Indications, Contraindications and Complications of Flexible Bronchoscopy

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Speaker: Varian

Some slides from Neeraj Desai, MD, Chicago Chest Center
Overview

- Indications
- Contraindications
- Preoperative assessment
- Patient preparation
- Sedation
Indications for Flexible Bronchoscopy

• Unexplained cough, hemoptysis, persistent or recurrent pneumonia

• Abnormal exam findings
  - focal wheeze
  - stridor
Indications for Flexible Bronchoscopy

- Abnormal Radiologic findings
  - Mass/ nodule
  - Pulmonary infiltrates
  - Lymphadenopathy (hilar or mediastinal)
- Lung cancer diagnosis/staging/restaging
- Diffuse parenchymal disease
Indications for flexible bronchoscopy

- Lung transplant - rejection
- Evaluation of airway injury - burns/trauma
- Immunocompromised - obtain culture specimens
• Mucous plugging
• Endobronchial tumor destruction (electrocoagulation, cryotherapy, laser etc.)
• Airway stent placement
  - rigid bronchoscopy preferred for central airway lesions
• Foreign body removal
  - oral route
Therapeutic

- Bronchoscopy guided ETT placement
- Percutaneous tracheostomy
- Bronchial thermoplasty
- Bronchoscopic lung volume reduction
- Localization/treatment of bronchopleural fistula
- Research

IBV valves
Contraindications

No absolute contraindications!

- Assess risk benefit ratio !!!!
- Relative
- Unstable neck or cervical spine immobility
- Limited motion of temporo-mandibular joint
- Life-threatening arrhythmia
- Recent myocardial infarction (6 weeks) or unstable angina
- Refractory hypoxemia
- Inability to cooperate with procedure
- Lung cavities and abscesses – risk of rupture and aspiration

BTS guidelines on diagnostic bronchoscopy. Thorax 2001;56 (suppl I) i1-i21
Contraindications
(mainly for Bx)

- Unable to stop antiplatelet agents (plavix) or anticoagulants (warfarin, dabigtran)
- Serum creatinine >3.0
- Platelets <50,000
- Uncorrected coagulopathy
- Superior vena cava obstruction
Bronchoscopy and Thrombocytopenia

- Risk of bleeding - 0-26% (TBBx, post transfusion)
- Transfuse platelets before & during to keep
  - > 20,000 - FB
  - > 50,000 - transbronchial biopsy
- Remember platelet half life is 6 hrs

1. Papin T et al, Chest, 1985; 88:54
2. Weiss S et al, Chest, 1993;104:1025
Bronchoscopy and Renal failure

- NO RCT to evaluate safety and the need for intervention prior to procedure
- Dialysis within 24 hrs prior
- Correct INR, platelet count if necessary (<1.5, >50,000)
- ? Desmopressin (DDAVP) 3µg/kg, IV 30 min prior to the procedure – $1000
- Mehta N. et al 2005
  - 8 % bleeding out of that 4 % (major) in no intervention group compared to no bleeding when dialysis + DDAVP given

2. Mannucci et al, NEJM 1983;308:3
## Anticoagulant and Antiplatelet agents

- **Aspirin** – safe
- **Clopidogrel (Plavix):** withhold drug for 5 d
- **Warfarin (Coumadin):** when INR < 1.5
  (FFP, Vitamin K, drug withdrawal)
- **Dabigatran (pradaxa):**
  \[\text{CrCl} > 50 - 1 \text{ to } 2 \text{ days, Cr Cl} < 50 - 3 \text{ to } 5 \text{ days}\]
- **I.V. Heparin:** > 6 hrs, check PTT, LMWH: 24 hrs
Bronchoscopy and Ventilated patient

- Size of the ETT
- Choose bronroscope accordingly
- Preoxygenate to 100 % FiO2
- Ventilator settings – mandatory, volume control
- Swivel adaptor

<table>
<thead>
<tr>
<th>Type</th>
<th>Features</th>
<th>Outer diameter (mm)</th>
<th>Channel diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult ultrathin fiberoptic or hybrid</td>
<td>Small diameter allows for more peripheral navigation</td>
<td>2.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Pediatric fiberoptic</td>
<td>Small diameter appropriate for pediatric applications</td>
<td>3.6</td>
<td>1.2</td>
</tr>
<tr>
<td>Pediatric hybrid</td>
<td>Improved image quality</td>
<td>4.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Adult diagnostic fiberoptic</td>
<td>Fiberoptic image</td>
<td>4.4</td>
<td>2.0</td>
</tr>
<tr>
<td>Adult diagnostic video</td>
<td>Superior image quality</td>
<td>4.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Adult therapeutic fiberoptic</td>
<td>Fiberoptic image</td>
<td>5.9</td>
<td>2.8</td>
</tr>
<tr>
<td>Adult therapeutic video</td>
<td>Superior image quality</td>
<td>6.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Endobronchial ultrasonography hybrid</td>
<td>Real-time ultrasound needle biopsy of lymph nodes</td>
<td>6.9</td>
<td>3.2</td>
</tr>
</tbody>
</table>

* State-of-the-art bronchoscopy requires a variety of flexible bronchoscopic instruments of varying outer diameter, channel diameter, and features.

