Transbronchial lung biopsy with a flexible cryoprobe during rigid bronchoscopy: Standardizing the procedure

Sir,

While certain diffuse parenchyma lung diseases such as sarcoidosis can be diagnosed in most instances on conventional transbronchial lung biopsy (TBLB), larger biopsies are required for the histopathological identification of usual interstitial pneumonia, nonspecific interstitial pneumonia, and others.[1] Until recently, surgical lung biopsy (thoracotomy or video-assisted thoracoscopic surgery) was the only modality to obtain large biopsy specimens from the lung parenchyma.[2] The flexible cryoprobe enables acquisition of large biopsy samples during flexible or rigid bronchoscopy, thus avoiding surgery and the potential complications of surgical lung biopsy (prolonged air leak, infections, and persistent chest pain).[3]

We recently reported the first experience from India of performing cryobiopsy from the lung parenchyma (cryo-TBLB).[4] Therein, we had described a flexible bronchoscopic technique with the procedure performed under conscious sedation in a spontaneously breathing patient using two bronchoscopes. The first bronchoscope was used to obtain the cryobiopsy and was withdrawn with the lung specimen adhered to the cryoprobe. Subsequently, the second bronchoscope was inserted immediately and "wedged" into the biopsied segment to control the bleeding. In the case that we had reported,[4] we did not encounter any complication. However, in the second patient using the aforementioned technique was employed, significant bleeding was encountered that hindered the introduction of the second bronchoscope into the airway, with resultant spillage of the blood to the contralateral bronchial tree. This was accompanied by a fall in oxygen saturation to 75%. Once the second bronchoscope was placed properly, the blood clots were cleared and the patient improved. This prompted us to change our technique of performing cryo-TBLB, and we have now standardized the procedure at our center.

The cryo-TBLB is now performed in the operating room under general anesthesia. The patient is intubated with an 11 mm rigid bronchoscope, the scope is positioned in the lower trachea, and the patient is ventilated through the rigid barrel. A flexible bronchoscope is then inserted through the rigid bronchoscope and positioned in the segmental bronchus (generally one of the segments of the right lower lobe) from which the biopsy is to be performed. A 1.9 mm flexible cryoprobe is introduced through the working channel of the flexible bronchoscope and advanced inside the segment until resistance is encountered, which generally corresponds to a point very close to the visceral pleura. The probe is then withdrawn by 2 cm and freezing at the tip of the probe is accomplished by activating the cryoprobe for 3 s. The bronchoscope along with the probe (and the specimen attached to it) is then pulled en bloc and withdrawn from the rigid barrel. There is a "give-way feel" as a piece of the lung parenchyma is torn off the surrounding lung while pulling the bronchoscope. The probe is then thawed and the specimen is retrieved as described earlier. The rigid telescope is immediately inserted through the barrel and any bleeding following the biopsy is managed with suctioning, instillation of cold saline or adrenaline as required. If there is profuse bleeding, the rigid bronchoscope is maneuvered into the contralateral main bronchus to maintain ventilation.

The details of the first four patients who underwent cryo-TBLB during rigid bronchoscopy are described in Table 1. We were able to obtain good alveolated tissue in all patients, and a histopathological diagnosis was made in each case. One patient developed a pneumothorax that was easily managed by placing an intercostal drainage tube, and the tube was removed on the following day after achieving complete lung expansion. In two patients, significant bleeding was encountered. However, as the rigid bronchoscope was used to selectively intubate the contralateral bronchus (in patient four), spillage to the other side was avoided and ventilation was maintained throughout the procedure without significant oxygen desaturation. The bleeding stopped spontaneously by clot formation (patient four). In another patient (patient three), instillation of cold saline was required to control the bleeding. The clots that were formed were removed using the large rigid suction catheter before further cryobiopsy was performed from a different lung segment. Thus, the use of the rigid bronchoscope allows the performance of subsequent biopsies even if significant bleeding ensues after the first or second biopsy attempts.

We did not use fluoroscopy in these cases, which certainly is a limitation. This was due to the nonavailability of fluoroscopy in our operating room. We encountered pneumothorax in one of the 4 (25%) patients, a relatively high rate. However, this was similar to that observed in a series of patients with fibrotic interstitial lung diseases (28%) in whom cryobiopsies were performed using fluoroscopic guidance.[5] All four of our patients had fibrotic interstitial lung diseases. However, we strongly recommend that fluoroscopy should be used to guide the placement of the cryoprobe in all procedures wherever it is feasible.

In a recent systematic review of studies on cryo-TBLB, remarkable heterogeneity was found in the technique

Table 1: Details of the patients who underwent cryo-transbronchial lung biopsy during rigid bronchoscopy

Patient	Age/ gender	Clinical suspicion	CT findings	Number of biopsies performed and lung segments biopsied	Duration of procedure (min)	Histopathological findings and diagnosis	Complications
1	61/male	Idiopathic pulmonary fibrosis	Lower lobe predominant interlobular septal thickening	4 (one piece each from anterior, lateral, medial, and posterior segments of right lower lobe)	30	Usual interstitial pneumonia	Pneumothorax requiring intercostal tube drainage, ICD removed the next day
2	30/male	Nonspecific interstitial pneumonia	Diffusely distributed ground glass opacities, intralobular septal thickening with early honeycombing	4 (one piece each from anterior, lateral, superior and posterior segments of right lower lobe)	35	Nonspecific interstitial pneumonia (fibrotic type)	None
3	56/female	Nonspecific interstitial pneumonia	Lower lobe predominant interlobular septal thickening with ground glass opacities	4 (two pieces from posterior segment and one each from anterior and lateral segments of the right lower lobe)	70	Bronchiolitis obliterans organizing pneumonia	Bleeding requiring suctioning, cold saline instillation and clot removal with rigid forceps and suction catheter
4	54/male	Chronic hypersensitivity pneumonitis	Diffusely distributed interlobular and intralobular septal thickening with multiple centrilobular nodules	5 (two pieces each from anterior and medial segments and one from posterior segment of the right lower lobe)	30	Sarcoidosis	Bleeding requiring selective intubation of the contralateral bronchus

CT: Computed tomography, ICD: Intercostal drainage

used for the performance of the procedure.[6] Not only the use of sedation/anesthesia and artificial airway varied across studies but also the freezing times, the size of the cryoprobe used, and the number of biopsies performed were different. Observing this, there has been a recent call for standardization of the technique.[7] Further prospective studies are needed in this regard, addressing various technical issues related to the procedure.

In conclusion, the performance of cryo-TBLB without an artificial airway, although described in previous studies and attempted by us recently, is feasible but may be associated with complications.[4,8] Cryo-TBLB can be performed much more safely and thoroughly under general anesthesia during rigid bronchoscopy.

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Conflicts of interest
There are no conflicts of interest.

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