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Electromagnetic Navigational Bronchoscopy – A Novel Technique for Better Diagnosis of Peripheral Pulmonary Lesions

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ABSTRACT

Lung cancer remains the most prevalent and fatal malignancy in Hong Kong, with rising incidences due to enhanced diagnostic practices, including the increased utilization of computed tomography (CT). This study examines the implementation of electromagnetic navigational bronchoscopy (ENB) in the Department of Respiratory Medicine at Kowloon Hospital, aimed at improving the diagnostic accuracy for peripheral pulmonary lesions deemed inaccessible by conventional methods. From March 1, 2023, to March 1, 2024, 11 ENB procedures were conducted, yielding a diagnostic sensitivity of 33%. The demographic data, lesion characteristics, and complication rates were analyzed, revealing a promising safety profile with no major complications reported. These findings suggest that ENB enhances diagnostic capabilities and reduces patient exposure to additional invasive procedures, thereby optimizing clinical management of lung cancer in a resource-limited setting.

Introduction

In Hong Kong, lung cancer is the most common and deadliest cancer with its annual incidence surpassed colonic cancer according to the latest Cancer Registry in 2019 [1]. There is an increased use of computed tomography (CT) thorax in diagnosis of extra- and intra-pulmonary condition including lung cancer screening and coronary angiogram. Tiny pulmonary lesions may be discovered incidentally from these imaging. Pulmonologists are therefore bombarded with increasing service demand and diagnostic challenges, especially for lesions that are smaller than 3cm. Histological diagnosis is the gold standard which could be obtained by image guided percutaneous biopsy or bronchoscopy. Conventionally pulmonologist could only arrange follow-up CT repeatedly to monitor and look for significant interval change for these non-accessible pulmonary lesions. This could lead to diagnostic delay, and added burden to imaging resources.

Electromagnetic navigational bronchoscopy (ENB) is a novel technique that allows real time guidance of tissue sampling by virtual images and electromagnetic system during bronchoscopy. The principle is similar to applying global positioning system (GPS) in driving. Before performing ENB, three dimensional images of bronchi were reconstructed from thin-cut CT using the ENB program. The best possible pathway to reach the targeted peripheral pulmonary lesions by bronchoscopy was then created and selected by pulmonologist. When performing ENB, pulmonologist follows the planned pathway which was synchronized with real-time images to reach the target lesion. Biopsy could then be taken via the working channel with an excellent chance of hitting the target, thus increasing the diagnostic yield, especially when combined with other interventional pulmonology techniques like fluoroscopy and endobronchial ultrasound [2, 3].

Methodology

ENB was introduced to Department of Respiratory Medicine, Kowloon Hospital, since 2023. It was performed by trained pulmonologist for tissue sampling of pulmonary lesions that were often peripherally located and considered non-accessible by conventional bronchoscopy alone or image-guided biopsy. We aim to explore the diagnostic accuracy and complication rate of ENB in our unit. All patients admitted to our unit for ENB were included in the analysis. Their baseline demographics, radiological presentation, and indication for ENB were reviewed. Results of ENB, including whether tissue biopsy could be performed and the pathological diagnosis were assessed. Complication of ENB, if any, was recorded and classified according to its severity. Based on their subsequent clinical outcomes and radiological changes, the sensitivity and diagnostic accuracy of ENB were determined.

Results

From 1st March 2023 to 1st March 2024, 11 cases of ENB were performed. Five cases were male and six cases were female. The mean age was 61 years old (range 25 to 82 years old). The target was located at right upper lobe in 6 cases, left upper lobe in 3 cases, right lower lobe in 1 case and left lower lobe in 1 case. The mean maximum dimension of target lesion measured on CT was 2.8cm (range 1.7cm to 4.7cm). They were all peripherally located pulmonary lesions that were considered non-accessible by conventional

bronchoscopy. Eight out of the eleven cases (72.7%) had navigation that were consistent with fluoroscopy and radial probe endobronchial ultrasound finding of lesion location. Among those cases with biopsy taken, six of them were true negative cases and the target lesions resolved upon follow up scan. The final diagnosis of only two cases could not be confirmed yet: one patient is awaiting CT guided lung biopsy; while the other refused further work up. The sensitivity and negative likelihood ratio were 33% and 66% respectively. Only minor bleeding with desaturation requiring transient oxygen supplementation and empirical antibiotic was reported in one case. None of the patients required overnight hospital observation nor developed major complication from the procedure.

Conclusion

ENB is a novel technique that added value in improving diagnostic accuracy for peripheral pulmonary lesions and is safe to be done in chest hospital where on-site intensive care, anaesthetic and surgical support were not available. With increasing experience in using ENB, pulmonologist would be more confident that the correct target was being biopsied and need not further expose the patient to extra risk such as repeating bronchoscopy or other invasive intervention, and minimizing radiation exposure from frequent follow-up imaging.

References

1. Registry HKC. Overview of Hong Kong Cancer Statistics of 2019.
2. Eberhardt R, Anantham D, Ernst A, Feller-Kopman D, Herth F. Multimodality bronchoscopic diagnosis of peripheral lung lesions: a randomized controlled trial. Am J Respir Crit Care Med. 2007;176(1):36-41.
3. Folch EE, Pritchett MA, Nead MA, Bowling MR, Murgu SD, Krimsky WS, et al. Electromagnetic Navigation Bronchoscopy for Peripheral Pulmonary Lesions: One-Year Results of the Prospective, Multicenter NAVIGATE Study. J Thorac Oncol. 2019;14(3):445-58.