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Experience with SonoTip Needles from Medi-Globe in EBUS-guided Transbronchial Mediastinal Cryobiopsy

Miguel Ariza Prota, M.D.

Interventional Pulmonologist
Asturias Central University Hospital, Spain

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Introduction

Mediastinal and hilar lesions can present in both, neoplastic and benign disorders of infectious, immunological, or other unusual etiologies. The management of thoracic malignancies, and more specifically lung cancer, has become increasingly complex through the last decade; for instance, proper molecular characterization of tissue samples is now pivotal in the therapeutic approach to non-small cell lung cancer (NSCLC). (1) Endobronchial ultrasound guided transbronchial needle aspiration (EBUS-TBNA), a minimally invasive and safe technique, is widely practiced nowadays for mediastinal lesion sampling and staging of lung cancer. (2) Nevertheless, intact, and larger tissue samples are increasingly needed for pathological, genomic, molecular, and immunological assessments. Unfortunately, EBUS-TBNA is occasionally hampered by limited or inadequate samples, thus requiring re-biopsies or additional diagnostic procedures such as mediastinoscopy when probability remains high (3), especially in certain conditions such as lymphoproliferative and granulomatous disorders. (4) Transbronchial lung cryobiopsy is a well-known endoscopic procedure employed in the diagnosis of interstitial lung diseases, based on rapid cooling, crystallization, and subsequent collection of tissue. Compared to forceps biopsy, cryobiopsy is superior for its capacity to harvest a greater amount of tissue adequate for histopathologic analyses. (5) In the everyday practice we usually use a 22G needle when we perform conventional EBUS-TBNA. However, every time we perform a transbronchial mediastinal cryobiopsy (TMC), we use the 22G SonoTip®TopGain TBNB needle before introducing the 1.1 mm cryo-probe (Erbecryo 20402-401) into the lymph node. Because TMC is a totally echo-guided process, the trace left in the lymph node by the puncture of the EBUS-TBNB with the SonoTip®TopGain needle, is key before introducing the cryoprobe and performing cryobiopsies.

The aim of this report is to share our experience with the 22G SonoTip®TopGain needle when performing TMC. We proceed to describe step by step the complete procedure applying the Ariza-Pallarés method through a clinical case. (6)

Discussion

Oezkan et.al. conducted a study that compared the novel crown cut SonoTip®TopGain needle against the standard single bevel ViziShot 2 needle and showed that the SonoTip®TopGain needle yields significantly more tissue and high-power fields (HPFs) but did not show significant differences in diagnostic yield and safety. The SonoTip®TopGain needle could not easily penetrate cartilage, which poses a new engineering problem. (7) In our experience, the 22G SonoTip®TopGain needle penetrates all lymph node stations without difficulty, we should always try to avoid the most cartilaginous area of the tracheal and bronchial wall, especially when performing a TMC. Our group has performed TMC in all mediastinal and hilar stations, and since we used the SonoTip®TopGain needle we have been able to introduce the 1.1 mm cryoprobe into the lymph node without complications.

Because our method for performing TMC is mainly based on introducing the cryoprobe always under ultrasound guidance, we do not focus on trying to introduce the cryoprobe through the puncture site only. We are guided by the trace left in the lymph node by the puncture of the EBUS-TBNB, it is key to introduce the cryoprobe at the same angle in which the previous punctures were performed. We consider that the 22G SonoTip®TopGain needle, due to its unique characteristic (3-point needle tip design with a crown cut), leaves a much more visible trace within the lymph node when compared to other 22G needles; and this point is essential for introducing the 1.1 mm cryoprobe, since on many occasions the TBNA puncture site is not visible. In our experience, because the SonoTip®TopGain needle has a crown cut design, we believe that the tunneled pathway created by this needle helps the cryoprobe to penetrate more easily into the lymph node, allowing us to obtain the necessary cryobiopsy samples every time.

It is important to mention than when we use a different TBNA needle for performing TMC, we usually perform between 5-6 TBNAs before being able to insert the 1.1 mm cryprobe into the lymph node; when we use the SonoTip®TopGain needle, we usually perform 3 TBNBs before introducing the cryoprobe inside the lymph node, making the procedure faster and safer.

