CT-GUIDED FNAC AND BIOPSY : OUR EXPERIENCE

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ABSTRACT

Twenty five patients with mass lesions in the chest, abdomen, pelvis, and paraspinal region underwent contrast enhanced computed tomographic scan (CT Scan) followed by CT guided FNAC or Tru-cut biopsy. CT was found to be extremely valuable in ensuring needle placement within the lesion. It also helped in avoiding the necrotic areas and obtaining tissue from an area most likely to yield an adequate sample. A post-procedure scan helped in ruling out post-procedure complications.

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Introduction

The value of interventional procedures for expeditious and cost effective management of patients is widely accepted. The acceptance of computerised tomography (CT)-guided procedures has been rapid due to the widespread use of fluoroscopic and ultrasonographic procedures [1,2]. Although fluoroscopy can provide multiplanar visualization of needle or instrument, it is not capable of directly visualizing soft tissue abnormalities except in the chest. The ability to localize the needle tip consistently and accurately in the axial plane is a distinct advantage of CT over fluoroscopy or ultrasonography.

Versatility is one of the most valuable features of CT-guided procedures. There is significant versatility in selecting the entry point for biopsies because of the completeness of the CT image. A full 360 degree view of the patient is provided. All organs including the bowel are visualized so that a variety of needle pathways can be chosen. It is possible to choose appropriate pathways to avoid specific organs and vascular structures.

Material and Methods

Twenty five patients with nodular or mass lesions in the chest, abdomen, and paraspinal regions were evaluated with a dynamic bolus CT scan prior to taking them up for biopsy. Informed consent was taken and premedication (atropine 0.6 mg intramuscularly) administered. The site for biopsy was selected. The criteria used for selection were :

- (a) A clear path of entry for the needle avoiding bone.
- (b) A table position where the largest diameter of the lesion was seen and which traversed the least amount of uninvolved tissue.

Using these criteria, the complication rate can be reduced [3].

The patient was placed in an appropriate position and a metallic marker was placed at the selected point of entry and a scan taken through this table position to verify the suitability of this point of entry. The distance of the marker from the biopsy site was measured on the console. As far as possible a straight entry of the needle was preferred to an angulated one.

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Once the entry site was confirmed, the skin was prepared with savlon, betadine and spirit. A local anaesthetic agent (Xylocaine) was administered at the selected site. After asking the patient to suspend respiration, the needle was introduced up to the required distance. Large Tru-cut biopsy needles were used for lesions abutting the chest wall whereas a 19-20 gauge spinal needle was used in more centrally located lesions where one had to go through normal tissue. The number of passes with the Tru-cut biopsy needle was limited to 2 in masses in contact with the pleura, whereas the number of passes with the spinal or Chiba needle was limited to 2 - 3 when one had to traverse a lot of normal tissue.

A section was taken at the same table position to ensure proper needle placement within the mass. A 10 mL disposable syringe was attached to the needle hub in case a spinal needle was used and the needle moved back and forth by a few millimetres maintaining a negative pressure, as advised by Kruela et al [4]. With a Tru-cut needle, the biopsy was obtained by the standard technique [5].

The smears on the slides were stained and mounted, and tissue was also taken in a test tube containing saline for further processing. After ensuring that a satisfactory specimen was obtained, a CT section was obtained at the same level to rule out post-procedure complications. A radiograph of the chest and abdomen in the standing patient was obtained 3 hours after the procedure to further rule out complications.

Results

A total of 25 patients were taken up for biopsy after CT scan. Of these, 21 patients had chest masses, 1 patient had an abdominal mass, 1 a pelvic mass and 2 patients had a paraspinal masses (Table 1).

Out of the 21 patients with chest masses, 8 cases were thought to be tubercular in etiology. In addition, 4 patients, in whom soft tissue mass lesions or nodules were seen, were suspected to be tuberculosis. Fine needle aspiration cytology (FNAC) Tru-cut bi-

