpedicular biopsy technique.

In the present study, there were 8 cases of infection, 21 of metastasis, 7 of primary tumor, and 2 of osteoporosis.

In study by Dave BR et al.[11], there were 25 cases of infection, 8 of metastasis, 7 of primary tumor, 21 of osteoporosis. In study by Sucu HK et al.[6], infectious etiology was reported in 73 cases, metastasis in 40 cases, primary tumor in 22 cases. The incidence of infection is much less as compared to other studies .This is partly due to the fact that tuberculosis is endemic in subcontinent, and as such most of the patients are started on empirical therapy; and same is the case with osteoporotic patients.

However the increased incidence of osteoporosis in rest of the literature can also be explained by the fact that minimally invasive methods of treating the symptoms of spinal compression fractures have attracted the attention and interest of both surgeons and patients over the past two decades. Percutaneous vertebral body injection procedures currently are used to stabilize and

reinforce weakened or fractured bone resulting from metastatic disease and severe osteoporosis.

Subjecting a patient to anti-tuberculosis treatment on a presumptive diagnosis without tissue diagnosis not only exposes him to the side effects of toxic drugs but also adds onto the financial burden and is considered a social stigma in our society .Similarly a presumptive diagnosis of metastasis to the spine if treated without tissue diagnosis would have an adverse psychological impact. Biopsy is a necessity before commencing any therapy.[10] Transpedicular technique has not been previously reported in Pakistan, and as more expertise is gained with this technique, results may get better.

CONCLUSION

Image-guided percutaneous spine biopsy is a procedure that can be performed safely and efficiently by surgeons. The decreased risk of hematoma, pneumothorax and nerve root injury makes the transpedicular approach an effective alternative to paraspinal biopsy.

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