Pre-Operative Services Teaching Rounds 2
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• **Asthma**
  ○ Pathophysiology
  ○ History
  ○ Physical
  ○ Labs
  ○ Medications

• **Hip surgery**
  ○ anesthesia
  ○ positioning
Case: 46 yr old male for total hip arthroplasty

- **HPI** – avascular necrosis, pain and limp

- **PMH**
  - asthma since childhood
    - Steroid dependent
    - Frequent ER visits
  - Smoker till 4 weeks ago (1 pack/day x 20 years)

- **PSH**
  - none
Case (cont)

- **Meds:**
  - Albuterol,
  - Spiriva,
  - Oral steroids - just finished tapering.

- **Examination:**
  - Cushingoid facies
  - Occasional expiratory wheeze over both lung fields
What do we do?

- Optimised?
- Elective surgery
- ?Risk

Well controlled asthma is not a risk factor for post-operative pulmonary complications
Asthma

- **Incidence**
  - 300 million worldwide
  - Higher in western countries

- **Definition**
  - chronic inflammatory disorder of the airways
  - Reversible – partly or completely
  - Airflow obstruction
  - Especially at night or early am
Pathophysiology

- Smooth muscle contraction
  - Contactile agonists from inflammatory cells
    - Mast cells
    - Eosinophils
    - Lymphocytes
  - Neural mechanisms
  - (bronchial hyper responsiveness.)

- Airway wall thickening/edema
- Mucus plugging
- Airway remodelling
Classification

- Intermittent
- Persistent
  - Mild
  - Moderate
  - Severe
**Classifying asthma severity and initiating treatment in youths greater than or equal to 12 years of age and adults**

<table>
<thead>
<tr>
<th>Components of severity</th>
<th>Classification of asthma severity (≥12 years of age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intermittent</td>
</tr>
<tr>
<td>Impairment</td>
<td></td>
</tr>
<tr>
<td>Normal FEV&lt;sub&gt;1&lt;/sub&gt;/FVC:</td>
<td></td>
</tr>
<tr>
<td>8-10 yr 85 percent</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>20-29 yr 80 percent</td>
<td>≤2x/month</td>
</tr>
<tr>
<td>40-59 yr 75 percent</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>60-80 yr 70 percent</td>
<td>None</td>
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<tr>
<td>Nighttime awakenings</td>
<td>≤2x/month</td>
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<tr>
<td>Short-acting beta&lt;sub&gt;2&lt;/sub&gt;-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Lung function</td>
<td></td>
</tr>
<tr>
<td>• Normal FEV&lt;sub&gt;1&lt;/sub&gt; between exacerbations</td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt; &gt;80 percent predicted</td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt;/FVC normal</td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt; ≥80 but &lt;80 percent predicted</td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt;/FVC reduced 5 percent</td>
<td></td>
</tr>
<tr>
<td>Risk</td>
<td>Exacerbations requiring oral systemic corticosteroids</td>
</tr>
<tr>
<td>Recommended step for initiating treatment</td>
<td></td>
</tr>
<tr>
<td>Step 1</td>
<td>Step 2</td>
</tr>
<tr>
<td>And consider short course of oral systemic corticosteroids</td>
<td></td>
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<td>In 2-6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.</td>
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Favoring asthma vs COPD

- Triggers present
- Age of onset is younger
- Episodic
- Family History of atopy
Is this patient optimized?

- Shortness of breath
- Wheezing
- Cough
- Chest tightness
- Rescue inhaler use
- Early morning waking
- Sputum - ?productive
- Admissions
- ER visits
- PO steroids

When last were you better?

= Classic triad of asthma
Further testing

- CXR
- Labs
- PFTs
Normal Values
FEV₁ = 4 L
FVC = 5 L
FEV₁/FVC = 0.8

Obstructive Values
FEV₁ = 1.7 L
FVC = 3.1 L
FEV₁/FVC = 0.55

Source: Reference 7.
Expiration:

Inspiration:
PFTs

- **Obstruction:**
  - Peak expiratory flow rate ↓
  - FEV\(_1\) ↓
  - FEV\(_1\) / FVC ratio ↓ below 70%
  - FVC ↓

- **Reversibility is significant if there is >12% improvement of FEV\(_1\) with bronchodilator.**
Treatment