TABLE 1

Distribution of cases by site and histopathology

Biopsied region	Pre-biopsy diagnosis on CT (no of patients)	Histopathological outcome (no of patients)
Chest	Tuberculosis (8)	Tuberculosis (8)
	Mass lesions or nodules (4)	Tuberculosis (3) Small cell carcinoma (1)
	Suspicion of bronchogenic carcinoma (3)	Bronchogenic carcinoma (3)
	Consolidation (2)	Granuloma (1) Small cell carcinoma (1)
	Germ cell tumour (1)	Germ cell tumour (1)
	Neuroblastoma residual tumour (1)	No residual tumour (1)
	Neurofibroma (1)	Neurofibroma (1)
	Carcinoma nasopharynx (1)	Metastatic lesion (1)
Abdomen	Intraabdominal mass (1)	Swchwannoma on FNAC and Fibroid on biopsy
Pelvis	Cystic adnexal mass in a patient with Ca cervix (1)	No malignant cells (1)
Paraspinal	Secondaries from Ca colon (1)	Metastatic adenocarcinoma (1)
	Paravertebral mass with (1) vertebral destruction (metastasis or primary?)	Plasmacytoma (1)

opsy confirmed granulomatous lesions in 11 of these twelve cases. One of these, with a cavitory lesion, was found to have super-added fungal infection. Two patients had consolidation and of these 1 patient had small cell carcinoma and 1 patient showed nonspecific findings suggestive of chronic granulomatous disease. Three more cases had consolidation but were strongly suggestive of bronchogenic carcinoma and this was confirmed on biopsy. One of these cases had a small cell carcinoma (Fig 1). One case of posterior mediastinal mass thought to be a neurogenic tumor was confirmed to be a neurofibroma. A residual metastatic chest wall lesion was suspected in a case of neuroblastoma. FNAC ruled out metastasis or active lesion. FNAC confirmed metastasis in

Fig. 1 : CT scan of the chest showing a large cavitating mass lesion in the right lung. The needle is seen within the wall of the lesion. This was a case of bronchogenic carcinoma.

Fig. 2 : CT scan of the chest shows nodular lesions in the left lung. The needle is seen just outside the nodule. The hypodensity seen distal to the nodule is due to photon subtraction artefact.

a case of nasopharyngeal carcinoma with a nodular lesion in the lung (Fig. 2). One case of anterior mediastinal mass was diagnosed on CT scan as germ cell tumour, which was confirmed histopathologically after biopsy.

Two paraspinal lesions were biopsied with Tru-cut needle, of which one was a known case of adenocarcinoma colon. Metastasis was confirmed on biopsy. Another case of vertebral destruction showed findings suggestive of plasmacytoma on FNAC.

The abdominal mass was thought to be a large pedunculated fibroid as per the CT appearances. FNAC showed findings suggestive of a schwannoma. However postoperatively this was confirmed to be a fibroid.

Fig. 3 : CT scan of the pelvis, in a case of carcinoma cervix, shows a large cystic adnexal mass lesion. The needle tip is seen at the centre of the mass.

A patient being followed up for carcinoma cervix was found to have a large cystic adnexal mass (Fig. 3). CT guided FNAC established the absence of any malignant cells.

We had no major complication in any of our cases. Three of our patients developed pneumothorax, one of whom also had surgical emphysema. In 2 of these patients a Tru-cut biopsy had been performed and two passes had been made in each case.

Discussion

The introduction of CT-guided biopsies in 1976 by Haaga et al [5] has totally revolutionized guided biopsy procedures. Prior to this, fluoroscopic guided biopsies were favoured. The lesions best suited for CT guidance in the chest are those in the apices, or mediastinum, or hilar regions. Other areas can be adequately seen on fluoroscopy or USG. However, whenever possible, CT guidance should be preferred. This ensures proper needle placement and helps to avoid the necrotic areas. Carefully performed transthoracic needle or Tru-cut biopsy can result in an extremely high accuracy rate (90% - 98%) of diagnosis of cancer [7-9]. They are often helpful in indicating the histologic typing of the lesions (77%-83%) [3]. In our series, the diagnosis of malignancy and cell typing were possible in almost all cases. FNAC of chest lesions was done in patients with tuberculosis who were not responding to both first and

second line of antitubercular drugs. Tuberculosis was confirmed in 9 of these cases. This was primarily done to rule out superadded fungal infection, as found in one of our cases. In another of our cases, an associated small cell carcinoma was seen in a case of pulmonary tuberculosis.

Complications were minor. We had pneumothorax in 3 of our patients and surgical emphysema in 1 of the 3. These were self-limiting and no further intervention was required. Studies have reported a higher incidence of pneumothorax ranging from 20 - 61% [10]. In our series, the incidence was 15%, close to the figure of 14% reported by van Sonnenberg et al [11]. This relatively low incidence could be due to

- (a) Larger number of peripheral chest lesions biopsied.
- (b) Limited number of passes made.
- (c) Passing through minimal amount of normal lung tissue.

In view of the above discussion, it is concluded that CT guided biopsy may be done as a routine procedure as it is less traumatic and less time consuming. More importantly, it results in a larger number of conclusive biopsy specimens and therefore has a high index of accuracy and positivity.

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