Bronchoscopy Biopsies

Presented by:
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Introduction

- Procedure that visualizes the tracheobronchial tree
Pre-Procedural Preparation

- History and clinical exam
- Indications and contraindications
- Not to eat for at least six hours prior to the procedure
Informed Consent

- Discussing the potential complications
- Benefits
- Alternatives of the planned procedure
- Type of sedation
- Questions should be answered
- Implied consent
Personnel

- Bronchoscopist
- RN
- Respiratory Therapist
Sedation

- Moderate sedation
  - Procedure room is prepared
  - Equipment checked
  - Time-out is done
Diagnostic Indications

- Evaluation of pneumonia or infiltrate
  - Bronchoalveolar lavage BAL
  - Bronchial washings
  - Cannot produce sputum for collection
  - Immunocompromised
  - Slow or incomplete resolution of presumed pneumonia
Diagnostic Indications

- Persistent atelectasis
  - Airway obstruction
- Centrally located lung masses or nodules
  - Washing, brushing, BAL, or biopsy
  - Extrinsic compression
  - Direct sampling of peribronchial masses
Diagnostic Indications

- Mediastinal lymphadenopathy
- Hemoptysis
  - Identify and localize the cause of bleeding
  - Bleeding may be controlled
  - Rigid bronchoscopy is indicated in the management of massive bleeding
- Suspected airway obstruction
Diagnostic Indications

- Tracheobronchomalacia
  - Dynamic airway collapse
- Suspected lung transplant infection or rejection
  - Post transplant period
  - Rejection
  - Opportunistic infection
  - Evaluate the donor lung
Diagnostic Indications

- Toxic inhalation or burn injury
  - Extent of smoke or chemical inhalation injury
  - Carbonaceous debris
  - Mucosal paller
  - Mucosal ulceration
  - Mucosal erythema
Diagnostic Indications

- Chest trauma
  - Trauma to the chest or neck
  - Pneumomediastinum
  - Membranous distal trachea or proximal main stem bronchi
- Cough
  - Last diagnostic modalities
  - Foreign body
  - Airways disease
Diagnostic Indications

- Tracheoesophageal fistula
  - Congenital
  - Malignancy
  - Prolonged intubation
Diagnostic Indications

- Bronchopleural fistula
  - Lost-lobectomy
  - Postpneumonectomy
- Evaluate complications of placement of artificial airways
  - Tracheostomy
  - Endotrachial tubes
Diagnostic Indications

- Precancerous lesion
  - Autofluorescence or narrow banding
- Confocal microbronchoscopcy
  - 1.4mm fiberoptic miniprobe
Therapeutic indications

- Endotracheal tube placement
  - Difficult airway or to confirm the position of an endotracheal tube
- Foreign body removal
- Mucus impaction
  - Isolation in hemoptysis
- Laser of argon plasma coagulation
- Ablate endobronchial lesions
- Photodynamic therapy
  - A photosensitizer drug (usually a hematoporphyrin derivative)
Therapeutic indications

- Electrocoagulation
  - Coagulated within the airways

- Cryotherapy
  - Endobronchial tumor or granulation tissue

- Balloon dilation

- Brachytherapy catheter placement
  - Insert the radioactive pellet
  - Three weekly sessions
Therapeutic indications

- Tracheobronchial stents
- Bronchial thermoplasty
  - Severe asthmatics
  - Weakening the smooth muscles of the airway
- Facilitation of pigtail catheter
  - To drain parenchymal abscess
  - Antibiotics locally
Therapeutic indications

- Needle aspiration of mediastinal cysts
- Treatment of bronchopleural fistula
  - Endobronchial one-way valves or synthetic gels
- Treatment of Emphysema
  - Lung volume reduction
Contraindications

- Risk of pulmonary and cardiovascular decompensation
- High risk of bleeding
- Intolerance to sedation
Specific contraindications

- Severe hypoxemia
- Severe pulmonary hypertension
- Unstable or severe obstructive airways disease
- Hemodynamic instability and myocardial ischemia
- Anticoagulants/coagulopathy
- Renal insufficiency
- Superior vena cava syndrome
Special populations

- Raised intracranial pressure
- Mechanical ventilation
- Large anterior mediastinal masses
- Pregnancy
- Older patients
- Patients requiring prophylactic antibiotics
Needle aspiration

- Endobronchial needle aspiration
- Transbronchial needle aspiration
Endobronchial biopsy

