Original Research Paper

Radiology

STUDY OF COMPUTERIZED TOMOGRAPHY (CT) GUIDED LUNG BIOPSY IN LUNG TUMOR

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ABSTRACT **Introduction:** Thoracic malignant diseases including lung cancer are increasing nowadays particularly in Asian region. Different diagnostic modalities include surgical biopsy, bronchoscopy and percutaneous needle biopsy under computed tomography (CT) guidance. Percutaneous needle biopsy under CT guidance is more effective, less invasive than surgical biopsy and commonly performed in clinical settings as well. It has a high diagnostic rate (77–96%). Present study was conducted to study CT guided lung biopsy findings in lung or pleural lesions **Materials and Methods:** 40 patients of age >30 years of both gender who underwent CT-guided percutaneous biopsy for peripheral lung or pleural lesions adjacent to the chest wall were enrolled. Local anaesthesia was administered containing 1% lidocaine. After insertion of introducer needle 18-G (needle length 100 mm) biopsies were performed with a 19-G core tissue biopsy needle. After completion of procedure, chest CT images were obtained to detect any complication like pneumothorax or haemorrhage **Observations and Results:** Majority cases i.e. 29 (72.5 %) were from paravertebral area followed by 6 (15 %) from posterior axillary area, 3 (7.5 %) from mid clavicular area & 2 (5 %) from anterior axillary area. Majority lesion i.e., 23 (57.5 %) between 0 to 20 mm size with long diameter mean ± SD as 23.44 ± 8.5. Lesion-pleura contact arc length (LPCAL) mean ± SD is 11.6 ± 4.43. Needle time & Total time mean ± SD 4.275 ± 0.75 & 31.1 ± 4.46 respectively. Pleural effusion & Hemoptysis was present in 8 (20 %) & 6 (15 %) patients respectively. malignant cases were 12 (30 %) & benign were 18 (45 %). 4 (10 %) had other diagnosis whereas in 6 (15 %) no diagnosis found. 1 (2.5 %) case had Pneumothorax & 1 (2.5 %) had hemorrhage as complication post procedure **Conclusion:** CT-guided percutaneous biopsy (CT-PTNB) has several advantages like high diagnostic accuracy, low cost, and manageable complications

KEYWORDS : CT-PTNB, LPCAL

INTRODUCTION

Thoracic malignant diseases including lung cancer are increasing nowadays particularly in Asian region[1,2]. Local invasiveness and distant metastases are signs of poor prognosis in lung cancer. Hence more accurate diagnostic procedure is necessary for appropriate management. Different diagnostic modalities include surgical biopsy, bronchoscopy and percutaneous needle biopsy under computed tomography (CT) guidance. In this surgical biopsy is a reliable method for in obtaining an adequate amount of tissue but it is invasive and requires general anaesthesia. Bronchoscopy in this regard is safe but, it has a low diagnostic yield in peripheral lesions, especially when the lesions are located adjacent to the chest wall or within 10 mm from the costal visceral pleura[3]. Percutaneous needle biopsy under CT guidance is more effective, less invasive than surgical biopsy and commonly performed in clinical settings as well. It has a high diagnostic rate (77–96%)[4,5,6]. Smaller and higher numbers of nodules can be detected because of improvement in the scan resolution nowadays[7,8]. Diagnosis of these nodules is challenging as differentiating malignant and benign nodules is important for treatment planning[9]. Although CT-guided lung biopsy is associated with certain complications as radiation exposure & others, it is a minimally invasive method to obtain tissue diagnosis of small indeterminate pulmonary nodules[10,11,12]. Present study was conducted to study CT guided lung biopsy findings in lung or pleural lesions

AIM

To study CT guided lung biopsy in lung tumour

OBJECTIVES

1. To assess efficacy and safety of CT-guided biopsy in patients with peripheral lung or pleural lesions
2. To assess possible complication post procedure

MATERIAL AND METHODS

Present study is a cross sectional prospective study conducted from duration June 2022 to May 2023 in radiology department, Dr Vitthalrao Vikhe Patil medical college and hospital Ahmednagar, Maharashtra. Institutional ethics committee permission was taken prior to commencement of study. 40 patients of thoracic percutaneous needle biopsy fulfilling inclusion and exclusion criteria were enrolled. Study was explained to all participants and written informed consent was obtained from all.

