

STUDY TO SHOW ACCURACY OF FNAC IN DETERMINING THE LESIONS OF SPINEAvdhesh Shukla¹, Sudha Iyenger², Jasmeet³, S. N. Iyenger⁴**HOW TO CITE THIS ARTICLE:**

Avdhesh Shukla, Sudha Iyenger, Jasmeet, S. N. Iyenger. "Study to show accuracy of FNAC in determining the lesions of spine". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 73, September 10; Page: 12727-12733, DOI: 10.14260/jemds/2015/1833

ABSTRACT: BACKGROUND: The vertebral column is a common site of metastasis. FNAC is associated with a lower risk of tumour seeding as compared to open biopsy. The advantages of the image guide FNAC are: Minimally invasive, relatively inexpensive, accurate, outdoor procedure, minimal complication takes shorter time for diagnosis and can be repeated. **OBJECTIVE:** To evaluate the accuracy of FNAC, its impact as a low cost technique for treatment initiation **METHODOLOGY:** The present cross-sectional hospital based study was carried out in the Department of Neurosurgery, G.R.M.C., Gwalior from Nov. 2009 to March 2011. Patients of age 5 yrs. and above with neurological signs and symptoms due to spinal lesions having normal coagulation profile and consenting to participate were included in the study. Each underwent clinic-radiological examination and radiologically guided FNAC. **RESULTS:** Image guided FNAC was able to correctly diagnosed the disease in 96.49% of the patients in current study. All the patients who were clinic-radiologically suspected as case of Pott's spine were confirmed on FNAC as Pott's spine (35 out of 35). The patients in whom metastasis was presumptive diagnosis, on FNAC only 9 out of 21 i.e. 42.86% turned out to have metastases of spine. **CONCLUSION:** Image guided FNAC is highly accurate and effective in diagnosis of vertebral lesions. It is very useful diagnostic tool for early initiation of treatment in patients who are medically unfit for surgical biopsy.

KEYWORDS: FNAC, Spine, Tumours.

INTRODUCTION: The vertebral column is an important site for occurrence of different variety of inflammatory, benign and malignant lesions. Since the common presenting complaint of all these lesions is pain, it becomes important to diagnose these lesions by using clinical acumen and best available diagnostic modalities. However, considering numerous and heterogeneous contents of these regions, lesions that can be encountered potentially are numerous and usual diagnostic armamentarium falls short of providing the exact diagnosis of the lesion. FNAC of radiologically detected vertebral and paravertebral lesions is now exclusively used for diagnosis and further management. It can be safely performed at difficult sites, does not require hospitalization, allows preliminary diagnosis in 15-20 min of aspiration and adjuvant methods such as electron microscopy, immunocytochemistry and DNA ploidy can be employed to arrive at definitive diagnosis.¹

This (FNAC) is of particular importance in suspected infection where a chemotherapeutic agent may be indicated and in suspected metastatic disease where it may be helpful in identifying the nature and probable site of the primary tumour. Moreover, a solitary vertebral lesion in a patient with known malignant disease does not always indicate metastasis. The most common pathological diagnosis is tuberculosis of the vertebral column (Pott's spine).^{2,3} There are on an average 30 million gross tuberculosis patients globally and approximately one third of the cases are found in India. 1 to 3% of the 10 million have involvement of bone and joints.

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Vertebral tuberculosis is the commonest form of skeletal tuberculosis comprising about 50-70% of all bone and joint tuberculosis.⁴

It may present as bony vertebral pain or as paraparesis. Tissue diagnosis is required before initiation of therapy, as sometimes it is not possible to differentiate inflammatory lesions from a malignancy. Thus the role of FNAC is of utmost relevance in this setting as it avoids unnecessary open biopsy in this morbid patients.⁵

The vertebral column is a common site of metastasis. FNAC is associated with a lower risk of tumour seeding as compared to open biopsy. One of the most important indications for FNAC of a radiologically detected vertebral lesion in a patient with a prior history of malignancy is to establish the presence of metastasis. In patients with no known primary tumour, FNAC can be helpful in establishing an initial diagnosis of malignancy and initiate a search for the occult primary malignancy. The common primary sites with vertebral metastasis are lung and breast.^{2,3}