- Treat Triggers
  - URI
  - Food
  - Environmental
  - Medications
  - GERD

- Prophylaxis
  - Influenza vaccine

- Medications:
### Components of severity

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<tr>
<th>Impairment</th>
<th>Symptoms</th>
<th>Nighttime awakenings</th>
<th>Short-acting beta₂-agonist use for symptom control (not prevention of EIB)</th>
<th>Interference with normal activity</th>
<th>Lung function</th>
<th>Risk</th>
<th>Exacerbations requiring oral systemic corticosteroids</th>
<th>Consider severity and interval since last exacerbation</th>
<th>Frequency and severity may fluctuate over time for patients in any severity category</th>
<th>Relative annual risk of exacerbations may be related to FEV₁</th>
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<tr>
<td>Normal FEV₁/FVC: 8-10 yr 85 percent</td>
<td>≤2 days/week</td>
<td>≤2x/month</td>
<td>≤2 days/week but not daily, and not more than 1x on any day</td>
<td>None</td>
<td>Normal FEV₁ between exacerbations</td>
<td>0-1/year (see footnote)</td>
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<td>20-39 yr 80 percent</td>
<td>&gt;2 days/week but not daily</td>
<td>3-4x/month</td>
<td>&gt;1x/week but not nightly</td>
<td>Minor limitation</td>
<td>FEV₁ &gt;80 percent predicted</td>
<td>≥2/year (see footnote)</td>
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<td>40-59 yr 75 percent</td>
<td>Daily</td>
<td>Throughout the day</td>
<td>Often 7x/week</td>
<td>Some limitation</td>
<td>FEV₁/FVC normal</td>
<td>Several times per day</td>
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<td>Daily</td>
<td>Throughout the day</td>
<td>Several times per day</td>
<td>Extremely limited</td>
<td>FEV₁ &lt;60 percent predicted</td>
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### Classification of asthma severity (≥12 years of age)

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**Recommended step for initiating treatment**

- **Step 1**: In 2-6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.
- **Step 2**: And consider short course of oral systemic corticosteroids.
- **Step 3**: And consider short course of oral systemic corticosteroids.
- **Step 4 or 5**: And consider short course of oral systemic corticosteroids.
Stepwise approach for managing asthma:

**Interruption asthma**
Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3.

**Step 1**
Preferred: Low-dose ICS
Alternative: Cromolyn, LTRA, Nedocromil, or Theophylline

**Step 2**
Preferred: Low-dose ICS + LABA
Alternative: Medium-dose ICS + either LTRA, Theophylline, or Zileuton

**Step 3**
Preferred: Medium-dose ICS + LABA
Alternative: Low-dose ICS + either LTRA, Theophylline, or Zileuton

**Step 4**
Preferred: High-dose ICS + LABA + oral corticosteroid AND Consider Omalizumab for patients who have allergies

**Step 5**
Preferred: High-dose ICS + LABA + oral corticosteroid AND Consider Omalizumab for patients who have allergies

**Step 6**
Step up if needed (first, check adherence, environmental control, and comorbid conditions)

Step down if possible (and asthma is well controlled at least 3 months)

Each step: patient education, environmental control, and management of comorbidities.
Steps 2-4: consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see footnotes).

**Quick-relief medication for all patients**
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Use of SABA >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.
Treatment preoperatively – no difference to usual management

- **Anti – bronchospasm**
  - Bronchodilator – Long and short acting beta agonist
    - (anticholinergic – ipratropium = atrovent/ tiotropium = spiriva)
    - (theophylline – phosphodiesterase inhibitor)

- **Anti – inflammatory**
  - Inhaled steroids
  - Systemic steroids,
  - Leukotriene receptor antagonist
    - (montelukast=singulair)
  - Chromolyn sodium
  - (Xolair – anti IgE)
Treatment – points to consider

Compliance

Inhaler technique

(Consider po steroids if surgery urgent)

• Remove triggers
Case

- Optimised?
- Treatment?
  - Smoking
  - Environment
  - Beta agonists
  - Steroids
- Pulmonary consult:
  Added inhaled steroid/long acting beta agonist and montelukast
THR

- Sir John Charnley – innovations since the 1960’s
- OA
- Trauma
  - Including old infection
- Congenital dislocated hip
- Pediatric
  - Slipped Upper Femoral (Capital) Epiphysis
  - Perthe’s (Legg-Calve-Perthe’s)
- RA
- Avascular necrosis
- Other
Positioning – left lateral

Diagram of patient positioned with left side down
Hip X-Ray

Normal hip

Avascular necrosis of hip
Prosthesis

Metallic replacement for head and neck of femur

Plastic and metallic replacement for acetabulum (hip socket)

Artificial Hip Joint
Xray of THR
Xray of THR
Cement

- Advantages
- Disadvantages
THR - Outcomes

- >90% working pain free at 10-15 years without complications
Complications

- **Acute**
  - Fracture
  - Bleeding
  - Nerve injury
  - Cement hypotension
  - Fibrin, fat, air embolus

- **Subacute**
  - Dislocation
  - DVT
Complications

- Chronic
  - Infection
  - Fracture
  - Loosening
  - Heterotrophic ossification
Anesthesia

- GA
- Spinal / epidural combination
- Lumbar plexus block
- (femoral block)
Epidural

• Benefits
  ○ Analgesia –
    • Intraop
    • Postop
  ○ DVT
  ○ Blood loss
  ○ Cement

• Risks
  ○ Bleeding
  ○ Nerve damage
  ○ Infection
  ○ Hypotension
  ○ Opiate side effects

• POCD
Take home points

• Asthma: not risk factor if well controlled
• Trigger and medication management
  ◦ Long acting Beta agonist and inhaled steroids
• Maybe optimized and wheezing

• Epidural
  ◦ Definite advantage in hip and knee replacements