

Role of fluoroscopic guided fine needle aspiration biopsy in spinal pathologies

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Background: The presence of vertebral lesion, whether symptomatic or not presents a diagnostic challenge. Open biopsy of spine is associated with considerable clinical morbidity. Hence it was decided to evaluate the efficacy of fluoroscopic guided fine needle aspiration biopsy (FGFNAB) in providing a definitive diagnosis in pathologies of the spine and to determine the degree of co-relation between the histopathological diagnosis and the presumptive clinicoradiological diagnosis.

Methods: A prospective study of 103 patients in whom a presumptive diagnosis was made by available imaging techniques (including magnetic resonance imaging) was undertaken. All patients underwent histopathological /cytological examination for confirmation of the presumptive diagnosis, using material obtained through FGFNAB.

Results: A definitive diagnosis was established, through FGFNAB, in 76 (73.8%) patients. Non concordant diagnosis was seen in 13(12%) of patients. In 27 (26.2%) patients the results of FGFNAB were inconclusive.

Conclusion: FGFNAB is a minimally invasive, technically easy, quick and cost-effective procedure. It can be done on an outpatient basis, under local anaesthesia and often eliminates the need for an open biopsy. FGFNAB can clinch the diagnosis early and helps institute definitive therapy. Hence we strongly recommend FGFNAB as a basic investigation in all pathological lesions of the spine.

Key-words: Spinal Pathology; Fluoroscopy; Fine needle biopsy.

Introduction

The presence of a vertebral lesion, whether symptomatic or not, presents a diagnostic challenge and is always a cause of concern to the treating clinician. Despite the formidable armamentarium of radiological investigations now available, it is still difficult in many cases to arrive at a definitive diagnosis. Since definitive therapy depends upon the histopathology of the lesion, a tissue diagnosis is invariably necessary¹.

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 nonspecific 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 to a correct diagnosis².

Open biopsy of the spine, was associated with considerable clinical morbidity in a large questionnaire survey of surgeons. The procedure was thought to have worsened the prognosis in 8.5 % of cases put to open biopsy³.

We undertook a prospective study to evaluate the efficacy of fluoroscopic guided fine needle aspiration biopsy (FGFNAB) in providing a definitive diagnosis in pathologies of the spine and to determine the degree of co-relation between the histopathological diagnosis and the presumptive clinicoradiological diagnosis.

Materials & Methods

From July 2002 to December 2003, a prospective study was carried out in 103 patients, who were taken up for FGFNAB of the cervical, dorsal, lumbar and sacral spine pathologies. Informed consent of the patients was obtained.

Patients having a lesion at any level of spine, confirmed by imaging techniques, were taken up. Exclusion criteria included lesions less than 5mm in size or too close to the canal, lesions of anterior cervical spine, patients with deranged bleeding parameters, and uncooperative patient.

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History, positive findings of examination of the spine and neurological assessment were recorded meticulously. Complete haemogram, Montoux test, radiographs of the affected spine, serum phosphorus, serum calcium, and serum alkaline phosphatase were done in all cases. Computer tomography or magnetic resonance imaging of the spine was done as and when indicated. Specific investigations like ELISA (Enzyme linked immunoabsorbant assay) for tuberculosis, Serum electrophoresis, Bence Jones proteins in urine, PSA (prostatic specific antigen) were undertaken, if clinically indicated. These investigations helped us reach to a presumptive diagnosis in all the cases.

Equipment: Touhy epidural needle (Fig 1) -17G was used with outer core diameter of 1.47mm and needle length- 8.89cm

Approach: Patient was put in lateral or prone position. Needle was introduced through postero-lateral approach⁴.

- a) In cervical spine only posterior elements (facet joint, lamina, and spinous process) can be approached safely as there are few, if any, important vascular or neurogenic structures within this region.
- b) D₂ to D₉ Thoracic Vertebrae : 04 cms from the midline at an angle of 35 degrees to the horizontal.
- c) D₁₀ to L₅ Vertebrae: 6.5 cm from the midline at an angle of 35 degrees to the horizontal.
- d) Sacral Spine: 02 cms from the midline at an angle of 90 degrees to the horizontal.