2. BTS guidelines on diagnostic bronchoscopy. Thorax 2001;56 (suppl I) i1-i21
Bronchoscopy and Pregnancy

• Defer until after pregnancy when possible
• Consult pharmacologist, anesthesiologist and obstetrician
• Conscious sedation – use lowest effective dose
  - propofol (category B), lidocaine (category C)
  - midazolam (category D), fentanyl (category D)
• Left lateral position – if possible
• Lead shielding, > 14 wks of gestation, short exposure times
• Most experienced bronchoscopist to perform

Bahhady IJ and Ernst A. Chest 2004;126;1974-81
Complications

- Fever (common) 10-30 % with lavage, tbna, tbbx
- Epistaxis (nasal approach)
- Hemorrhage >50 ml (2 to 9 %)
- Laryngospasm
- Cardiac arrythmia
- Hypoxemia

- Bacteremia/ Infection
- Pneumothorax (tbbx)
  - 3-5 % - < half require chest tube
  - 14- 20 % - mechanically ventilated
Patient preparation

- H and P – indication, planning, equipment (fluoroscopy, EBUS, cytology, navigation), need for isolation?
- ASA score - ? Need for anesthesiologist
- Prophylactic antibiotics - asplenic, heart valve prosthesis, history of endocarditis
- BTS guidelines (2001) – no food (4 hrs), no liquids (2 hrs)
- ASA guidelines (2002)
  - 6 - 8 hrs: solid food
  - 6hrs: light meal, milk
  - 2hrs: clear liquids

1. Anesthesiology 2002; 96:1004–17
2. BTS guidelines on diagnostic bronchoscopy. Thorax 2001;56 (suppl I) i1-i21
Patient preparation

• Informed consent (procedure & sedation) – risk and benefits
• What to expect during and post procedure
• Need to have a ride / escort
# Sedation

<table>
<thead>
<tr>
<th></th>
<th>Minimal Sedation (Anxiolysis)</th>
<th>Moderate Sedation/Analgesia (Conscious Sedation)</th>
<th>Deep Sedation/Analgesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsiveness</td>
<td>Normal response to verbal stimulation</td>
<td>Purposeful* response to verbal or tactile stimulation</td>
<td>Purposeful* response after repeated or painful stimulation</td>
</tr>
<tr>
<td>Airway</td>
<td>Unaffected</td>
<td>No intervention required</td>
<td>Intervention may be required</td>
</tr>
<tr>
<td>Spontaneous ventilation</td>
<td>Unaffected</td>
<td>Adequate</td>
<td>May be inadequate</td>
</tr>
<tr>
<td>Cardiovascular function</td>
<td>Unaffected</td>
<td>Usually maintained</td>
<td>Usually maintained</td>
</tr>
</tbody>
</table>

*Purposeful* refers to a response that is both deliberate and directed toward the operator’s needs.
American College of Chest Physicians Consensus Statement on the Use of Topical Anesthesia, Analgesia, and Sedation During Flexible Bronchoscopy in Adult Patients

Momen M. Wahidi, MD, MBA, FCCP; Prasoon Jain, MD, FCCP; Michael Jantz, MD, FCCP; Pyng Lee, MD, FCCP; G. Burkhard Mackensen, MD, PhD; Sally Y. Barbour, PharmD; Carla Lamb, MD, FCCP; and Gerard A. Silvestri, MD, FCCP

- Sedation is recommended unless contraindicated
- Improves patient satisfaction and tolerance
- Extent of sedation – depending on the type and duration of the procedure (basic to advanced diagnostic etc)
- Topical agents – lidocaine (preferred), benzocaine (methemoglobinemia), cocaine (use is discouraged)
### Sedative and analgesics

<table>
<thead>
<tr>
<th>Benzodiazepines</th>
<th>Propofol</th>
</tr>
</thead>
<tbody>
<tr>
<td>- preferred agents for sedation</td>
<td>- No difference compared to BZ and opioid combination</td>
</tr>
<tr>
<td>- increases recovery time (not associated with increase in complications)</td>
<td>- Use by non anesthesiologist is limited</td>
</tr>
<tr>
<td>Midazolam (quick onset, rapid peak and short duration)</td>
<td></td>
</tr>
<tr>
<td>• Opioids</td>
<td></td>
</tr>
<tr>
<td>- Anti-tussive</td>
<td></td>
</tr>
<tr>
<td>- Synergistic effects</td>
<td></td>
</tr>
<tr>
<td>Fentanyl (quick onset, rapid peak and short duration)</td>
<td></td>
</tr>
</tbody>
</table>

Emergency Cart

- Intravenous equipment
- Basic airway management equipment
  - Source of compressed oxygen (tank with regulator or pipeline supply with flowmeter)
  - Source of suction, Suction catheters [pediatric suction catheters] Yankauer-type suction
  - Face masks [infant/child], Self-inflating breathing bag-valve set [pediatric]
  - Oral and nasal airways [infant/child-sized], Lubricant
- Advanced airway management equipment
  - Laryngeal mask airways, laryngoscope and Endotracheal tubes with stylet
- Pharmacologic Antagonists
  - Naloxone, Flumazenil
- Emergency medications
  - Epinephrine, ephedrine vasopressin, atropine, nitroglycerin (tablets or spray, amiodarone, lidocaine, Glucose, 50% [10 or 25%]

Anesthesiology 2002; 96:1004–17
Post procedure

- Monitor for complications
- Routine CXR post TBBX – not recommended
- Physician should be immediately available
- Sufficient time (up to 2 h) after the last sedative dose
- Discharge patients - responsible adult (accompany home)
- Written instructions – post-procedure diet, medications, activities, f/u appointment and a phone number to be called incase of emergency.
- Keep a log of procedures
Take home points

• Know your patient
• Risk and benefit ratio
• Anticipate and be prepared for complications
• More you do better you get!
• “Perfection is attained by slow degrees; it requires the hand of time” - Voltaire
Questions

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