ATS Resident Boot Camp Live 2021: Bronchoscopy

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Objectives

- Identify appropriate pre-procedural preparation for bronchoscopy.
- Describe a procedural approach to airway lesions.
- Discuss management of bronchoscopy-related complications.
Indications for Bronchoscopy

- Infection
- Hemoptysis
- Persistent atelectasis
- Lung transplant rejection
- Tracheobronchomalacia
- Lung nodules / masses
- Mediastinal lymphadenopathy
Contraindications to Bronchoscopy

Depends on the clinical situation

Most contraindications are relative rather than absolute

Absolute: uncooperative patient, operator inexperience, lack of adequate facilities and personnel to care for emergencies (arrest, pneumothorax, bleeding)
Relative Contraindications

Current or recent MI, unstable angina, decompensated heart failure or arrhythmias

- General 6-week rule

Severe hypoxia, acute bronchospasm

Stridor / advanced CAO

- Converting a relatively unstable airway into an unstable airway

Coagulopathy

- Plavix within the past 5-7 days
- Warfarin within 5 days
- Platelets <50,000
- INR >1.6
- Severe uremia
- ASA is ok

Evaluate for these in your H&P!!

Obtaining Informed Consent

**CLINICIAN’S RESPONSIBILITY**

- **Purpose**
- **Procedure**
- **Benefits**
- **Risks**

**PATIENT’S RESPONSIBILITY**

- **Express Understanding**
- **Pre-procedure to-do list**
- **Consent Voluntariness**

**Bronchoscopy**
Bronchoscopy-Related Complications

Occur in <1% of cases

- Hemoptysis
- Pneumothorax
- Hypoxemia

You may do ~100 bronchoscopies during your pulmonary fellowship = high likelihood of 1 or more of these occurring.

Ernst A. Chest 2003.
Facciolongo N. Monaldi Arch Chest Dis 2009.
<table>
<thead>
<tr>
<th>History</th>
<th>Physical Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking history</td>
<td>Vital Signs</td>
</tr>
<tr>
<td>Occupational exposure</td>
<td>Visual assessment</td>
</tr>
<tr>
<td>Comorbidities:</td>
<td>--Respiratory distress</td>
</tr>
<tr>
<td>--Asthma</td>
<td>--Stridor</td>
</tr>
<tr>
<td>--COPD</td>
<td>--Hoarseness</td>
</tr>
<tr>
<td>--Cardiovascular health</td>
<td>--Anatomic abnormalities of face and neck</td>
</tr>
<tr>
<td>--Bleeding disorders</td>
<td>--Spine deformities</td>
</tr>
<tr>
<td>--Liver disease</td>
<td>Lung auscultation</td>
</tr>
<tr>
<td>--Kidney disease</td>
<td>Cardiac auscultation</td>
</tr>
<tr>
<td>Allergies</td>
<td></td>
</tr>
<tr>
<td>Medications</td>
<td></td>
</tr>
</tbody>
</table>
## Pre-Procedure Testing & Instructions

<table>
<thead>
<tr>
<th>Testing</th>
<th>Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete blood count</td>
<td>Chest X-ray</td>
</tr>
<tr>
<td>Basic metabolic panel</td>
<td>CT chest</td>
</tr>
<tr>
<td>Coagulation studies</td>
<td>Pulmonary Function Tests</td>
</tr>
<tr>
<td>EKG</td>
<td>Echocardiogram</td>
</tr>
<tr>
<td><strong>COVID-19 testing</strong></td>
<td>Prior amount of sedation</td>
</tr>
<tr>
<td></td>
<td>required for procedures</td>
</tr>
</tbody>
</table>

- ✓ Instructions for NPO
- ✓ Ride home

### Table 1. Summary of the American Society of Anesthesiologists Preoperative Fasting Guidelines for Healthy Patients of All Ages

