

Percutaneous intrathoracic mass biopsy: single centre performance and complications

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SUMMARY

Background: Lung cancer and pulmonary metastasis are common problems in daily practice, obtaining tissue sample to reach a final diagnosis is previously done by surgical operation under general anaesthesia, and nowadays with an adventure of imaging-guided tissue biopsy specifically tru-cut biopsy the number of surgical procedures was dramatically decreasing.

Aims: The study aimed to evaluate the role of Computed Tomography (CT) guided intrathoracic biopsy in achieving adequate tissue sampling and to assess the complications of the procedure.

Methods: A prospective study included 30 patients who complained of variable symptoms related to the respiratory system and were referred to Interventional Radiology (IR) clinic from the thoracic surgery after performing contrast-enhanced chest CT that revealed intrathoracic-lung or pleural related-lesion(s), this study was performed in Ghazi alharriri subspecialty hospital during the period from September 2020 to November 2021.

Results: Thirty patients were included in the study, 19 are males and 11 are females, the mean age is 60 years, the majority of patients were in their 6th or 7th decades, 77% had a solitary pulmonary lesion, technical success is seen in 97%, the majority of biopsied lesions were >3 centimetres in diameter, 80% were less than 5 centimetres in-depth, one passing attempt was achieved in 67% of patients, pneumothorax is seen in 26% of the cases, pulmonary hematoma seen in 13% while haemoptysis seen in one case, significant correlation seen between a number of passes and pneumothorax and/or hematoma formation, haemoptysis correlation is also statistically significant when correlated with the depth of lesion.

Conclusion: CT guided intrathoracic lesion biopsy is very efficient, cost-effective, and less invasive technique when compared with thoracic surgery, as well as it has low complications and even when the complications occur all are not significant, it dramatically decreases the number of surgical procedures attempted to reach the final tissue diagnosis.

Key words: CT guided lung biopsy, lung mass, pneumothorax, pulmonary haemorrhage, pulmonary contusion

INTRODUCTION

Lung cancer is the commonest malignancy diagnosed in males and 2nd most common primary cancer in females, lung cancer is still the second most commonly diagnosed malignancy and the number one cause of cancer death in 2020 [1].

The mass is the most common presenting features of lung cancer, it appeared rounded or elliptical lesion with well-defined margin or spiculated outline invading the nearby lung parenchyma, central hilar mass with pulmonary collapse is another radiological feature of primary lung cancer, other features include pleural effusion, lymphadenopathy and locoregional metastasis [2-4].

Achieving thoracic tissue tru-cut biopsy was a promising technique with high accuracy [5] and now considered time saving and minimally invasive procedure in comparison to traditional surgery [6], it can be either ultrasound-guided biopsy which was indicated for superficial pleural based lesion, soft tissue lesion or lytic expansile bony lesion, for deeper lesions and through who cannot be reached by ultrasound the CT was the main modality for achieving tissue sampling, by comparing it to ultrasound its costly, time consuming and utilize ionizing radiation [7].

CT guided tissue biopsy has a minimal if any procedural or post procedure complications, in the top of list was pneumothorax which is expected to occur in 10%-15% of patients and even more in those with chronic lung disease when the risk increases to 25%-50% [8], in 90% of cases pneumothorax is self-limited and does not require drainage [9], other common self-limited complication is pulmonary haemorrhage in the course of firing needle, extremely rare complications include air embolism and tumour seeding along biopsy tract [10].

PATIENTS AND METHODS

This is a prospective study that comprised 30 patients referred to the interventional radiology unit from the cardiovascular and thoracic surgery clinic after the discovery of lung related or intrathoracic mass lesion, the study was performed in specialties surgical hospital/medical city complex in Baghdad during the period from September 2020 to November 2021. Their age ranged from 38 to 82 years.

All patients had chest contrast enhanced CT being reviewed and the access site was determined properly, all patients were

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Tab. 1. Demographic distribution of study sample

Gender	No.%
Males	19 (63%)
Females	11 (37%)
Total	30
Age	No. %
<50 years	4 (13%)
51-60 years	10 (34%)
61-70 years	11 (36%)
>71 years	5 (17%)
Total	30

prepared by sending them for platelets count and International Normalization Ratio (INR) to rule out bleeding tendency, those with platelets counts >50000 and INR <1.5 were included in the study, patients on clopidogrel or heparin had their treatment stopped 5 days/one day before the procedure respectively.