The first CT guided FNAC of spine was done by Adapon (1981) with 50% accuracy rate. But with advances in CT technology as well as in the cytology techniques, percutaneous aspiration cytology (PAC) rather than the 'core biopsy' has gained momentum.^[6] The advantages of the image guide FNAC are: Minimally invasive, relatively inexpensive, accurate, outdoor procedure, minimal complication takes shorter time for diagnosis and can be repeated. This project was undertaken to evaluate the accuracy of FNAC, its impact as a low cost technique for treatment initiation and because this department caters to a very large bulk of spinal skeletal lesions with or without neurological complications.

MATERIAL AND METHODS: The present cross-sectional hospital based study was carried out in the Department of Neurosurgery, G.R.M.C., Gwalior from Nov. 2009 to March 2011. After the institutional ethics committee permission was sought, all the patients of age 5 yrs. and above from either sex presented to the Neurosurgical O.P.D. with neurological signs and symptoms due to spinal lesions were evaluated and investigated and only those with confirmed solitary/multiple vertebral lesions on x-ray/CT/MRI, having normal coagulation profile and consenting to participate were included in the study. The pre-procedure work up of these patients was as follows: Detailed clinical evaluation (History and physical examination).

Laboratory Studies which Include: Complete hemogram, complete coagulation profile i.e. bleeding time, coagulation time, prothrombin time, prothombin time index and platelet count and Urine examination. Radiological studies included Spinal radiogarth, antero-posterior and lateral views; Chest radiograph-PA view; MRI of spine/CT of spine and Ultrasound abdomen and pelvis when indicated. Percutaneous spine FNAC was performed with local anesthesia or local anesthesia and conscious sedation. To minimize the possibility of infection, the study was performed with strict aseptic technique.

Patient positioning depends upon the spine level (Cervical, thoracic, or lumbosacral) of the lesion and its location (vertebral body versus posterior elements). The prone position is optimal for accessing lesions in the thoracic or lumbosacral spine or, rarely, within the posterior aspect of the cervical spine. The supine position is usually required to access the cervical spine. In certain instances – for example, when a patient cannot lie completely prone – the lateral decubitus or prone oblique position can be helpful, an intravenous catheter was also placed prior to the procedure to facilitate the intravenous administration of medications, contrast agents, or hydration.

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Equipment Requirements: Image guidance was accomplished with several different modalities, including fluoroscopy, computed tomography, computed tomography combined with a multidirectional fluoroscope, computed tomographic fluoroscopy, and magnetic resonance imaging. The choice of equipment was determined by its availability, operator preference, and by the location and size of the suspected lesion. A CT-guided spine biopsy was performed without or with the use of a stereotactic apparatus to guide the insertion of the biopsy needle. The use of MRI required the simultaneous usage of MR-compatible equipment, both for patient monitoring and for performing the biopsy procedure.

Biopsy Techniques: An important decision that was made before and during spine FNAC is the choice of approach. The determinants for the approach were lesion location and lesion size. A posterior approach is used for thoracic, lumbosacral, and posterior cervical lesions. An anterior approach was used for most cervical spine biopsies. The location of “critical” normal anatomical structures also modified the approach. Unless the lesion was clearly localized to the left side of the spine, a right-sided approach was preferred to a left-sided approach for accessing thoracic spine tumors without damaging the aorta. The objective was to choose a trajectory that enables access to the lesion without compromising normal, critical structures. The specific location of the lesion within the spine also influenced the approach that was selected.