Inclusion Criteria

40 patients of age >30 years of both gender who underwent CT-guided percutaneous biopsy for peripheral lung or pleural lesions adjacent to the chest wall were enrolled

Exclusion Criteria

1. Biopsies of thoracic lesions not adjacent to the chest wall
2. Patients with abnormal coagulations status

Procedure

Relevant clinical history & demographics like age, sex was noted. All patients were then posted for CT scan. All lesions were visualized on CT machine Philips 16 slices and imaged as 5-mm-thick contiguous axial tomographic sections, at 120 kVp and 100 mA, before CT-guided needle biopsy. After lesions were detected, preliminary helical CT images were obtained in 3-mm-thick sections through the lesion. Local anaesthesia was administered containing 1% lidocaine. After insertion of introducer needle 18-G (needle length 100 mm) biopsies were performed with a 19-G core tissue biopsy needle. After completion of procedure, chest CT images were obtained to detect any complication like pneumothorax or haemorrhage. Patients were continuously monitored in a supine or prone position for SpO2 and blood pressure for at

least 2 hours. Lesion location, lesion size, lesion-pleura contact arc length (LPCAL) were note & result analyzed

Statistical analysis

Statistical analysis was performed using SPSS software, version 20. Data are expressed as mean ± SD and frequency with percentages N (%). χ^2-test was used to evaluate qualitative data and to study association between two variables. Statistical significance was assumed if P value less than 0.05.

OBSERVATION AND RESULT

Table 1: Age & gender distribution

Sr No.	Age (Years)	Male N (%)	Female N (%)	Total N (%)
1	30-40	2 (5 %)	1 (2.5 %)	3 (7.5 %)
2	41-50	18 (45 %)	6 (15 %)	24 (60 %)
3	51-60	4 (10 %)	3 (7.5 %)	7 (17.5 %)
4	61-70	2 (5 %)	1 (2.5 %)	3 (7.5 %)
5	>70	2 (5 %)	1 (2.5 %)	3 (7.5 %)
Total N (%)		28 (70 %)	12 (30 %)	40 (100 %)

Table 1 showing age & gender distribution, shows that the maximum patients i.e. 24 (60 %) were between age group 41 to 50 years. Male cases were 28 (70 %) & females were 12 (30 %).

Table 2: Lesion location

Sr No.	Lesion location	Number of cases N (%)
1	Mid clavicular area	3 (7.5 %)
2	Anterior axillary area	2 (5 %)
3	Posterior axillary area	6 (15 %)
4	Paravertebral area	29 (72.5 %)
Total N (%)		40 (100 %)

In **Table 2** it is shown that, majority cases i.e. 29 (72.5 %) were from paravertebral area followed by 6 (15 %) from posterior axillary area, 3 (7.5 %) from mid clavicular area & 2 (5 %) from anterior axillary area

Table 3: CT guided biopsy findings

Sr No.	Findings	Result
1	Lesion size (mm) N (%) a. 0-20 b. 21-40 c. 41-90	23 (57.5 %) 10 (25 %) 7 (17.5 %)
2	Long diameter (mm) Mean ± SD	23.44 ± 8.5
3	LPCAL (lesion-pleura contact arc length) Mean ± SD	11.6 ± 4.43
4	Needle time (min), Mean ± SD	4.275 ± 0.75
5	Total time (min) Mean ± SD	31.1 ± 4.46
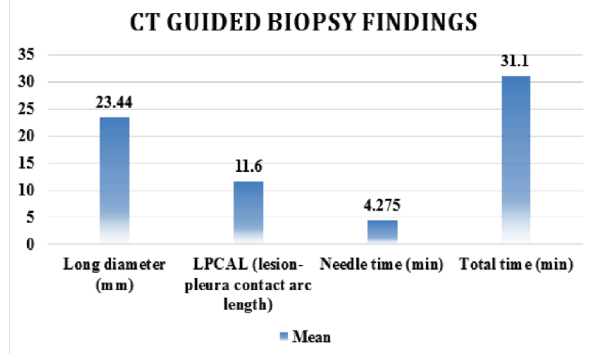
Graph 1: CT guided biopsy findings

Table 3 showing CT findings, shows majority lesion i.e., 23 (57.5 %) between o to 20 mm size with long diameter mean ± SD as 23.44 ± 8.5. Lesion-pleura contact arc length (LPCAL) mean ± SD is 11.6 ± 4.43. Needle time & Total time mean ± SD 4.275 ± 0.75 & 31.1 ± 4.46 respectively.

