MEDICAL INSIGHTS ePaper

Accessing mediastinal lymph nodes to perform mini-probe cryobiopsy – how we do it

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EBUS-guided transbronchial needle aspiration (EBUS-TBNA) is widely accepted for the evaluation of mediastinal lymphadenopathy. Taking into account the sample quality and patient history, differential diagnosis can be challenging. Granulomatous or lymphoproliferative diseases or the confirmation of primary in case of ROSE positive for adenocarcinomatous cells can put a challenge on the cytopathologist.

Cryobiopsy represents an established biopsy technique for the diagnosis of pulmonary malignancies and interstitial lung diseases 1,2. The potential to harvest larger samples compared to forceps, needle or brush in the absence of crush artifacts provides higher quality material for molecular analysis and markers on immunohistochemistry 3-6.

A novel ultrathin cryoprobe has been developed and is available since 2019 (20402-401, Erbe Elektromedizin GmbH, Tuebingen). The EBUS-guided transbronchial intra-nodal cryobiopsy (EBUS-TBINCB) has been performed for the first time at Interbalkan medical center, Thessaloniki, Greece in September 2020. We aim to describe how to overcome the shortcoming to enter the lymph node despite the cryoprobe´s blunt tip in EBUS-TBINCB.

Based on CT-scan we aim to select a feasible location for access. Station 7, 11R or 11L are easier to penetrate as opposed to other stations. In mixed echogenicity, Doppler ultrasonography can support differentiation between cystic and vascular components and thus avoid trauma to extended vascularity. Elastography can support selecting the appropriate puncture site inside the node.
To prepare the access we use a 22G TBNA-needle for EBUS-TBNA in the regular fashion. The puncture channel through airway wall and inside the lymph node serves as a track for the ultrathin cryoprobe afterwards. As the TBNA-needle is thinner than the cryoprobe, we puncture in the exact same location for 2-4 times, aiming to widen airway puncture and track in the node for the cryoprobe (Fig. 1).
During repeated back-and-forth-movements of the needle, retraction until the subcapsular area should be aimed to further widen the entry point to the puncture track.
We carry out the EBUS-TBNA in a close-to-perpendicular angle with the stylet left inserted for stabilization purposes. A flat angle can result in the cryoprobe slipping around the lymph node instead of entering the needle track. In station 4, puncture entry in the proximal node proportion can ensure stable access without slipping out of the track with the cryoprobe.

Rapid on-site evaluation (ROSE) helps to select the appropriate lymph node station for subsequent EBUS-TBINCB.

The cryoprobe is then inserted into the working channel of the EBUS-bronchoscope. We maintain the view on the previously formed track of the TBNA-needle on sonography in the main view. The small optical image is in the lower right corner of the screen.
Subsquently, the cryoprobe is extended from the working channel and contact with the bronchial wall is made. Usually, oozing from the puncture location complicates the exact indentification of the entry point. In the suspected position of the entry point according to the sonography image, the cryoprobe is repeatedly pushed against the bronchial wall with the right hand.
A loss of resistance can be felt when the probe passes the airway wall and enters the lymph node. The positioning can then be verified on the sonography image (Fig. 2).

We experienced that after entering the lymph node with the cryoprobe, angulation of the bronchoscope´s tip can support mechanical widening of the entry point. Further passes can thus be facilitated.

Under sonographical control we freeze for 4s, before extracting bronchoscope and cryoprobe together in a swift movement. The cryosurgical unit is activated until the cryoprobe has left the patient in order to prevent premature thawing and loss of the sample (Fig. 3).

In case the probe passes the wall but does not enter the needle track, a too narrow width of the track can be the reason. We experienced that 2-4 cycles of repeated freezing for 2s followed by 5s of thawing can facilitate the entry of the cryoprobe into the node. We hypothesize that this leads to a transitional softening of the lymphatic tissue.
Should it not be possible to pass the bronchial wall, another 2-4 needle punctures in this position followed by access attempts with the cryoprobe can be carried out. Alternatively, the steps can be repeated in another position (Fig 4).

In a previous case series by Gonuguntla et al. mild bleedings have been reported 7.

