

Performance Guideline for Bronchoscopy, Bronchoalveolar Lavage, Protected Specimen Brushing

Pre-procedure evaluation:

During performance of any bronchoscopic procedure, several steps must be taken to minimize risk of complications:

- Estimate ability to maintain oxygenation and ventilation during and after procedure
 - Peep < 14 cm H₂O
 - Ability to tolerate decreased minute ventilation
 - Low FIO₂ requirements prior to initiating procedure
- Absence of elevated ICP
 - Acute change in minute ventilation and airway pressures will acutely elevate ICP
- Minimal coagulopathy
 - INR < 1.5
 - Platelet count > 20,000
- ET tube or tracheostomy size ≥ 7.5 mm diameter

Parameters not within these recommendations suggest increased risk and should be discussed with attending.

Monitoring:

Patients must be monitored to ensure adequate hemodynamics, minute ventilation and oxygen saturations are maintained throughout procedure with standardized documentation:

- Continuous pulse-oximetry
- Continuous ECG monitoring
- Continuous or q5 minute blood pressure monitoring
- Completion of documentation for sedation/paralysis surrounding procedure. (Must be signed by MD)

Equipment preparation:

Bronchoscopy cart should be brought to bedside and all equipment examined and verified to be in working order.

All flushes and equipment needed should be prepared before beginning procedure.

- Bronchoscope and light source
- Swivel adapter, biopsy and suction valves for scope
- Bite block
- Gauze and water-soluble lubricant
- Wall suction and tubing
- Saline for irrigation and clearing/cleaning suction port on scope
 - IF performing bronchoalveolar lavage (BAL) ensure saline
 - Must be non-bacteriostatic saline
 - Use non Luer-Lock (Luer-Slip) 20 ml syringes
 - 5 total aliquots
- Sterile bowl for saline
- Sputum trap if BAL needed
- Sterile drape and towels covering patient to prevent contaminating respiratory tract with new or resistant pathogens
- Gloves, gown, hat and mask with face-shield to prevent contamination

Ventilator adjustments:

To ensure continued minute ventilation and adequate oxygenation, the ventilator must be adjusted accordingly.

Contact respiratory therapist (or appropriate faculty/fellow) to make changes:

- 100% FIO₂
- Mode with mandatory minute ventilation – usually volume control /AC to allow continued minute ventilation despite relative airway obstruction
 - High RR
 - Small TV
 - Decreased flow-rates (can be achieved by lengthening inspiratory time)
 - Adjust “high-pressure” limits and alarms
- Settings should be adjusted to maintain at least the pre-procedure minute ventilation that was being delivered to patient before changing the ventilator or medicating patient

Patients may require frequent interruption of procedure to maintain ventilation

Medication for procedure:

Patients must be adequately sedated for procedure to ensure tolerance and comfort.

- Sedation with some combination of opioid, benzodiazepine or propofol
- Supplemental sedation for increased BP and heart rate
- Select patients may need small bolus of pressor support
- Inhaled non-bacteriostatic lidocaine may be administered via ETT/trach (do not administer via IV route)

Patients in whom the bronchoscope is passed through an ETT must receive paralytics as well to prevent damaging the scope. Other patients may also require paralysis as adequacy of the procedure is markedly enhanced by their use.

- Paralytic agent (vecuronium if hepatic insufficiency suspected or cisatracurium if renal insufficiency suspected)

Performance of Bronchoscopic alveolar lavage:

Standardized procedure must be followed to ensure adequacy of data and prevent false negative results.

Thick secretions with high mucous content are typically from the larger airways and cannot be adequately quantitatively cultured (increased false negative results).

Additionally, small volume irrigation does not necessarily reach the peripheral alveolar spaces and decreases the sensitivity.

- Clear large airways of secretions as needed
- Advance bronchoscope to the terminal bronchi of the area of concern on CXR and wedge
- Irrigate with 20 ml aliquot and discard to reduce upper airway flora and contamination in specimen
- Attach sputum trap to suction valve and suction tubing
- Irrigate with sequential 20 ml aliquots X 4 while remaining in wedge position in the identified bronchus. Return of volumes may require a slight “in and out” motion of the bronchoscope.
- Collect the four 20 ml aliquots in a single sterile sputum trap
- Send for quantitative bacterial cultures by typing in BRP, selecting bronchoscopic lavage and type in “quantitative culture from X lobe”

Performance of Protected Specimen Brush Sampling:

Protected brushing may be preferable to BAL in patients with more severe pulmonary dysfunction.

BAL is probably preferable when no visible mucopurulent material is visible at the ostia of terminal bronchi.

- Advance bronchoscope to the orifice of the area of concern
- Advance the PSB catheter 3 cm from the scope
- Eject the distal carbon wax plug
- Advance brush into sub-segment and rotate brush within secretions
- Retract brush into catheter sleeve and remove entire catheter from bronchoscope
- Wipe distal portion of catheter with 70% alcohol, then advance brush portion and cut brush with sterile scissors and place in 1 ml of non-bacteriostatic saline
- Send for quantitative bacterial cultures by typing in BRP, selecting bronchoscopic lavage and type in “quantitative culture from X lobe”

Post-bronchoscopy procedures:

- Clean the suction port by suctioning enzymatic detergent solution
- Wipe the outside with the enzymatic detergent solution soaked sponge
- Place bronchoscope in plastic tub container, then into a clear biohazard bag with a patient label
- Obtain post-bronch chest x-ray

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