A vertebral body lesion and a posterior element lesion were approached differently. The selected imaging modality was used to identify the lesion level. Once a safe path to the target lesion was chosen, the entry site on the skin surface was marked with an indelible ink marker. The region of interest was prepared and draped in sterile fashion. A 1cm wheal was raised at the skin entry site by using a 25-gauge needle and a local anesthetic agent (e.g., 1% lidocaine, 0.25% bupivacaine). A stylet-bearing thin needle was then advanced by means of image guidance, and the local anesthetic was administered into the deeper soft tissues. If a vertebra was to be entered, infiltration of the anesthetic agent into the periosteum was extremely helpful in minimizing patient discomfort. When the needle tip was in satisfactory position, the needle hub was removed. Specimen retrieval by means of fine-needle aspiration requires an in-and-out motion within the lesion matrix.

To access bone marrow or a lytic lesion with an aspiration or cutting needle, a pre-existing bone window must be present within the vertebral cortex, as occurs with a lytic focus, or a cortical window was first to be cut with a bone needle. Neither aspiration nor cutting needles will penetrate normal or near normal bone cortex. The suction was released and in this position, both the needle and the syringe were withdrawn. It is important to release negative pressure before removing the needle and syringe and if this is forgotten then the material from the needle may be accidentally aspirated into the syringe and it becomes difficult to expel it.

Needle is detached from syringe and material expelled onto glass slides and thin smears are prepared. If infection was suspected clinically and radiologically, part of the aspirate was sent to the microbiology department for routine bacterial strains as well as A.F.B. culture. Post procedure x-ray chest in erect posture is performed in case of thoracic spine FNAC to exclude pneumothorax. Analgesics were given if patient complains of pain. Any complaints e.g. chest pain, neurological deficit etc. are recorded and managed accordingly.

RESULTS: A total of 56 cases were included in this study. The age of patients ranges between 13 to 72 years, there were 19 females (33.93%) and 37 males (66.07%). Maximum cases were in 3rd to 5th decades. The mean age of cases was 43.2 ± 12.3 years.

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In males the mean age (46.3 ± 11.1 years) was higher than females (40.1 ± 14.2 years). Pain was the most common presenting symptom, followed by radiculopathy and weakness which were seen in 35 (62.5%) and 15 patients (26.79%) respectively. Sphincter disturbances were seen in 6 patients (10.71%) (Table No. 1). Lumbar spine (31 i.e. 55.35%) was most commonly involved segment followed by lower dorsal spine (13 i.e. 23.22%). Upper dorsal and cervical spine was involved in 2 patients each while 7 patients had involvement of multiple spinal segments. L3-L5 segments showed involvement in almost one third of the cases (15 cases). Overall there was uniform distribution in lumbar segment with slight preponderance in the L4-L5 segment.

Being a referral center many patients came here after being investigated at many places. Most of the patients' level of exact lesion was decided on the basis of the MRI of the involved spine (Table No. 2). Many patients had signs and symptoms of systemic involvement (Table No. 3). In maximum number of patients (50 i.e. 89.29) FNAC was done under CT guidance. Image guided FNAC was able to correctly diagnosed the disease in 96.49% of the patients in current study. 1 patient required repeat FNAC because of inadequate specimen obtained during first FNAC and 1 patient in whom FNAC was suggestive of Pott's spine turned out to be metastatic on histopathological examination (after surgery). Pott's spine (42) was the most common cytological result in current study followed by metastasis (9) of which all were adenocarcinomas. Multiple myeloma was seen in 3 patients and in 1 patient FNAC was suggestive of plasmacytoma. In 1 patient sacral chondroma was the clinic-radiological diagnosis but on FNAC diagnosis turned out to be PNET/NHL (Table No. 4).

DISCUSSION: The present study was done with an aim of to find out relation between diagnosis made by FNAC and radiological findings. The mean age of cases was 43.2 ± 12.3 years. In males the mean age (46.3 ± 11.1 years) was higher than females (40.1 ± 14.2 years). And there were fewer females than the males, similar finding has been reported by Kishore et al.⁷ and Moller et al.⁸ Our study observed pain as the most common presenting symptom followed by spinal deformity which are similar to findings by Kishore et al (1991).⁷ As is clear from table above Dorsal and Lumbar spine was most commonly affected in our study (26.7% and 55.35% respectively). This compares favourably with results of Mondal et al.⁹ and Moller et al.⁸ Absence of cervical cases in the study of Moller et al.⁸ probably reflects patient selection. The most common MRI finding in the present study was vertebral body destruction with granulation tissue formation, which reflects the incidence of Pott's spine in this part of the world. Abscess formation was seen in 9% of the patients. A detailed workup all the patients were done to rule out source of spinal lesion.