Pneumothorax or pneumomediastinum were not encountered, mediastinitis has not been reported in these patients.
These findings are in concordance with the over 100 cases we have conducted in our center so far. Bleedings in EBUS-TBINCB never exceeded the oozing usually encountered during EBUS-TBNA. A loss of the sample by stripping during retraction through the bronchial wall has not occured so far, as the cryoadhesion of the tissue seems to be very strong. We recognize a larger fraction of samples that are sufficient for advanced molecular analysis, such as PD-L1-testing. The differentiation of glandular components in adenocarcinomas according to their primary and the subclassification of lymphomas seems to be more accurate compared to cytology.

Therefore we hypothesize that EBUS-TBINCB is a safe and effective procedure. Further data is warranted evaluating the added value over conventional EBUS-TBNA and the performance outside the expert setting.

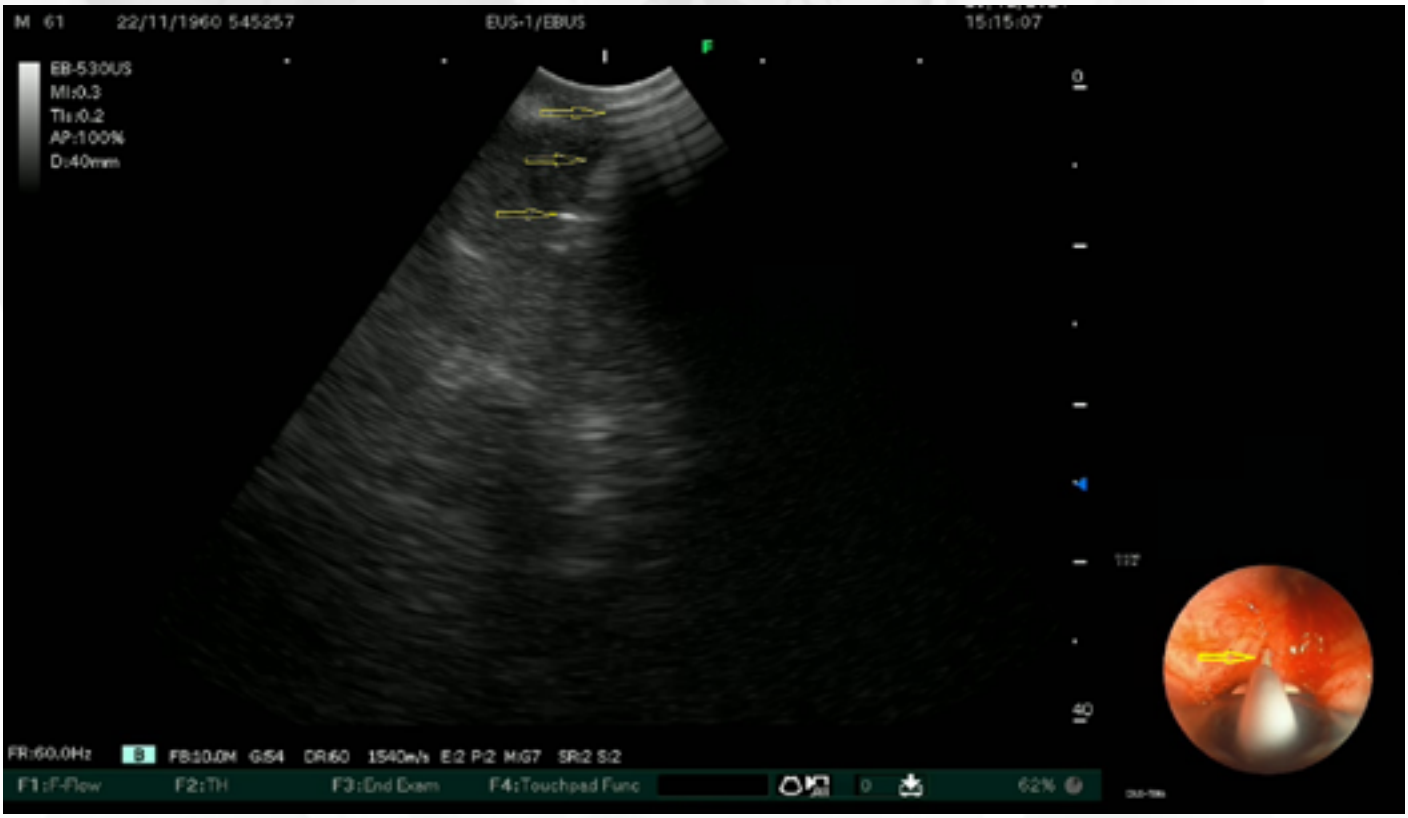

Figure 1: Needle puncture track of the TBNA-needle on ultrasonography before cryobiopsy