Table 4: Associated condition

Sr No.	Condition	Number of cases N (%)
1	Pleural effusion a. Present b. Absent	 8 (20 %) 32 (80 %)
2	Hemoptysis a. Present b. Absent	 6 (15 %) 34 (85 %)

As shown in **Table 4** Pleural effusion & Hemoptysis was present in 8 (20 %) & 6 (15 %) patients respectively

Table 5: Diagnosis

Sr No.	Diagnosis	Number of cases N (%)
1	Malignant	12 (30 %)
2	Benign	18 (45 %)
3	Other	4 (10 %)
4	No diagnosis	6 (15 %)
Total N (%)		40 (100 %)

As shown in **Table 5,** malignant cases were 12 (30 %) & benign were 18 (45 %). 4 (10 %) had other diagnosis whereas in 6 (15 %) no diagnosis found.

Table 6: Complication post procedure

Sr No.	Complication	Number of cases N (%)
1	Pneumothorax	1 (2.5 %)
2	Hemorrhage	1 (2.5 %)
Total N (%)		2 (5 %)

As shown in **Table 6,** 1 (2.5 %) case had Pneumothorax & 1 (2.5 %) had hemorrhage

DISCUSSION

Advancements in computed tomography (CT) contributed to major influence on detection of cancer-suspected lung nodules. CT-guided lung biopsy is a minimally invasive method & helps in diagnosis of small indeterminate pulmonary nodules. But accuracy of biopsies is very important as false positive and false negative result have a huge impact on the management. Present study was conducted in 40 patients of age >30 years of both gender who underwent CT-guided percutaneous biopsy for peripheral lung or pleural lesions to assess efficacy and safety of CT-guided biopsy in patients with peripheral lung or pleural lesions. Results obtained were compiled as summarized. In present study maximum patients i.e. 24 (60 %) were between age group 41 to 50 years. Male cases were 28 (70 %) & females were 12 (30 %). In similar study by **Yamamoto N et al (2019)**[13] mean age was 73 (age range 66-79). In **Ashraf H et al (2017)**[14] study mean age was 68 (age range 29-91). **Yang W et al (2015)**[15] in their study enrolled three hundred and eleven patients (211 males and 100 females), with a mean age of 59.6 years (range, 19–87 years). In present study majority cases i.e. 29 (72.5 %) were from paravertebral area followed by 6 (15 %) from posterior axillary area, 3 (7.5 %) from mid clavicular area & 2 (5 %) from anterior axillary area.

Majority lesion i.e., 23 (57.5 %) between o to 20 mm size with long diameter mean ± SD as 23.44 ± 8.5. Lesion-pleura contact arc length (LPCAL) mean ± SD is 11.6 ± 4.43. Needle time & Total time mean ± SD 4.275 ± 0.75 & 31.1 ± 4.46 respectively. Pleural effusion & Hemoptysis was present in 8 (20 %) & 6 (15 %) patients respectively. malignant cases were 12 (30 %) & benign were 18 (45 %). 4 (10 %) had other diagnosis whereas in 6 (15 %) no diagnosis found. 1 (2.5 %) case had Pneumothorax & 1 (2.5 %) had haemorrhage as complication post procedure. In similar study by **Yamamoto N et al (2019)**[13] amongst 52 samples, 40 were non-small cell lung cancers, 3 small cell lung cancers, 7 metastatic lung cancers, 1 malignant mesothelioma, and 1 malignant thymic cancer. Amongst rest Seven 2 organizing pneumonias, 2 granulation

tissues, 1 tuberculoma, 1 schwannoma, and 1 methotrexate-associated lymphoproliferative disorder. 11 biopsies had no diagnosis as in 8 no malignancy specimens, 2 necrosis, and 1 insufficient material. The median value of LPCAL was 40 mm. **Ashraf H et al (2017)**[14] in their study found 53% of the biopsies had malignancy, 16% were benign, and approximately 27% were inconclusive. **Yang W et al (2015)**[15] in their study found of the 311 pulmonary lesion 217 and 94 cases were found to be malignant and benign lesions, respectively. Pneumothorax found in 55 (17.7%) patients

CONCLUSION

In conclusion, CT-guided percutaneous biopsy (CT-PTNB) has several advantages like high diagnostic accuracy, low cost, and manageable complications. It has scope for improving accuracy through proficient operating skills and precise positioning of the puncture. This will minimize complications too. Thus, this conventional method is still useful for most cases

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