The chest x-ray abnormality, which were most commonly observed were COPD changes and pleural effusion. USG of abdomen and pelvis which was done routinely did not show primary lesion/ concurrent second lesion in the patients who were included in the study. Serum PSA was raised in 3 patients. Spinal lesions in these patients turned out to be metastasis from carcinoma prostate. M-band electrophoresis was positive in 4 patients who were later diagnosed as cases of multiple myeloma on cytology report. In the present study Pott's spine was the most frequent spinal lesion encountered which reflects prevalence of Pott's spine in this part of world as well as poor socioeconomic status of the patients presenting to Govt. Hospitals. Paravertebral abscess was seen in 9% of the patients in present series but only in half of the patients AFB (Acid Fast Bacillus) was seen on routine microscopy. Metastasis of spine was seen in 15.79% of the patients and multiple myeloma contributed to 7% of spinal lesions. In various studies published worldwide metastasis and infective osteomyelitis account for majority of spinal lesions.⁷⁻¹⁰

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Primary bone lesion other than multiple myeloma was not included in present study. The overall accuracy of various studies.⁷⁻¹⁰ ranged from 60-96%. The accuracy of earlier studies is low probably because advances made in image guidance have helped to accurately localize the lesion as well as to guide placement of needle within the area of interest. In post-CT era, the accuracy approaches 90-96%. The accuracy of our study was 96.49% and this compares favorably with studies performed in post-CT era.

CONCLUSION: Image guided FNAC is highly accurate and effective in diagnosis of vertebral lesions. It is very useful diagnostic tool for early initiation of treatment in patients who are medically unfit for surgical biopsy. It is also very helpful in places where there is high incidence of vertebral lesions. With the help of FNAC initial treatment can be started obviating need of surgical biopsy, especially when equally effective non-surgical option is available.

Sl. No.	Clinical Features	No.	%
1	Pain		
	Neck	2	3.57
	Upper Backache	10	17.86
	Low Backache	44	78.57
2	Radiculopathy	35	62.5
3	Weakness	15	26.79
4	Numbness	12	21.43
5	Sphincter Disturbance	6	10.71

Table 1: The Clinical Profile of the Case

Sl. No.	MRI Finding	No. (n=56)	%
1	Predominant discal involvement	7	12.5
2	Vertebral body and discal involvement	6	10.71
3	Vertebral body destruction	8	14.29
4	Vertebral body destruction with granulation tissue	28	50
5	Abscess	5	8.93
6	Reduce bone height without any other change	15	26.78

Table 2: MRI Findings of Involved Segments

Sl. No.	Systemic Findings	No. (n=56)	%
1	Abnormal chest x-ray	10	45.46
2	USG abdomen pelvis (abnormal findings)	4	18.18
3	CT abdomen	0	0
4	Specific blood investigations:		
	PSA	3	13.64
	Serum electrophoresis for M-Band	4	18.18
	Hormonal profile e.g. (thyroid function test)	1	4.54
	Others	0	0

Table 3: Other Systemic Findings

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Sl. No.	Cytological Diagnosis	No.	%
1	Infection	42	73.69
	Pyogenic	0	0
	Tubercular	42	100
	Others	0	0
2	Metastasis	9	15.79
	Adenocarcinoma	9	100
	Squamous cell carcinoma	0	0
	Others	0	0
3	Multiple myeloma	4*	7.02
4	Primary bone neoplasm	0	0
4	Others (e.g. Hematological malignancies etc.)	1	1.75
5	No result/repeat FNAC	1	1.75

Table 4: Results of FNAC

* 1 patient of plasmacytoma

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