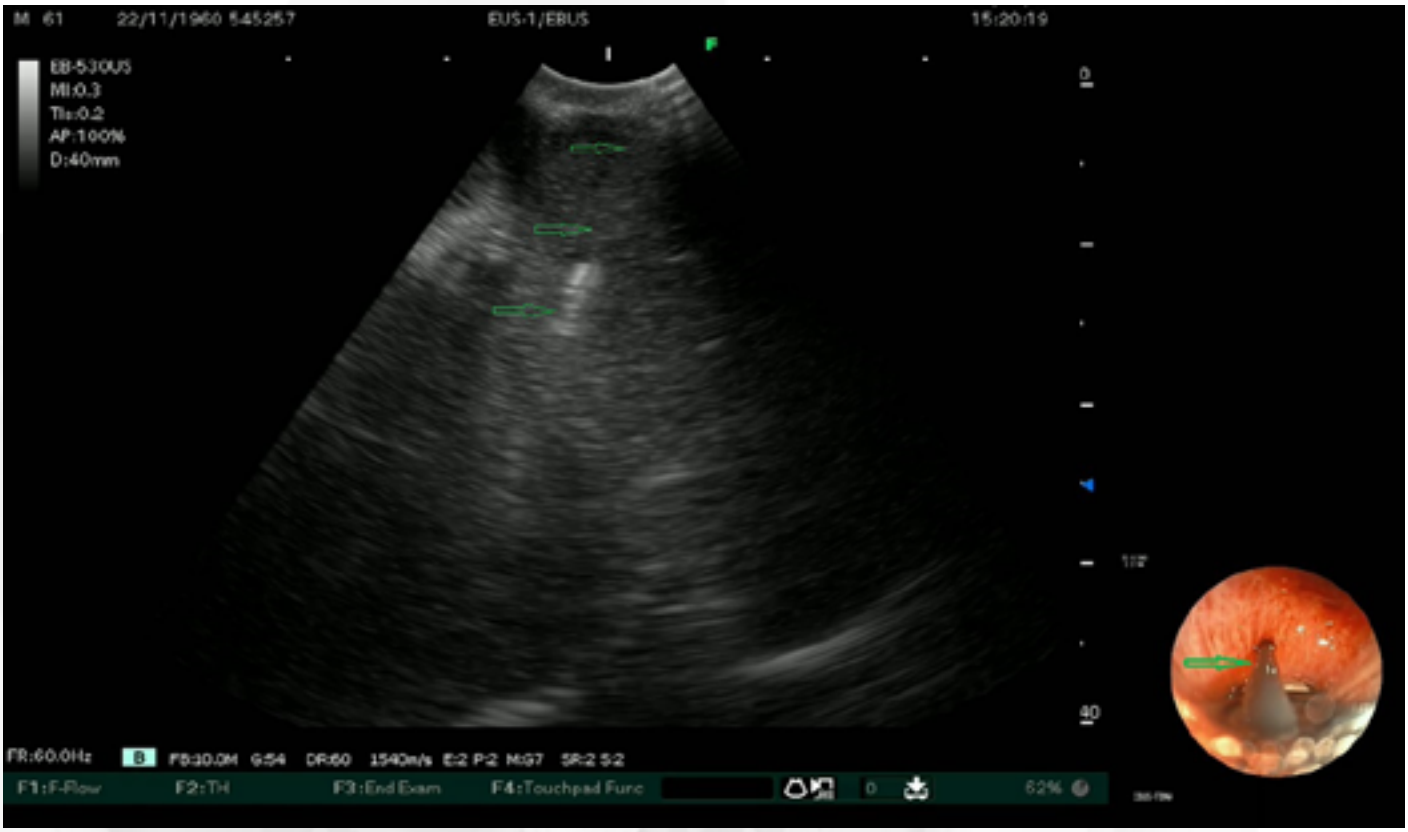

Figure 2: The cryoprobe is inserted into lymph node station 7 and visualized with ultrasonography