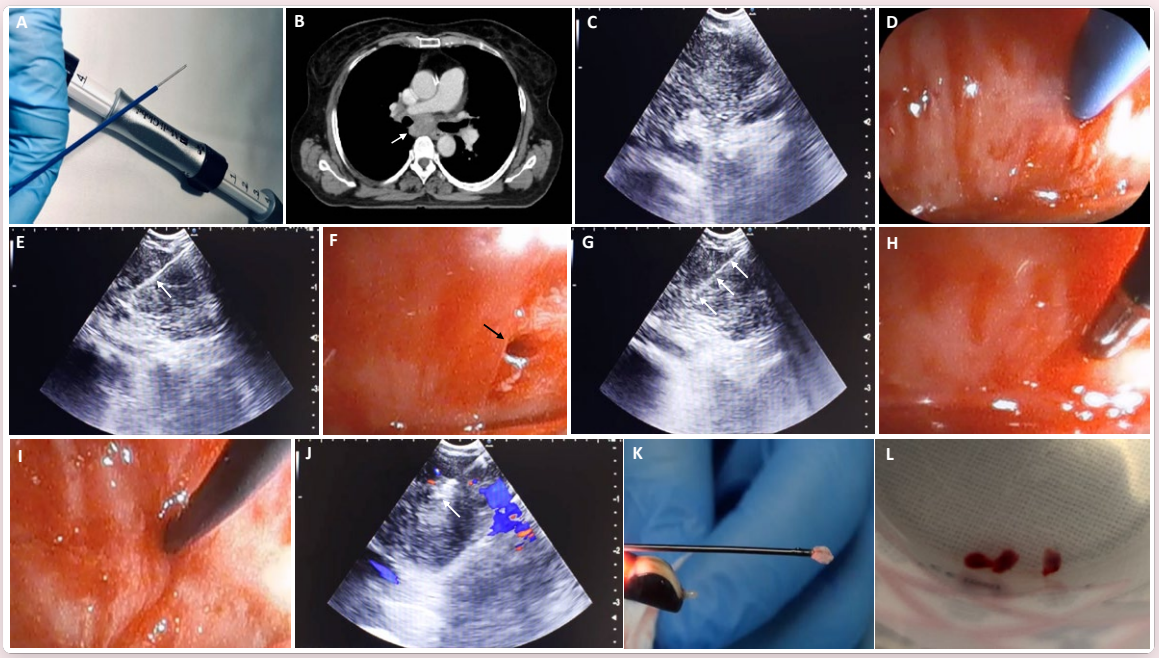
In conclusion, although EBUS-TBNA is the technique of choice for the diagnosis and staging of malignant mediastinal lesions, we believe TMC might provide an additive value to current diagnostic approaches for mediastinal diseases, specifically in cases of uncommon tumors, suspicion of lymphoproliferative disorders or when more biopsy sample is needed for molecular determinations; and the use of the 22G SonoTip® TopGain TBNB needle is essential to perform this novel procedure.

Patient case

A 42-year-old male was referred to our Interventional Pulmonology Unit (IPU) in February 2022 to perform a mediastinal biopsy due to suspicion of relapse of B-cell non-Hodgkin lymphoma previously diagnosed in 2019. We decided to perform TMC given the relevance of the case using the 22G SonoTip®TopGain needle (Fig. 1A) before introducing the 1.1 mm cryo-probe into the lymph node. A chest CT scan showed an enlarged 7 lymph node (Fig. 1B). After identification of station 7 lymph node at EBUS (Fig. 1C), we performed three passes of TBNBs with the 22-gauge SonoTip®TopGain needle (Fig. 1D-E). After initial puncture with the TBNB needle, a 1.1 mm cryo-probe was introduced into the working channel of the EBUS bronchoscope.

