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MEDICAL INSIGHTS

Transbronchial cryobiopsy for the diagnosis of interstitial lung diseases (ILDs)

Current procedural guidance for interventional bronchoscopists according to the literature

Background

Data supporting transbronchial cryobiopsy (TBCB) for diagnosis of ILDs continues to mount. The technique represents a reasonable alternative to surgical lung biopsy (SLB) contributing to the multidisciplinary discussion (MDD) and is adopted in an increasing number of centers around the globe[1,3].

Mortality rates for TBCB are low with a pooled estimate of 0.5 %[3]. Acute exacerbation rates and length of hospital stay were also reported to be lower compared to SLB[1]. Although SLB carries an in-hospital mortality of up to 16 % if conducted non-electively, it is still commonly used for sampling in ILD-patients[2]. 80 % of SLBs could be avoided by performing a TBCB[1].

Challenges and goals

For idiopathic pulmonary fibrosis (IPF) and fibrotic hypersensitivity pneumonitis, recommendations have been made for TBCB over SLB[6,7]. A lack of procedural standardization and high degree of interobserver variability between different institutions make it difficult to recommend TBCB over SLB in general[1]. To this end, common questions on the application of Erbe flexible cryoprobes as an indispensable part of TBCB need to be addressed.

Method

Avasarala et al. conducted research on MEDLINE and Cochrane library comprising articles from 2009 to 2020 on cryobiopsy. 263 publications were selected for an evidence-based narrative review to address common procedural questions[1].

Results and key findings

Diagnostic yield

Pooled estimate for the diagnostic yield for TBCB independently from the MDD was 82.5 % but should be viewed with caution, as the MDD represents the gold standard[1,3]. Nevertheless, TBCB could add diagnostic confidence of between +31 % and +34 % to clinical, radiographic and bronchoalveolar lavage data[1,4].

Procedural environment

Physicians should be trained on the procedure and management of severe complications (severe bleeding & tension pneumothorax). It is suggested that TBCB is performed in an operating room or endoscopy suite under general anesthesia. Interventional radiology, thoracic surgery and critical care unit should be available for emergent situations[1].

Contraindications

- → Rapid clinical decline (can indicate an impending exacerbation, e.g. development of unexplained patchy ground-glass opacities)[1]
- → Pulmonary hypertension (> 50 mmHg relative contraindication, risk of damage to pathologic vasculature)[1]
- → Uncorrected bleeding diathesis (iatrogenic or pathologies, aspirine medication is considered a relative contraindication)[1]
- → Compromised pulmonary function (see Fig. 1)[1]

Cryobiopsy collection

TBCB can be performed by the use of a flexible bronchoscope through an endotracheal tube or a rigid bronchoscope[1]. A bronchial blocker is placed for bleeding control on segmental level[1,3]. The cryoprobe is retracted 1 cm after resistance of the visceral pleura is felt[1]. Fluoroscopy for probe placement helps preventing a pneumothorax[1]. Depending on the size of the cryoprobe, freezing is activated for 3 to 6 seconds before en-bloc extraction[1]. A freeze test in water before the procedure can support adjustment of the activation time[1].

Management of complications

Pneumothorax occurs in approximately 10 % of patients[3]. A chest drainage insertion kit, drainage apparatus and fluoroscopy/ultrasound to aid placement should be available. Further, supplies to secure and connect a chest tube are needed[1].

Severe bleeding occurs in 0.3 % of patients[1]. A larger endotracheal tube (8.5 mm diameter or larger) or rigid bronchoscope are necessary to secure the airway along with a bronchial blocker[1].

Histopathological considerations

The fragile specimen should be carefully thawed into saline without scraping or squeezing[1]. It is embedded in paraffin with an orientation to maximize the surface area[1].

Fig 1

Thresholds in pulmonary function representing contraindications

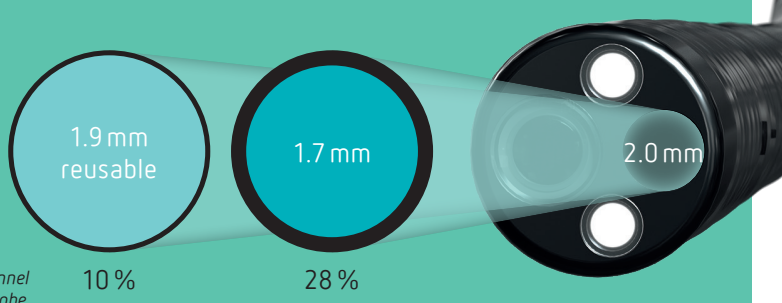
Implications

Avasarala et al. conclude that TBCB is a minimally invasive, effective and safe biopsy technique. TBCB outcomes could be improved by further technological harmonization[1].

Friction in the 2.0 mm working channel hampering tactile identification of the pleura, and a small remaining cross section of the working channel available for suction to control bleeding were discussed[1]. With respect to prevention of a pneumothorax, Avasarala et al. make a weak recommendation for the flexible reuseable 1.9 mm cryoprobe (recommendation grade 2B)[1].

The new flexible single-use 1.7 mm cryoprobe did not show a significantly different sample size when compared to the flexible reuseable 1.9 mm cryoprobe[5]. Additionally, the smaller cryoprobe provides less friction and better suction through the working channel[1].

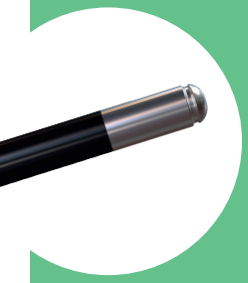
To reduce the risk of a pneumothorax, retraction of 1 cm after contact with the visceral pleura is strongly recommended[1]. The radiopaque probe tip of the 1.7 mm flexible single-use cryoprobe has a length of approximately 6 mm and can serve for distance estimation under fluoroscopy[1]. When the angle of the fluorosocpy beam is not perpendicular to the probe, care should be taken in distance estimation. To prevent coughing and dislocation of the cryoprobe, Avasarala et al. recommend the use of general anesthesia[1]. In previous literature, deep sedation has been deemed applicable, too[8].



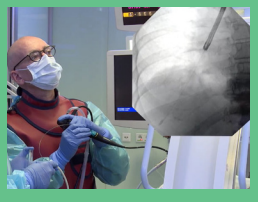
Remaining cross section of a 2.0 mm working channel depending on the diameter of the inserted cryoprobe

Products

The Erbe portfolio includes a flexible single-use cryoprobe with a diameter of 1.7 mm which can be used equivalently to the flexible re-useable 1.9 mm cryoprobe[5]. These are operated with the ERBECRYO® 2. Depending on the size of the cryoprobe, freezing times between 3 and 6 seconds were reported[1].



***Prof. Felix Herth** (Thoraxklinik, University of Heidelberg) demonstrating a transbronchial cryobiopsy for ILD diagnosis*



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Erbe Elektromedizin GmbH
Waldhoernlestrasse 17
72072 Tuebingen
Germany

Phone +49 7071 755-0
info@erbe-med.com
erbe-med.com
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