

Bronchoscopy with endobronchial ultrasound in hybrid operating room

With gaining more evidence of lung cancer screening with low dose computer tomography (CT), more small, indeterminate lung nodules or ground glass opacities (GGO) are being discovered. One major challenge of managing small, indeterminate pulmonary nodules is the need for a reliable method or technique to accurately localize and reach the target lesion or lesions. After localized the target lesion, we can perform diagnostic biopsy, label the target for surgical resection, and local treatment in selected cases.

An important aim of the hybrid operating room is to provide a one-stop, cost effective procedural flow to enhance diagnostic accuracy and reduce complications associated with patient transfer. Hybrid operating room provides real-time high-resolution imaging during the endoscopic or surgical procedure and improves current techniques of lung navigation and nodule localization. Bronchoscopy with endobronchial ultrasound (EBUS) and transbronchial needle aspiration (TBNA) in hybrid operating room can provide diagnosis, target localization and more precise staging work-up. The hybrid operating room for thoracic surgery in selected patients is a cost-effective streamlined solution for the diagnosis and treatment of early stage lung cancers.

支氣管內視鏡超音波之簡介及應用

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支氣管內視鏡(bronchoscopy)在十多年來有許多進展，特別是支氣管內視鏡超音波 (endobronchial ultrasound, EBUS) 及 EBUS 導引之經支氣管細針穿刺 (transbronchial needle aspiration, TBNA)針對縱膈腔淋巴結之取樣，在許多胸腔肺部疾病都有廣泛的應用。在近幾年，許多介入性的處置在呼吸道內視鏡領域都逐漸發展中，包含 3D 立體定位磁導航指引、冷凍切片、熱消融汽化等等，許多以往需要依靠外科手術才能處理的情況，已經可經由支氣管內視鏡的相關技術來處理。本次演講將介紹支氣管內視鏡在本院的操作內容及近幾年的發展。

講題：Bronchoscopy Biopsy and Rapid On-Site Cytology in Hybrid Operating Room:
Experiences in NTUH

摘要：

隨著低劑量電腦斷層檢查的人數上升，篩檢到的肺部結節數量也與日俱增，對於需要進行切片診斷的患者，有許多方式可以進行切片採樣，如支氣管鏡切片、超音波切片、電腦斷層導引切片等等。各種方式的診斷率以及可能產生的風險皆不相同。而於複合式手術房中以多方式的角度來進行精準定位肺腫瘤與切片，在近年來也有越來越多的研究進行。台大醫院於 2022 年開始啟用複合式手術房並且也於其中設置一台顯微鏡以利進行 **rapid on-site cytology** 分析，本講將會以台大醫院這一年來於複合式手術房中進行的腫瘤切片經驗來做整理與分享。

演講題目：影像導引系統的應用

摘要

隨著胸腔外科手術技術的不斷演進，更精準地定位腫瘤並保留病患更多的健康組織已成為外科醫師的首要目標。新一代支氣管鏡導航系統，搭載最先進的磁導航技術，可以精準抵達腫瘤位置，該系統也可以配合各種器械，如 transbronchial access tool，進行腫瘤染色定位與切片檢查等，同時可整合 fluoroscope 影像，進而實現一站式醫療的服務。

此外，4K 高清晰影像系統的 TeXture and color enhancement Imaging (TXI) 模式能夠強調組織的顏色、結構和亮度，清楚呈現細微的組織變異，從而提高可疑組織的識別率；而 Red Dichromatic Imaging (RDI) 模式能深入呈現黏膜底層，將深層血管清晰呈現，有助於醫師進行內視鏡治療。4K 影像系統除了提供超高解析度的畫面，還能完整呈現組織顏色，使醫師在胸腔鏡手術中能夠清楚看到各血管、氣管和神經，進一步提高手術的精確度，為病患帶來安全、高品質且人性化的醫療服務。

放眼未來，精準定位與高解析畫面的呈現，將成為胸腔外科手術的強大助力。

The Diagnosis of PPLs in Bronchoscopy Procedure

With the increasing use of low-dose computed tomography (CT) for lung cancer screening, peripheral pulmonary lesions (PPLs) are more easily exposed. For suspected malignant PPLs, an accurate diagnosis is an essential step in devising an appropriate treatment plan. The transthoracic approach with CT-guided biopsy traditionally is the first choice due to its having the highest diagnostic accuracy. However, because of its high complication rate, which may lead to patient morbidity and mortality, the use of bronchoscopic techniques has gradually increased.

Endobronchial ultrasound-guided transbronchial biopsy (EBUS-TBB) is now widely used for the diagnosis of PPLs. In previous publications, the diagnostic accuracy of EBUS-TBB alone has ranged from 60-70%. Combined use with other methods, such as fluoroscopy, virtual bronchoscopic navigation or rapid on-site cyologic evaluation, has been attempted to improve diagnostic accuracy. However, these techniques have their limitations or disadvantages, so a more effective system is required to assist EBUS-TBB procedures.

Cone-beam CT (CBCT) is a newer CT modality that can provide both real-time 2-dimensional (2D) fluoroscopy and 3D CBCT scans. With dedicated software, the target can be contoured, and be projected onto live fluoroscopy images, termed augmented fluoroscopy (AF). This system provides real-time information for interventional radiologists and surgeons in many advanced procedures. CBCT-AF can also guide the bronchial route for navigation, and confirm the location of target PPLs, thereby improving diagnostic accuracy during EBUS-TBB. Traditionally, most TBB procedures employed standard biopsy forceps, which frequently obtained small, crushed tissue samples that might affect the molecular analysis for further cancer management. Therefore, a better biopsy device is needed. Collecting larger and highly-quality histologic specimens is required.

Cryobiopsy is performed using compressed gas, followed by decompression to create a cooling (Joule-Thomson) effect, that freezes surrounding tissue, and then extracts a larger tissue specimen with preserved internal structure. It has been commonly used to diagnose of interstitial pulmonary diseases, endobronchial tumors and pleuroscopy procedure. Transbronchial cryobiopsy (TBC) was also performed recently. In addition, TBC provide ample tissue for gene analysis and for dividing histologic subtype, which assist physician to guide further cancer treatment. Some reports also revealed a relative low complication rate. Cryobiopsy should be wisely applied in this gene guided therapy era.

Procedures Guided in CT room and Hybrid OR: Radiologist Experience Sharing

Abstract

Procedures guided in CT room and hybrid operation room is important for patient management in thoracic radiology.

In this lecture, I will introduce the tips of CT-guided procedures for lung nodules. I will also review some cases and remind how to prevent the possible complications. I hope this experience sharing session can bring fruitful harvests for all the participants.