- Direct visual guidance
- Bronchoscope is placed 2 or 3 cm proximal
- Clear instructions
- Forceps are briskly pulled back
- Biopsy specimen handed to the assistant
- Sample
- Biopsied area should be inspected
Transbronchial biopsy

- Blindly
- Fluoroscopic guidance
Complications

- Complication rates ranging from 0.08 to 6.8%
- Appropriate patient selection
- Procedure-related and/or sedation related
- Common complications
  - Hypotension
  - Bleeding
  - Pneumothorax
  - Nasal discomfort, a sore, and mild hemoptysis
Complications

- Less common complications
  - Bronchospasm
  - Hypoxemia
  - Epistaxis due to nasal trauma
  - Nausea & vomiting
  - Cardiac arrhythmias
  - Infection
  - Vasovagal syncope
Complications

- **Bleeding**
  - 2.8%
  - Ice cold saline and/or epinephrine
- **Pneumothorax**
- **Hypotension and cardiac arrhythmias**
- **Hypoxemia and respiratory failure**
- **Others**
  - Nausea and vomiting as well as aspiration
  - Airway injury
  - Late complications including bacteremia, fever, and pneumonia
Bronchoscopy-induced Hemorrhage

- 1% to 20%
- Cytological brushing or forceps biopsy
- Underlying coagulation disorders
- Neoplastic lesions
- Cardinoid tumors
- Necrotic endobronchial tumors
- Inadvertent laceration of pulmonary vessels
- Not related to the type of biopsy forceps used
- Cavitated lesions
- Bronchiectasis
Portable bronchoscope with monitor

A portable bronchoscope with built-in liquid crystal display (LCD) and light source. It has an outer diameter of 3.1 mm and working channel of 2.8 mm and can be operated without a large monitor or image processor.

Image courtesy of Olympus America Inc. Copyright © 2014 Olympus America Inc.


Version: 1.0
Bronchoscope reprocessing system

Bronchoscope reprocessing system. A dual chamber unit where the bronchoscope is placed for disinfection after enzymatic cleaning and leak testing is done.

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https://www.upload.com/contents/files/bronchoscopy-in-adult-overview/10poty=8LWwPF4666dated=7Timeto=15&source=search_results... 2021
Bronchoscopes hung upright to prevent the accumulation of moisture
The pulmonary artery and its branches follow the same course as the tracheobronchial tree.
Size of ultrathin bronchoscope compared to routine diagnostic and therapeutic bronchoscope

Figure shows an ultrathin bronchoscope (right) compared with therapeutic (left) and diagnostic (middle) bronchoscopes. The ultrathin bronchoscope allows access to small airways or through tight endobronchial obstructions.

Graphic 94870 Version 1.0
## Indications for bronchoscopy

### Inspection
- Cough (persistent, unexplained)
- Hemoptysis
- Wheezes (tuberculosis/asthma)
- Diaphragmatic paralysis
- Unexplained hoarseness and/or vocal cord paralysis/trich
- Suspected tracheo-esophageal fistula
- Chest trauma
- Suspected tracheomalacia
- Toxic inhalation or burn injury
- Verify tracheotomy or endotracheal tube placement
- Evaluate precocious lesions (actinomyces)
- Donor transplant lung evaluation

### May require biopsy, BAL, or other procedure
- Focal/unilateral hypertersia or hyperemia
- Inflammation of bronchial/pleural fistula
- Atelectasis (persistent)
- Abnormal chest radiograph
- Pleural effusion
- Parenchymal or mediastinal mass
- Parachymal mass/tumor
- Diagnosis of etiology of pneumonia
- Recurrent/prolonged (immunocompromised host)
- Nosocomial
- Immunocompromised host
- Foreign body in airway (known or suspected)
- Evaluation for rejection in lung transplant recipient
- Delivery of brachytherapy
- Research

* Utility/yield for this indication are controversial.
* Diagnostic yield ≥40 percent only when effusion is massive or associated with hemoptysis, mass, or atelectasis.

