Original Article

Diagnostic Yield of Ultrasound-Guided Tru-Cut Biopsies of Peripheral Lesions by the Pulmonologist

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Background: Lung parenchyma lesions have multiple differential diagnoses and needs extensive workup for proper treatment but tissue histopathology or culture remain the gold standard. We calculated whether ultrasound guided Tru-cut biopsy is safe when performed by pulmonologist.

Material and methods: Patient with peripheral lesion on CT chest were underwent tru-cut biopsies performed with Fine-core needle (16 G) under ultrasound guidance by pulmonologist.

A curvi-linear 2-5 MHz probe was used for localization and real time guidance during procedure. Minimum 4 biopsies were performed. Definitive diagnosis was labeled if clear cut diagnosis was made on provided tissue by pathologist. Diagnostic yield was calculated by SPSS 16.0.

Results: Fifty patients (M: 28(56%), F: 22(44%)) had tru-cut biopsies with mean age 55± 9.4. The sites of the lesions were pulmonary in 44 cases (88%), Mediastinal in 4 cases (8%), pleuro-parietal in 1 case (2%) supraclavicular in 1 case (2%). Mean size was 9.09±1.65 cm in maximum dimension. No major complication like pneumothorax was noted. Minor hemoptysis after procedure was noted in two patients 4% (n= 2) that stopped spontaneously while procedural pain was reported in 20 % (n=10) of cases.

In 98% (n=49) procedures we obtained a concluding diagnostic, 4% (n=2) with organizing pneumonia and 94% (n= 47) with cancers. Remaining 2% (n=1) patient; we obtained a non-diagnostic result due to inadequate tissue it was a sub-clavicular lesion.

The sensitivity was 98 % and the overall diagnostic yield was 98%.

Conclusions: Pulmonologists can efficiently perform ultrasound-guided biopsies in peripheral lesions with limited complications. It is comparable to biopsies performed by radiologist (91%).

KEY Words: Malignancy, Truc-cut biopsy, lung biopsy , Ultrasound, mediastinal

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Introduction

Pulmonary lesions have broad differential diagnosis including malignant, benign and inflammatory lesions. Adenocarcinoma is most common among the malignant. These lesions can be in parenchyma, pleural or Mediastinal. Tissue diagnosis is gold standard for all of these lesions that used to be obtained either by open lung biopsy, mediastinoscopy or video assisted thoracic surgery (VATS). CT guided biopsy is also a known modality for transthoracic biopsies but costly, exposure to radiation, shifting of patient and availability are the main drawback of the technique.[1] Role of ultrasound is emerging in the pulmonology and now being used assessment of various parenchymal and pleural diseases.[2]

USG guided transthoracic biopsy of pulmonary lesions is cost effective, portable and readily available modality that not only spare patient from huge radiation but also easy to perform.[3] Many studies shows that tru-cut biopsied done by radiologist have comparable diagnostic yield with the CT scan guided

procedures.[3,4,6]. Tru-cut biopsies can be done by the pulmonologist as they are familiar to the USG and already using it for various procedures including thoraco-centesis. This will not only save the time of the patient but also help in early diagnosis. Incidental findings can also help for decision of further investigations.

Materials and Methods

It was Non-Randomized Prospective interventional study performed at Pulmonology and Critical department of Services Institute of Medical Sciences (SIMS) from March 2013 to 2015. Study was approved by ethical review committee of the department.

A total of 50 consecutive patients underwent US-guided transthoracic Tru-cut biopsy of pulmonary lesions after informed consent.

Every patient was evaluated with baseline investigations, CXR and HRCT/CT chest with contrast beforehand. USG was done with 2-5Hz Curvi-linear probe. Site, size and echogenicity of each lesion were noted. Lesions which were peripheral or abutting thoracic wall were biopsied. Fine core single shot needle 16F was used and 5-8 biopsies were performed with different depths. Biopsy sample was saved in fromaline jar and sent for histopathology. AFB culture/ sensitivity was requested (sample in normal saline) if indicated. Patients were observed for 2 hours post procedure and complication were noted on a pre-set proforma.

Results

Fifty patient underwent patients had tru-cut biopsies with mean age 55± 9.4. Male patients were 28(56%) while Female22 (44%). The sites of the lesions were pulmonary in 44 cases (88%), Mediastinal in 4 cases (8%), pleuro-parietal in 1 case (2%) and supraclavicular in 1 case (2%). Two patients had sub-scapular lesion and biopsy was performed with maximum lateral displacement and angulation of needle with real time USG guidance. Mean size of the lesions was 9.09±1.65 cm in maximum dimension. Most the tumors had homogenous echogenicity 40(80%) while 19(20%) had mixed. Minor hemoptysis after procedure was noted in two patients(4%) that stopped spontaneously while procedural pain were reported in 20 % of cases(table 1).

In 49 procedures we obtained a concluding diagnostic (98%) with adequate tissue, while in 1 patient (2%) we obtained a non-diagnostic result.

Most common diagnosis was adenocarcinoma followed by squamous cell carcinoma and small cell carcinoma. 2 patients had organizing pneumonia (table 2). The sensitivity was 98 % and the overall diagnostic accuracy was 98%.

Table I. Characteristic of study population and rate of complications

Age	55± 9.4
Size	7.09± 1.65
Characteristic	N (%)
Male Female	28 (56) 22 (44)
Complications Hemoptysis Pain	 02 (04) 20 (40)

Table II.various diagnosis obtained on Histopathology after tru-cut biopsy.

Diagnosis	Number (N)	Percentage
Squamous Cell CA	16	32
Adenocarcinoma	18	36
Poorly differentiated Ca.	04	08
Small Cell Carcinoma	09	18
Organizing Pneumonia	02	04
Non-Diagnostic	01	2

Discussion

Ultrasound has now become the useful investigation for the diagnosis of various pulmonary diseases. It role has expended from pleural fluid assessment to diagnosis of pneumonia[10], pneumothorax, atelectasis, interstitial lung disease, pulmonary edema, and assessment of various pulmonary mass lesions. Transthoracic tru-cut biopsy has been done by CT guidance now switched to USG guidance especially for peripheral lesion.[5] Various studies of different origin found it safe, cheaper and easy to perform.[5-9]

We selected patients with peripheral lesions that were attached to thoracic wall and size was 4cm or greater. This not only made the procedure safer (no pneumothorax) but increase the tissue sample and diagnostic yield. As Mr. Yang and colleagues found that pneumothorax is often seen in patients with a lesion depth <1.5 cm, which might be due to the fact that the

Tru-Cut needle can easily damage normal lung tissue surrounding lesions at this depth.[11] Another factor might have increase the yield was sampling in various depths. Safety may be increase by color Doppler for needle guidance. [9]

Diagnostic yield (98%) is comparable to various studies done by radiologist[12-14]and pulmonologist.[15]

Conclusion

USG guided trucut biopsy is safe procedure with good diagnostic yield when performed by pulmonologist.

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