Procedure: Biopsy was done in the operation theatre under local anaesthesia with all aseptic precautions. After confirming the site of the lesion under the image intensifier, epidural needle was inserted according to the above-mentioned technique. The stylet remained in place while inserting the needle into the tissue, to prevent clogging of the needle. Needle was checked for its position under image intensifier in both antero-posterior and lateral views. Stylet was then removed; aspirates were obtained through the epidural needle by attaching a 20cc syringe, to the needle hub and gently withdrawing and advancing the needle several millimeters at the pathologic site while maintaining negative suction. If there was no return of aspirate material, a small amount of saline was injected and then aspirated.

Needle was inserted for a maximum of three times at the pathological site in one sitting and if adequate material was not obtained the procedure was aborted, and it was repeated after 24 hours. We used the needle to obtain two cores of tissue to have a representative sample in almost every case as recommended by Phadke et al⁵. If the patient complained of radicular pain during advancement of the needle, it was

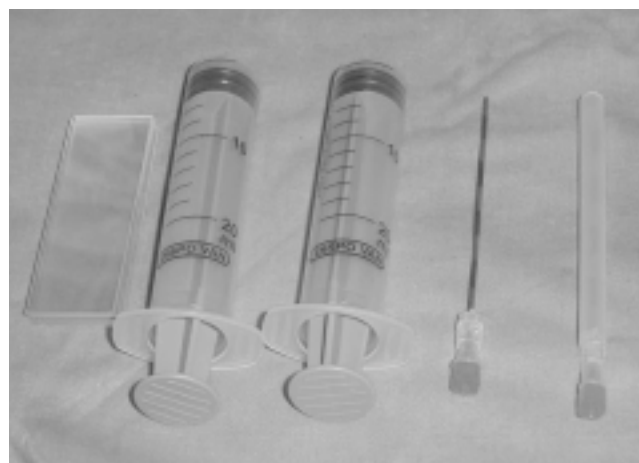


Fig. 1 . Touhy's Needle with Syringe

immediately withdrawn and repositioned in a caudal or cranial direction in order to avoid the nerve root.

During the procedure the same pathologist was available every time in the operation theatre. Needle along with the syringe was handed over to him immediately for cytological / histopathological examination. In all cases air dried and wet smears were prepared and stained smears were also prepared by the papanicolaou method. For interpretation of the result, Phadke et al⁵ criteria's were followed by the pathologist to reach to a definitive diagnosis.

The patients were closely monitored for at least 2 hours after the procedure. Neurological assessment was done during this period to rule out any iatrogenic nerve injury. No additional limitation of activity was enforced after the procedure.

Results

Age of patients ranged from 06 to 90 years; 41 of them were in the age group of 41 to 60 years. One hundred and one cases presented with the chief complaint of back pain with or without weakness. Of the two cases presenting without back pain, one had a mass in the paravertebral region and the other had a kyphotic deformity with weakness. Neurological deficit was observed in 80 patients. Forty five biopsies were done at the thoracic level, followed by the lumbar spine in 36, dorso lumbar junction 13, sacral spine 4, cervical spine 3 and lumbosacral junction in 2 cases.

Pus, fluid, tissue pieces, bone bits, blood clots, necrotic material, granulation tissue and sero-sanguinous fluid were the contents of the aspirates from the site of lesion. On clinico radiological assessment we could reach to a presumptive diagnosis in 80 cases while 23 cases remained undiagnosed on clinicroadiological assessment.

The 80 clinico-radiologically diagnosed cases, which were subjected for FGFNAB showed concordant diagnosis in 50 cases (that is the diagnosis was same both clinico-radiologically and histopathologically). Nonconcordant diagnosis was seen in 13 cases and in 17 cases no diagnosis could be made histopathologically. The distribution of 13 nonconcordant cases is as shown in Table I.