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Graphic S8406 Version 3.0

https://www.update.com/content/factsheet/bronchoscopy-in-adult-indications-and-contraindications?topicKey=FU3P2F4289&KeyPressed=1&msr=1318001856...
Diagram of a flexible bronchoscope’s distal tip (ie, working tip)
FIG. 5. Bronchoscopic biopsy forceps; cup forceps (left), toothed forceps (middle), and forceps with an impaler needle (right).
# Table 1. Indications for diagnostic bronchoscopy

<table>
<thead>
<tr>
<th>Indications</th>
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</thead>
<tbody>
<tr>
<td>Cough</td>
</tr>
<tr>
<td>Wheeze and stridor</td>
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<tr>
<td>Abnormal chest roentgenogram</td>
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<tr>
<td>Persistent pneumothorax</td>
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<tr>
<td>Diaphragmatic paralysis</td>
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<tr>
<td>Vocal cord paralysis and hoarseness</td>
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<tr>
<td>Chemical and thermal burns of tracheobronchial tree</td>
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<tr>
<td>Refractory lung abscess</td>
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<tr>
<td>Thoracic trauma</td>
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<tr>
<td>Bronchography</td>
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<tr>
<td>Hemoptysis (Chapter 17)</td>
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<tr>
<td>Abnormal or atypical sputum cytology (Chapter 15)</td>
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<tr>
<td>Diagnostic bronchoalveolar lavage (Chapters 13 and 14)</td>
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<td>Suspected pulmonary infections (Chapters 13 and 14)</td>
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<tr>
<td>Suspected tracheoesophageal or bronchoesophageal fistula (Chapters 16 and 22)</td>
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<td>Follow-up of bronchogenic carcinoma (Chapter 15)</td>
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<td>Carcinoma of the lung (Chapter 15)</td>
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<tr>
<td>Mediastinal neoplasm (Chapter 22)</td>
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<tr>
<td>Esophageal carcinoma (Chapter 22)</td>
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<td>Suspected foreign body in the tracheobronchial tree (Chapter 18)</td>
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<td>Obstructing neoplasms (Chapters 19–21)</td>
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<tr>
<td>Tracheobronchial strictures and stenoses (Chapter 21)</td>
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<tr>
<td>Bronchopleural fistula (Chapters 16 and 22)</td>
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<tr>
<td>Assessment of endotracheal tube placement (Chapter 16)</td>
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<tr>
<td>Assessment of potential endotracheal tube–related injury (Chapter 16)</td>
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<tr>
<td>Postoperative assessment of tracheal, tracheobronchial, or bronchial anastomosis (Chapter 22)</td>
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<tr>
<td>Research</td>
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</tbody>
</table>
FIG. 1. (A) Bronchoscopic image of another bronchoscope in the process of performing transcarinal needle insertion in a model of a tracheobronchial tree. Note the ideal distance to which the needle has extended outside the flexible bronchoscope. (B) The needle has fully entered the carina.
FIG. 3. Flexible bronchoscope with bronchoscopic lung biopsy forceps in place for biopsy.
FIG. 25. Even the fluoroscopic monitoring (single plane) may not clearly show the open jaws of the biopsy forceps even when they are open (A). Under fluoroscopic guidance, the bronchoscopy assistant turns the handle of the forceps until the open jaws are clearly visible on fluoroscopic monitor (B).
<table>
<thead>
<tr>
<th>Equipment</th>
<th>Medications</th>
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<tbody>
<tr>
<td>Pulse oximeter</td>
<td>Sodium thiopental</td>
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<tr>
<td>Capnograph</td>
<td>Propofol</td>
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<tr>
<td>Electrocardiogram monitor and leads</td>
<td>Succinylcholine</td>
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<tr>
<td>Suction (wall outlet with attachment or portable)</td>
<td>Epinephrine</td>
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<tr>
<td>Compressed oxygen (wall outlet with adapter or E cylinder)</td>
<td>Breytium tosylate</td>
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<tr>
<td></td>
<td>Calcium chloride</td>
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<tr>
<td></td>
<td>Sodium bicarbonate</td>
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<td></td>
<td>Lidocaine</td>
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<tr>
<td>Defibrillator</td>
<td>Phenylephrine</td>
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<tr>
<td>Laryngoscope with assorted blades</td>
<td>Atropine</td>
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<tr>
<td>Ambu bag</td>
<td>Glycopyrrolate</td>
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<tr>
<td>Anesthesia masks (small, medium, and large)</td>
<td>Narcotics and benzodiazepines as needed</td>
</tr>
<tr>
<td>Assorted endotracheal tubes and intubating styles</td>
<td></td>
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</tbody>
</table>
FIG. 8. A toothed biopsy forceps (left), biopsy forceps with an impaler needle (middle), and a claw (right) can easily traverse the working channel of a standard flexible bronchoscope. Courtesy of Olympus Corp.
**FIG. 2.** Components of a flexible bronchoscope (a model manufactured by Pentax Corp.).
"Do you sterilize your instrument after each use?"

"Well, I know my endoscopes are sterilized after every use, but I have no idea who does it."

[Cartoon image of a patient and a medical professional]