Proposed Best Practice Checklist: Bronchoscopy and BAL

The role of Bronchoscopy

BAL is usually carried out via a paediatric flexible fibreoptic bronchoscope; in intubated patients BAL is performed after inserting the FFB through the endotracheal tube using a swivel Y connector. Whether the bronchoscopy is performed through an endotracheal tube, a laryngeal mask or facemask, suction should not be used before the bronchoscope has been passed beyond the vocal cords, in order to avoid contamination of bacteriological samples with upper airway flora, as far as possible.

Location of BAL

In case of diffuse disease, the BAL target site should be chosen on the basis of an HRCT performed before the procedure, rather than choosing a traditional BAL site (i.e., the right middle lobe or lingula). In infants it is often easier to perform BAL in the right lower lobe. If BAL and lung biopsy is to be done at the same session, BAL should not be performed in the lung lobe chosen for biopsy.

Amount of fluid and recovery

BAL is carried out using sterile normal saline. BAL volume is adjusted to body weight using 3 mL. kg^{-1} of normal saline divided into three equal fractions in children weighing < 20 kg and 3 mL. kg^{-1} in 20 mL portions in children weighing > 20 kg. The fluid may be recovered by hand suction using a syringe or by mechanical aspiration into a suction trap. The negative suction pressure should be adjusted to avoid visible airway collapse

Processing BAL Fluid

- the first BALF aliquot should be unfiltered and used for microbiological studies
- the other aliquots should be pooled unless one is bloodstained, filtered through one or two layers sterile gauze to remove mucus (only if a lot of mucus present, which is unlikely in chILD) and used for analysis of cellular and non-cellular components.
    - The recovered fluid can be transported at room temperature if the delay between BAL fluid retrieval and delivery to the laboratory is less than 30 minutes. If not it should be kept at 4° C before analysis to optimize cell viability.
    - Cytospins are obtained after centrifugation (500 rpm for 10 min). At least 10 slides should be prepared for each patient.
    - For further analysis, the rest of BAL should be centrifuged (2000 rpm for 10 min), giving sediment and supernatant, and stored at -70°C.

References

1. de Blic J, Midulla F, Barbato A, Clement A, Dab I, Eber E, Green C, Grigg J, Kotecha S, Kurland G, Pohunek P, Ratjen F, Rossi G. Bronchoalveolar lavage in children. ERS Task Force on bronchoalveolar lavage in children. European Respiratory Society. Eur Respir J. 2000; 15: 217-31
2. Midulla F, Nenna R. Bronchoalveolar lavage : indications and applications. In Progress in respiratory research : Paediatric Bronchoscopy. Priftis KN ed. Karger, Basel. 2010 :30-41.
3. Meyer KC, Raghu G, Baughman RP, Brown KK, Costabel U, du Bois RM, Drent M, Haslam PL, Kim DS, Nagai S, Rottoli P, Saltini C, Selman M, Strange C, Wood B; An official American Thoracic Society clinical practice guideline: the clinical utility of bronchoalveolar lavage cellular analysis in interstitial lung disease. American Thoracic Society Committee on BAL in Interstitial Lung Disease. Am J Respir Crit Care Med. 2012; 185: 1004-14

SOP/ Endo Bronchial Biopsy (EBB)

Although the performance of EBB is fully justified as part of bronchoscopy, its role in the investigation of chILD is limited. Specifically, it is not useful for the diagnosis of NEHI, in which condition the increase in Bombesin positive cells is not seen in the proximal airways. However, the presence of non-caseating granulomas may be a pointer to a diagnosis of sarcoidosis.

Material

- Best samples are obtained using a bronchoscope which has a working channel at least 2 mm (smaller instruments ie with a 1.2 mm working channel are much less efficient for biopsy)

- The standard biopsy forceps is a fenestrated cupped forceps

Location

Bronchial biopsies are taken from secondary and tertiary carina under direct vision. It is unwise to perform bilateral invasive procedures

Processing

Four to 6 samples should be taken. One sample should be used for microbiological studies (if clinically relevant); two to four samples are fixed on 4% formaldehyde and embedded in paraffin wax; one to two fresh samples should be kept frozen at -80°C

SOP / Transbronchial biopsy (TBB)

Endobronchial biopsy is useful in suspected lung transplant rejection, but its use in chILD is limited by the sample size. It is most useful in diffuse lung disease with highly specific features, e.g. alveolar microlithithiasis [1]. There are also significant complications (bleeding, pneumothorax). For most cases of chILD, a surgical biopsy is the investigation of choice.

Material

- Best samples are obtained using a bronchoscope which has a working channel at least 2 mm (smaller instrument ie with a 1.2 mm working channel can be used but are much less efficient)

- The standard biopsies forceps are a fenestrated cupped forceps or an alligator forceps

Location

- TBB should be done under fluoroscopy under general anaesthesia
- Samples are always taken on the same side, never bilaterally

Processing

Three to six samples are taken. One sample should be used for microbiological studies; two to four samples are fixed on 4% formaldehyde and embedded in paraffin wax; one to two fresh samples should be kept frozen at -80°C

References

1. Wallis C, Whitehead B, Malone M, Dinwiddie R. Pulmonary alveolar microlithiasis in childhood: diagnosis by transbronchial biopsy. Pediatr Pulmonol. 1996; 21: 62-4