Focus on treatment complications and optimal management

Surgery

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Disclosure slide

- No disclosures
- No conflicts of interests
Postoperative complications

- cardiac
- respiratory: pulmonary, pleural
- wound
- central nervous system
- urinary tract
- other (DVT, diabetic)
Postoperative respiratory complications

• introduction

• pulmonary complications

• pleural complications

• conclusions
Postoperative respiratory complications

- introduction
- pulmonary complications
- pleural complications
- conclusions
Postoperative complications

- difficult, complicated subject
- registration important ($\Delta$ induction therapy)
- major cause of mortality - morbidity
- who should discuss complications?
- expert: a man who has made all possible mistakes in a very narrow field

*Top Knife, Hirshberg A & Mattox K, tfm Publishing, UK, 2005*
## Respiratory complications after pulmonary resection – 3516 pts

<table>
<thead>
<tr>
<th></th>
<th>Lobectomy</th>
<th>Pneumonectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 2949</td>
<td>n = 567</td>
<td></td>
</tr>
<tr>
<td>30-day †</td>
<td>4 %</td>
<td>11.5 %</td>
</tr>
<tr>
<td>30-day morbidity</td>
<td>23.8</td>
<td>25.7</td>
</tr>
<tr>
<td>(1 or more complications)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>11.7</td>
<td>9.7</td>
</tr>
<tr>
<td>Unplanned reintubation</td>
<td>7.9</td>
<td>10.6</td>
</tr>
<tr>
<td>Failure to wean &gt; 48 h</td>
<td>6.6</td>
<td>9.3</td>
</tr>
<tr>
<td>Pulmonary embolism</td>
<td>0.7</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Harpole DH. J Thorac Cardiovasc Surg 1999; 117:969
Postoperative respiratory complications

- introduction
- *pulmonary* complications
- *pleural* complications
- conclusions
Pulmonary complications

- atelectasis
- pneumonia
- respiratory insufficiency
- *postpneumonectomy pulmonary oedema*
- pulmonary embolism
- *prolonged air leak, SC emphysema*
Postpneumonectomy pulmonary oedema

- non-cardiogenic, non-infectious pulmonary oedema
- ARDS in remaining lung
Postpneumonectomy pulmonary oedema

- permeability oedema, diffuse alveolar damage
- incidence: 2-5% after pneumonectomy
  † 60-90%
- risk factors: R pneumonectomy
  excessive fluid load (transfusion)
- Δ/ of exclusion
- R/ diuretics, inotropic drugs, ↓fluid infusion
  ventilation (↓ airway pressure, NO)
  steroids?
Pulmonary embolism

- DVT: deep venous thrombosis
- TED: thromboembolic disease
- incidence: 1-5% ↑ †
- prevention: *thromboprophylaxis*
  - elastic stockings
  - LMW heparin
  - peroperative pneumatic calf compression
  - early ambulation
Prolonged air leak

- incidence: 15% (abnormal > 7 days)
  → mediastinal, subcutaneous emphysema (*Michelin syndrome*)
Prolonged air leak

- risk factors: emphysema
  volume reduction surgery
  prolonged ventilatory support
- R/ perop. control of bronchial stump
  ↓ suction
  instillation talc, sclerosing agent, autologous blood
  ↑ duration: Heimlich valve
- prevention (peroperative): fibrin glue, sealant
  reinforcement staple line (strips)
  pleural tent
Postoperative respiratory complications

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Pleural complications

- persistent pleural space
- empyema
- bronchopleural fistula (BPF)
Pleural complications
persistent pleural space

- remaining space after (bi)lobectomy, mostly apical
Pleural complications
persistent pleural space

• no standard definition
• risk factors: inflammatory, infectious disease (20%)
  LVRS (air leak), emphysema
  diffuse fibrosis (stiff lung)
• R/ individual basis,
  usually conservative unless infected
Pleural complications
empyema

• infected pleural space
• incidence: 2-16% after pneumonectomy
  (majority also BPF)
  < 2% after lesser resection
• risk factors: ↑ age, cardiopulmonary impairment,
  malnutrition, induction therapy, diabetes,
  steroids, R pneumonectomy, complex
  procedures, pneumonia, mechanical ventilation
Pleural complications
empyema

• Δ/ clinical systemic toxicity, ↓appetite
general deterioration
lab values: ↑inflammatory parameters (CRP, leucocytes)
culture pleural fluid

• R/ chest tube drainage
thoracostomy
antibiotics ~ cultures
irrigation
closure BPF
Pleural complications

BPF

- incidence: 1-10% overall
- minor problem (small BPF) → life-threatening catastrophic event
- † 16-72% (sepsis, respiratory insufficiency)
- early (<7 days): technically poor closure
- late (>7 days): failure of healing, infection
Pleural complications

Case BPF

- 56-year-old psychiatric patient
- COPD, haemoptysis
- Centrally located tumour R upper lobe
Pleural complications

case BPF

R pneumonectomy
+ azygos vein
Pleural complications

case BPF
POD 18 rethoracotomy
repeat section + closure bronchial stump covered with serratus anterior muscle flap

culture : Streptococcus pneumoniae
Pleural complications case BPF

bronchial stump
Pleural complications

case BPF
Pleural complications

case BPF
Pleural complications

sutures bronchial stump

serratus anterior muscle

case BPF
Pleural complications

case BPF

POD 25  small recurrent  BPF
         fibrin glue
         culture:  Xanthomonas maltophilia
                  Proteus mirabilis

POD 30  large recurrent  BPF
         rethoracotomy:  resuturing bronchus
                          repositioning muscle flap
                          thoracotomy left open, daily dressings
Pleural complications

Case BPF

POD 34  recurrent BPF
flap pectoral muscle

POD 37  intact bronchial stump

POD 47  cardiac arrest, bradycardia
hypotension, †
Pleural complications

BPF

- risk factors: R or completion pneumonectomy infectious, inflammatory disease high-dose radiotherapy prolonged mechanical ventilation empyema, infected postresection space residual tumour at bronchial stump technical factors (early): devascularisation incomplete closure
Pleural complications

• Δ/ ~ empyema, expectoration of dark brown fluid

  chest X-ray: ↓ fluid level

  bronchoscopy, ventilation scan

  injection of methylene blue
**Pleural complications BPF**

- R/ difficult, prolonged!

  expectoration: operated side down, head elevated

  R/ of empyema: open drainage, thoracostomy, antibiotics
closure of fistula, coverage viable tissue
  (muscle, omentum, pericardium)
  irrigation, antibiotic solution in thoracic cavity
prevention BPF!
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Postoperative respiratory complications

Conclusions

• wide variety of postop. respiratory complications
• range minor → life-threatening
• prevention, early detection essential
• important role of respiratory physician and physiotherapist in prevention and treatment
• international registries necessary for comparative studies