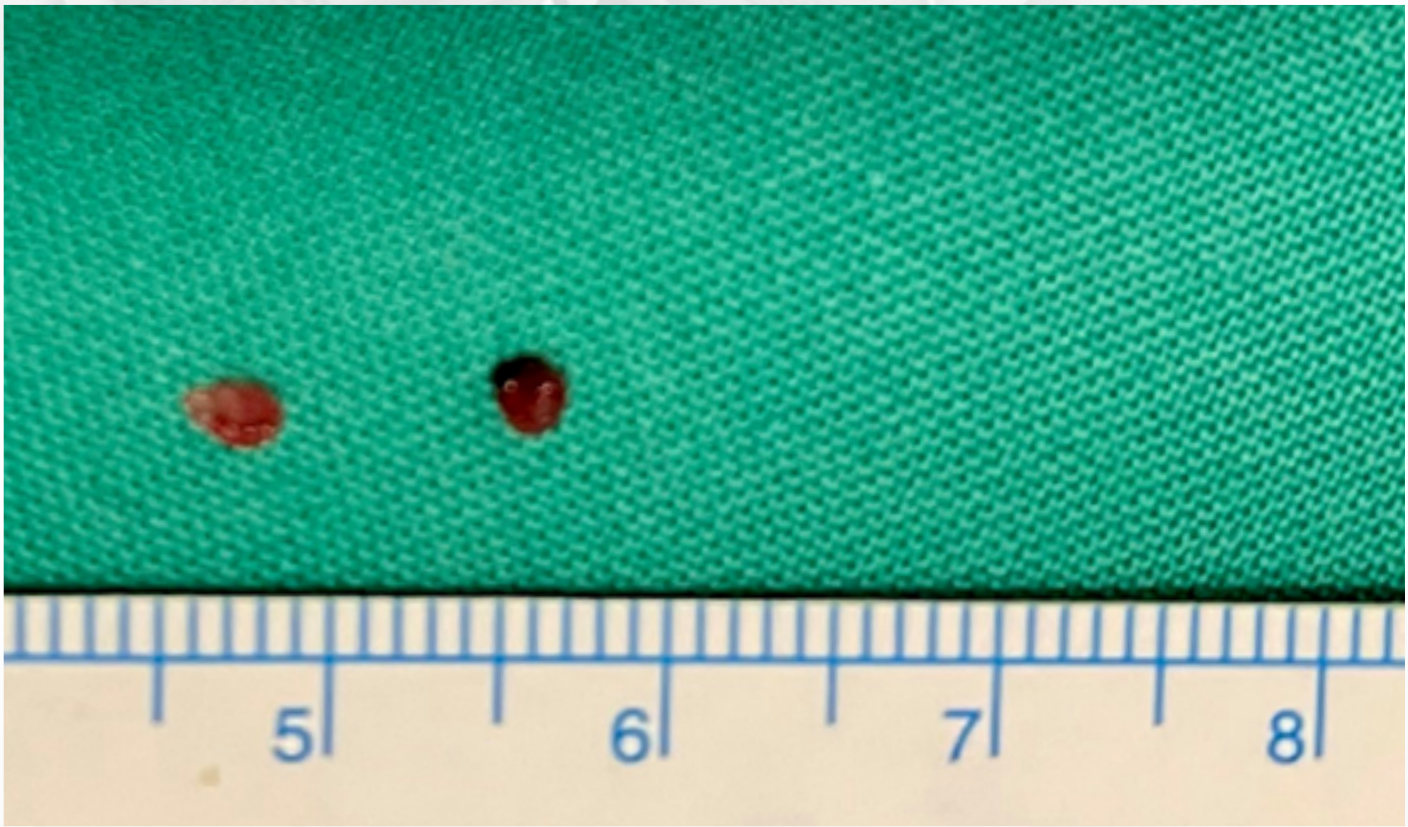

Figure 3: Sample of a squamous cell carcinomy from station 7 accessed from the left main bronchus. The freezing time was 4 seconds