In the day of the procedure, the patients put off their cloth and lying flat on CT couch, supine, prone or prone oblique position was utilized according to the mass location, central linear metallic marker was deployed along the spine or sternum and CT scan was initiated, the level of CT slice was chosen and table movement was done subsequently to the desire level, using CT light marker to draw a corresponding line on patient body, the site was prepared and draped with complete sterilization, local anesthesia was given using 5 ml-10 ml of lidocaine 2%, then the co-axial biopsy needle was introduced in steps down to pleura chest wall interface, after that gradual advance of the needle was utilized down to the mass, three biopsies was attempted in all patients, post-procedure check CT scan was done in all patient to assess for immediate complications if occurred, then the patient was transferred to the recovery room for monitoring and discharged home 1 hour after the procedure if no complications, those with pneumothorax were slept biopsy site down and discharged 4 hours after obtaining chest x-ray.

STATISTICAL ANALYSIS

All patients' data entered using computerized statistical software; Statistical Package for Social Sciences (SPSS) version 20 was used. Descriptive statistics presented as (mean \pm standard deviation) and frequencies as percentages. Multiple contingency tables conducted and appropriate statistical tests were performed, Chi-square was used for categorical variables and Fisher's exact test was used when more than 20% of the expected variable was less than 5.

RESULTS

The study consists of thirty patients, 19 males and 11 females, their age is in range between 38-82 years with median age is 60 years, the majority of the patients are in 6th or 7th decades, the details regarding the patients age and gender are shown in table 1 below.

Regarding the causes of the intrathoracic lesion, solitary lung mass seen in majority of patient and represents 23/30 patients (77%) of the cases, from the remaining sample six patients had multiple lesions mostly meets from extra-thoracic primary

malignancy and one patient had radiological features of mesothelioma.

Percutaneous lung biopsy was successful in 29 patients (97%) and one failed due to pneumothorax displacing the targeted mass to be in contact with diaphragm making it unsafe for biopsy.

The majority of the lesions are greater than 3 centimetres and seen in 70% of the patients, most of them are less than 5 centimetres in depth (80%).

One passing attempt was performed in large number of the sample 20/30 (67%), the prone position is used in 18 out of 30 patients (60%), the remaining 40% were biopsied in supine position.

Concerning the complications of percutaneous CT guided lung biopsy, pneumothorax is seen in 26.6% of the patients, in all of them is less than 20% in volume and resolved within 1 hours-3 hours of monitoring, non- of them need chest tube or resuscitation, simple pulmonary haemorrhage is seen in 13% while haemoptysis developed in one patient (3%) which is resolved in less than 30 minutes.

No significant correlation seen between the mass size and development of pneumothorax, p value=0.7, the mass depth and pneumothorax with p value=0.5, but it was significant regarding the number of passes and development of pneumothorax, P value=0.049. Regarding the correlation between the development of hematoma and number of passes and depth of mass, there is significant correlation with number of passes, p value=0.017, while it is not significant for the depth of lesion, p value =0.15.

No correlation seen between haemoptysis development and size of lesion, however a significant correlation regarding the depth of lesion, p value=0.044.

DISCUSSION

Intrathoracic lesion is a common problem in the clinical practice and usually seen in every day thoracic clinic, the bronchogenic carcinoma is the commonest cause of malignant lung lesion [11] and this attributed to prevalence of smoking in the Iraqi society especially among the males [12], in female it is still a common cause of solitary pulmonary lesion, while metastasis mainly from the breast cancer a commonest cause of multiple pulmonary nodules [13].

In Iraq and especially in our centre, before the introduction of image guided tru-cut biopsy, the prevalence of surgical interventions for those previously mentioned causes of

intrathoracic lesions were so high for achieving the diagnosis and to reach cure in early stages of primary disease, this prevalence is dramatically decreased to less than 10% than before with utilization of tru-cut biopsy, the latter has a fantastic role in cases where surgery is contraindicated or cannot be tolerated especially in the elderly, those unfit and in individuals with poor pulmonary function.

Regarding the success rate of CT guided lung biopsy in our study was about 97% and this is higher than the study performed by M Mills et al. in USA, the explanation may be due to very large sample utilized by Mills this is 20 times that of our sample [14].

The development of pneumothorax is seen in 26% of the patients

and this is in line with the study performed by F Laurent et al in France which said that pneumothorax was seen in 20% of cases [15]. Pulmonary hematoma is seen in 8% and haemoptysis seen in 3%, also this is in line with the study performed by Dennie et al. in Canada [16].

CONCLUSION

CT guided thoracic lesion biopsy is very efficient, cost-effective and less invasive technique when compared with the thoracic surgery, as well as it has a low complication and even when complications occurred all are not significant, it was dramatically decreasing the surgical procedures.

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