Table I. Distribution of nonconcordant cases.

Presumptive Clinicoradiological Diagnosis	Number of Patients	Definitive diagnosis by FNAB	Number of Patients
Tuberculosis	13	Metastasis	05
		Pyogenic	08
Total	13		13

In the 23 non-conclusive clinicoradiological cases which were also subjected for FGFNAB, a definitive diagnosis could be reached histologically in 13 cases however 10 cases still remained inconclusive (Table II). Hence a definitive diagnosis with FGFNAB could be made in 76 patients. There were 27 inconclusive biopsies out of 103.

Table II. FGFNAB results in 23 cases where clinico radiological assessment was inconclusive.

Presumptive Clinicoradiological Diagnosis	Number of Patients	Definitive diagnosis by FGFNAB	Number of Patients
Inconclusive	23	Tuberculosis	05
		Dermoid cyst	01
		Metastasis	04
		Multiple Myeloma	01
		Plasmacytoma	01
		Aneurysmal bone cyst	01
		Still Inconclusive	10
Total	23		23

Discussion

We preferred the Touhy's epidural needle because of its beveled tip and curved portion at its end, which allows minimal tissue trauma during insertion and also helps in taking biopsy from the osteolytic bones. It has a thin-wall design, which provides maximum lumen with minimum trauma to the patient. Another reasons to choose this needle were its easy availability as it is regularly used by anesthetists for epidural analgesia and also that the needle is economical compared to other suggested varieties of needles by Desantos et al⁶, Debnam and Staple⁷, and Stoker and Kissin⁸.

Subjecting a patient to anti tubercular treatment on a presumptive diagnosis without tissue diagnosis not only

exposes him to the side effects of toxic drugs but also adds on to 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, on being labeled as a case of cancer. Therefore, FGFNAB is a necessity before subjecting the patients to any definitive therapy.

In our study no complications like vertebral compressions, neurologic complications or infections, have been reported at the time of biopsy or post biopsy, suggesting that the procedure is very safe in experienced hands.

In 50 patients FGFNAB, gave a concordant diagnosis with the clinicoradiological diagnosis. Thus FGFNAB proved to be a complimentary adjunct to clinicoradiological assessment. Phadke et al⁵ opined in his study that correlating FGFNAB with the clinical and radiologic findings, a definitive diagnosis could be made in most cases.

The value of FGFNAB of the spine can be judged by the observation that in 13 patients FGFNAB gave a non-concordant diagnosis with the clinicoradiological diagnosis. This is a very high number and certainly proves beyond doubt that FGFNAB should be made a gold standard for the diagnosis of the lesions of the spine. FGFNAB proved to be a base line investigation in 13 out of 23 cases (which could not be diagnosed clinicoradiologically) to give a definitive diagnosis. In our study, the failure was in 27 cases; these cases were taken up for open procedures

Stoker and Kissin⁷ stated that the overall accuracy of FGFNAB varies from 68% to 96%. Debnam & Staple⁶ in 1975 reported a success of 82% working with the Ackerman needle (12 gauge), Shalot et al² in 1982 reported 96% working with Jamshidi needle (8-10 gauge), and Stoker et al⁷ 88.1% working with Jamshidi needle (8-10 gauge). Our success rate was 73.8%, with the Touhy's (17 gauge) epidural needle. This variation in success rates is attributed to the difference in needle type used. In all the 3 studies who have reported better success rates compared to ours, have used wider bore needles with a trephine cutting edge, but the procedure was invasive and done under local anaesthesia and sedation. It was cumbersome, costly, and needed expertise in undertaking this procedure. They had used the needles to achieve specimen adequacy. On the other hand, we have used the 17 gauge Touhy's needle essentially to achieve a percutaneous route, making it cost-effective and noninvasive leading us to undertake FGFNAB as an outdoor procedure.

When compared with the success rates of Fyfe et al⁹, 71%, working with trephine needles and Moore et al¹⁰, 60%, working with Ackerman needle, our results were better.

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