

Osteolytic Vertebral Lesion: CT Guided FNAC of 67 Cases to Detect Cause and Differential Diagnosis

*Basak NC,¹ Das RK,² Talukder SI,³ Habib MA⁴

Vertebral osteolytic lesion is the major cause of pathological fracture and spinal cord injury that lead to deformity, paresis and death. There are so many physiological and pathological reasons of vertebral osteolytic lesion. In this study 67 patients were selected and CT guided aspiration was done from the lesion in Rajshahi city from January 2008 to August 2010. Cytological study to this patient reveals multiple causes which are grossly categorized into two groups, neoplastic 21 (31.34%) and non neoplastic 46(68.66%). Among the neoplastic disorder metastatic carcinoma from different organs occupies the most common cause which was 66.66% and in non neoplastic group's tuberculosis is still the most common and important cause of osteolytic vertebral lesion comprises 91.30%. From this short retrospective study, it may be concluded the tuberculosis is the most common and important cause of vertebral osteolytic lesion.

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Key words: FNAC, osteolytic, vertebra, CT

Introduction

Vertebral column is the axial back bone of human consists of 33 pieces of specialized bone (vertebra) with interposed fibrocartilagenous disc (intervetebral disc) divided the whole column into five separate zones, cervical C₁-C₇, Thoracic D₁-D₁₂, Lumber L₁-L₅, fused 5 Sacral and 4 fused Coccygeal portion resembling tail of vertebrates.

After birth sequential mineralization under control of hormone calcitonine and parathormone, deposition of calcium gives it's a unique strength for maintenance of posture, helping the spine to carry loads created during usual activity to transmit body weight in walking and standing. It also leads

passage of spinal cord and maintains its protection.

In advanced age the bony mineralization is reduce and causes osteophoretic change, resulting osleolytic lesion and pathological fracture. During injury the spinal column and spinal cord can be injured anywhere along their length. The majority of the damage to spinal cord occurs at the time of injury. But further damage can be caused by improper handling of the unstable spine and by disruption of blood supply, which can cause hypoxia, necrosis and pathological fracture. There are so many causes of physiological and pathological solitary or multiple vertebral bone lesions.

1. *Dr. Niranjana Chandra Basak, Associate Professor of Pathology, Pabna Medical College, Pabna
2. Dr. Ruhini Kumar Das, Assistant Professor, Department of Pathology, Dinajpur Medical College, Dinajpur
3. Dr. Sadequel Islam Talukder, Assistant Professor, Department of Pathology, Dinajpur Medical College, Dinajpur
4. Dr. Md. Ahsan Habib, Associate Professor, Department of Pathology, Rangpur Medical College, Rangpur.

*For correspondence

Most important causes of multiple spinal bone lesions are usually malignant tumors such as metastatic disease, myeloma and lymphoproliferative disorder and therefore these can be easily diagnosed based on consideration of clinical data.¹ In contrast diagnosis of solitary spinal bone lesion (SSBL) can be difficult because a spectrum of SSBL including benign and malignant primary tumors, pseudotumors, metastatic tumors, specific and non specific infection can be involving the spine.²⁻⁶

Image guided (MRI & CT) FNAC plays a control and initial role in the diagnosis of solitary and multiple spinal bone lesion with its differential diagnosis. In some cases an invasive biopsy is required to achieve a differential diagnosis.^{7,8}

Methods

We retrospectively studied 67 consecutive patient referred from orthopedic department of Rajshahi Medical College Hospital, general physician, orthopedic surgeon and general surgeon for evaluation of osteolytic lesions detected by MRI, CT scan or digital X-ray from January 2008 to August 2010. The inclusion criteria were a) An obscure osteolytic lesion of vertebral bone on initial MRI requiring the differential diagnosis of a malignant tumor and benign lesion based on musculoskeletal radiologist's interpretation, b) Solitary or multiple lesions by a sequential whole spine study and c) Cytological confirmation of the spinal lesion, or the primary sites of metastatic tumors. Patient with known history of traumatic vertebral lesion was excluded.

All these 67 patients prior consent was taken in a prescribed form after discussion with patients and relatives regarding the operational procedure; its merits, demerits and possible complications. Relevant investigations like BT. CT. Prothombin time

were done. Short history regarding bleeding disorder, hypertension, asthma and other were taken.

The samples were collected on CT scan table in presence of related specialist. The scan of vertebral lesion was taken and multiple sections of suitable length were taken. Appropriate sections were selected and the direction and depth of the lesion was measured correctly. The selected area of vertebral lesion was thoroughly washed and cleaned with antiseptic solution and measured amount of local anesthesia was introduced in periosteal, intramuscular subcutaneous and cutaneous level.

A 18 or 21 gauge spinal needle with stylet was used. Needle was introduced with utmost precaution. Direction and presence of needle tip within the target site of lesion was ensured with CT scan monitor display. Aspiration was performed with real time monitoring after aspiration without any delay to avoid clot formation or clumping.

Slides were fixed in koplins jar using 95% Ethyl alcohol as fixative. Slides were stained in standard method using Hematoxyline and Eosin (HE), Leishman and Zeihl- Neelson stain. In all cases two or more slides were preserved unstained for further evaluation according to necessity.