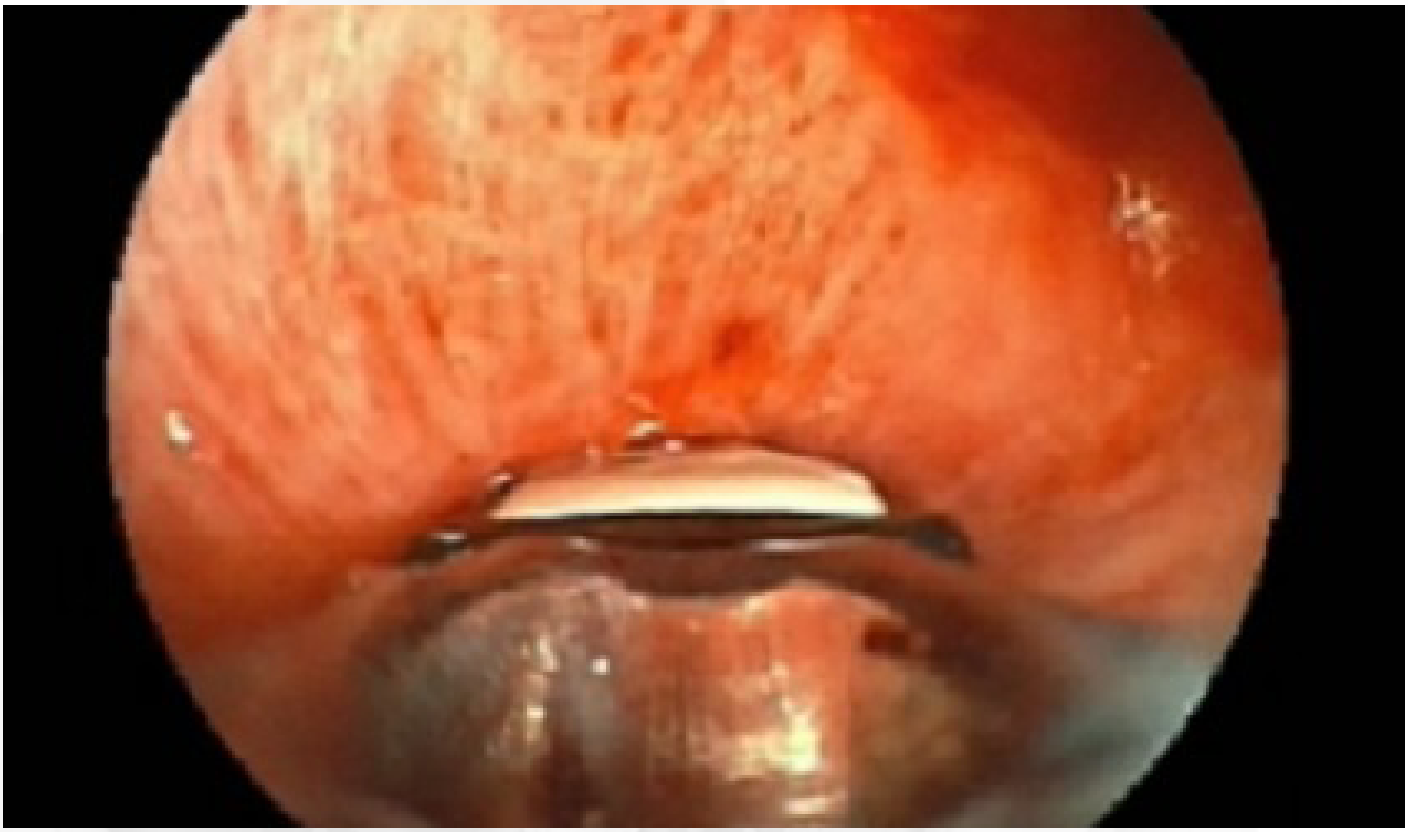

Figure 4: Final bronchoscopic image of the biopsy site. The oozing does not exceed the degree of bleeding compared to a conventional EBUS-TBNA

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