Figure 1:

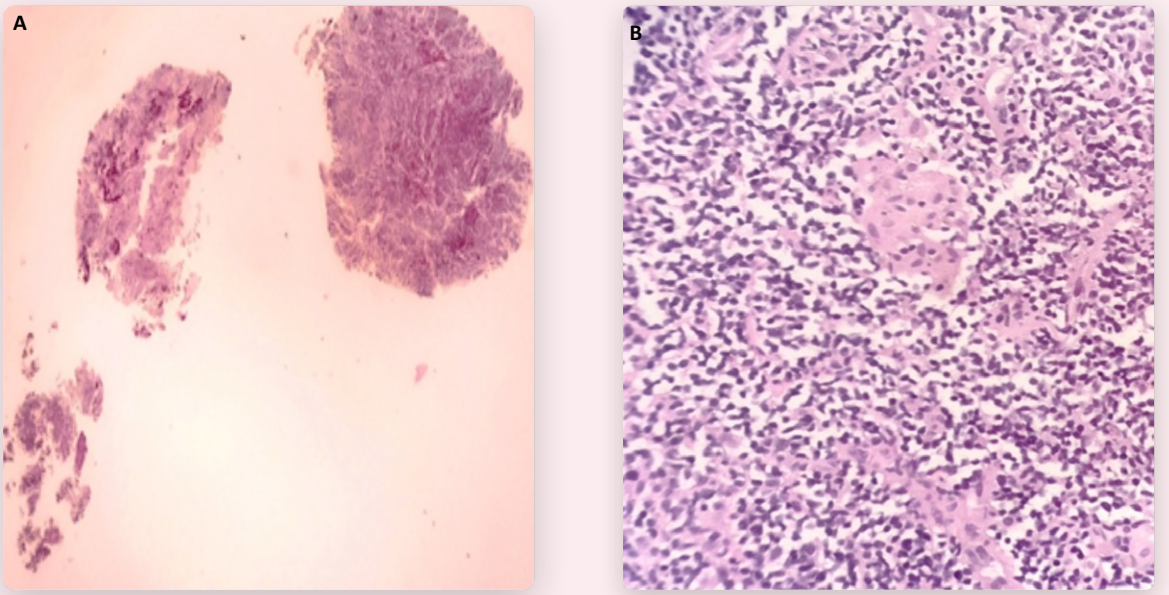
Figure 1. The 22G SonoTip®TopGain needle (3-point needle tip design with a crown cut) (A). Chest CT scan showing an enlarged station 7 lymph node, white arrow (B). Station 7 lymph node at EBUS (C). Performing EBUS-TBNB in station 7 node; TBNB needle sheath (D). EBUS image of the 22G SonoTip®TopGain needle inside the lymph node, white arrow (E). Puncture site made by TBNB needle, black arrow (F). Trace left inside the lymph node by the 22G SonoTip®TopGain needle after three TBNBs, white arrows (G). Tip of the cryo-probe approaching the puncture site (H), after pushing the probe gently the tip of the cryo-probe is completely inside the node (I). EBUS-Doppler image showing the tip of the 1.1 mm cryo-probe within the lymph node, white arrow (J). Tip of the probe has the lymph node tissue obtained by cryo-nodal biopsy (K). Samples obtained from transbronchial mediastinal cryobiopsy (L).



The cryo-probe was advanced towards the puncture site and inserted gently through the previous puncture site created by the TBNB needle. The EBUS image confirmed the cryo-probe position within the lymph-node. The cryo-probe was cooled down for 4 s, and then retracted with the bronchoscope and the frozen biopsy tissue attached to the tip of the probe (Figure 1F-K). Cryobiopsies were retrieved in saline and fixed in formalin (Figure 1L). In this case, EBUS-TBNB was positive for lymphoma cells, but mediastinal cryobiopsy allowed a more accurate characterization, which demonstrated a B cell non-Hodgkin lymphoma of follicular origin, avoiding a possible mediastinoscopy (Figure 2).

Figure 2:

Microscopic image of the cryobiopsy sample at low magnification (2x) showing an integrated and compact tissue (A). Microscopic image of cryobiopsy (10x) showing a well-preserved architecture (B).



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Medi-Globe GmbH
Medi-Globe-Straße 1 – 5
D-83101 Rohrdorf OT Achenmühle
Tel.: +49 (0) 8032 - 973 - 379
Fax: +49 (0) 8032 - 973 - 392
Email: sales@medi-globe.de
www.medi-globe.de