After aspiration the patients were closely monitored with CT scan or USG for possible hemorrhage or spinal injury. In most of the cases single aspiration was satisfactory containing cellular particle except a few where we need reaspiration. All the patients were given a mild to moderate analgesic in the form of tablet, injection or per rectal suppository. Then all the stained and processed slides were examined under microscope.

Results

Among the 67 patients 38 (56.71%) were male and 29(43.28%) were female. The age range was 20-90 yrs with mean age of 55 yrs. Male Female ratio was 1:0.7. The location and number of vertebra affected are shown in Table I.

Among the 67 patients the cause of osteolytic lesion was neoplasm in 21 (31.34%) cases of which 07 (33.33%) were benign tumor and 14 patients (66.66%) were malignant tumor (both primary and metastatic).

Table I: Location and number of vertebra affected

Location	Number	%	Number of vertebra affected	Number	%
Cervical	02	2.98	Solitary lesion	44	65.67
Thoracic	36	53.73	Multiple lesion	23	34.33
Lumber	26	38.80			
Sacral	03	4.48			

Table II: Histopathological pattern of Neoplastic and Non neoplastic lesion

A. Neoplastic

Lesions	No	%	Lesions	No	%
a). Benign	07	33.33	b). Malignant	14	66.66
Plasmacytoma	05	23.80	Metastatic squamous cell carcinoma	03	14.28
Giant cell tumor	02	09.53	Metastatic Adenocarcinoma	03	14.28
			Metastatic Follicular Papillary carcinoma	03	14.28
			Metastatic undifferentiated carcinoma	03	14.28
			Metastatic Duct cell carcinoma	01	4.77
			MPNST	01	4.77
B. Non Neoplastic			Non Specific (Pyogenic)	04	8.70
Specific(Tuberculosis)	42	91.30			

Among the non neoplastic cases 42 (91.30%) were due to specific infection (Tuberculosis) and 04 (8.70%) were non specific (pyogenic) organism.

Discussion

Final diagnosis of 67 cases of osteolytic lesion 31.35% were neoplastic disorder of which 33.33% were benign and 66.66% were malignant neoplasm and among the malignant lesion most were secondary deposits. Squamous cell carcinoma and Adenocarcinoma of lung, follicular carcinoma of thyroid, undifferentiated carcinoma from undetermined primary were the most common. Next common cause of secondary was duct cell carcinoma of breast and single

cause of primary malignant tumor detected in this study was malignant peripheral nerve sheath tumor (MPNST).

Generally metastatic disease, myeloma & lymphoma are considered to be the most common cases of malignant spinal tumor.⁹ Excepting hemangioma primary benign lesion in the spine is uncommon. About 10% of all cancer metastazies to spine and 60% of spinal metastasis are from breast, lung or prostate, renal and gastro intestinal malignances each account for about 5% of spinal metastasis.^{10, 11}

In present study there was no prostate cancer case among the osteolytic vertebral lesion patients. But it has been speculated that breast

and prostate cancer are usually encountered as multiple metastasis due to a relatively long survival. In benign lesions, vertebral osteomyelitis predominated, but causative organisms were various, including pyogenic bacteria, fungus and most commonly in this study was mycobacterium 91.30%¹². In patients without a known history of malignancy, the chances of metastasis increases to 50% in fourth decade and over 90% in the seventh decade³. In certain cases osteolytic lesion the MRI pattern mimicking osseous metastasis and present with non specific, especially in early stages¹³.

Radiologically cystic lace like or extensive bone erosion, when accompanied by intact articular space and accompanied by soft tissue mass or tenosynovitis is virtually diagnostic of tuberculosis. Similar lesions are also detected in case of bone Sarcoidosis.⁶ Cytological feature of marrow granuloma reveal presence of lymphocytes, histiocytes, plasma and giant cells. ZN stained smears was positive for AFB.

Although imaging modalities play an important role in the diagnosis, characterized and extension of spinal bone tumors, but it is not enough to make a final diagnosis for obscure vertebral bone lesion and thus, additional workup studies are required. Initially the possibility of a metastatic tumor should be ruled out, thus chest, abdominal and pelvic CT scan is essential for detection of possible primaries. CT scan was found to be useful for making a final diagnosis in solid tumors but not for multiple myeloma and thus laboratory analysis including tumor markers and plasma electrophoresis should be considered. Similarly for suspected metastasis from prostate carcinoma PSA and other biochemical assay are useful¹². When CT scan fails to provide a final clue, radio nucleotide studies such as bone scan and PET/CT could be considered. If PET/CT findings are not

conclusive, a biopsy should be considered, though an invasive biopsy is not essential to achieve final diagnosis of metastatic tumor and hematological malignancies.

To summarize vertebral osteolytic lesion is being increasingly diagnosed with advance in imaging. In cases of vertebral primary tumor, vertebral involvement is usually localized but may be generalized, osteolytic or combined lytic and sclerotic. Clinically the patients are usually symptomatic but in certain cases may be asymptomatic. Making the diagnosis requires biopsy and analysis to rule out infection, malignancy and other causes.

Conclusion

In this study among the non neoplastic group, tuberculosis was the major cause of vertebral osteolytic lesion and most of malignant tumor were from metastasis. From this study it may be concluded that in addition to CT guided FNAB of vertebral lesion other modern modalities for preliminary diagnosis of tuberculosis is useful.

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