<table>
<thead>
<tr>
<th>Ingested Material</th>
<th>Minimum Fasting Period (hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear liquids b</td>
<td>2</td>
</tr>
<tr>
<td>Breast milk</td>
<td>4</td>
</tr>
<tr>
<td>Infant formula</td>
<td>6</td>
</tr>
<tr>
<td>Nonhuman milk c</td>
<td>6</td>
</tr>
<tr>
<td>Light meal</td>
<td>6</td>
</tr>
<tr>
<td>Regular meal</td>
<td>8</td>
</tr>
</tbody>
</table>
**Bronchoscopy Team**

- **Bronchoscopist**
  - Administers topical medications
  - Instills saline for lavage
  - Assists with insertion and activation of tools
  - Handles specimens

- **Assistant**
  - Assists with insertion and activation of tools
  - Handles specimens

- **Patient**
  - Administers medications for conscious sedation
  - Monitors vital signs

- **Nurse**
  - Directs medications for conscious sedation

- **Anesthesia**
Systematic 4 box approach

Initial evaluation
- Physical exam, tests
- Functional status
- Significant comorbidities
- Patient’s support system
- Patient preferences
- Patient expectations

Procedural strategies and plan
- Indications
- Contraindications
- Results
- Team experience
- Risk-benefit analysis
- Therapeutic alternatives
- Informed consent

Long-term plan
- Outcomes assessed
- Follow-up tests, visits
- Referrals to medical, surgical and palliative
- Quality improvement

Procedural techniques
- Perioperative care
- Anaesthesia
- Techniques, instruments
- Risks
- Expected results
- Related complications
1. Insertion Cord

- Working channel
- Lights
- Optics
2. Control Body

- Control lever
- Suction port
- Buttons
- Working channel port
2. Control Body – Control Lever
2. Control Body – Buttons

- Picture
- Freeze
- Magnify
- Narrow Band Imaging
SCOPE DRIVING
SCOPE DRIVING
Bronchoscope Selection

Consider:
1) Route of entry: mouth, nose, ETT, tracheostomy
2) Purpose of the procedure

<table>
<thead>
<tr>
<th></th>
<th>Outer Diameter</th>
<th>Working Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Olympus</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hybrid</td>
<td>4.0 mm</td>
<td>2.0 mm</td>
</tr>
<tr>
<td>Diagnostic</td>
<td>5.5 mm</td>
<td>2.0 mm</td>
</tr>
<tr>
<td>Therapeutic</td>
<td>6.0 mm</td>
<td>2.8 mm</td>
</tr>
<tr>
<td><strong>Ambu</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>aScope 3 Slim</td>
<td>3.8 mm</td>
<td>1.2 mm</td>
</tr>
<tr>
<td>aScope 3 Regular</td>
<td>5.0 mm</td>
<td>2.0 mm</td>
</tr>
<tr>
<td>aScope 3 Large</td>
<td>5.8 mm</td>
<td>2.8 mm</td>
</tr>
</tbody>
</table>
Samples

- Bronchoalveolar lavage
- Transbronchial needle aspirations
- Brushings
- Biopsies
  - Endobronchial
  - Transbronchial
Tracheobronchial Anatomy
- Diameter varies at different levels and with respiration
- Posterior membrane may move anteriorly with exhalation
- Length 9-15cm in adult, 7-10cm in children
- Distal margin indicated by carina
Trachea

Cross section through trachea

- Connective tissue sheath
- Cartilage
- Elastic fibers
- Gland
- Small artery
- Lymph vessels
- Nerve
- Epithelium
- Anterior wall
- Posterior wall
- Nerve
- Small arteries
- Gland
- Elastic fibers
- Trachealis muscle
- Esophageal muscle
- Epithelium
- Lymph vessels
Bronchial anatomy

- Right lung
  - 3 lobes
  - 10 bronchopulmonary segments
- Left lung
  - 2 lobes
  - 10 bronchopulmonary segments
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Procedural techniques