Bronchial Stump Management

Hand Sewn Closure Remains Superior

UCHSC Department of Surgery
Grand Rounds
May 14th, 2007

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Hand sewn or stapled?

• Options for bronchial stump management

• Feared complication

• Data
  – Complication rates
  – Cost
  – Threshold for air leak

• Conclusions
Bronchial Stump Management

- Typical cases
  - Lung CA, metastatic CA, infectious diseases
  - Pneumonectomy, segmentectomy, lobectomy, bilobectomy

- Type of Closure
  - Manual suturing
  - Stapled
  - Combination
  - Coverage Technique

- Bronchoplueral Fistula (BPF)
  - Incidence 0 -15%
  - Mortality rate 12-71%
BPF Considerations

- Risk factors in general
  - Right pneumonectomy
  - Post-op mech vent
  - Pre-op infection
  - Adjuvant / neoadjuvant therapies
  - COPD
  - Residual tumor
  - Age greater than 60
  - Large diameter (>25mm) bronchial stump

- Technique
  - Surgeon experience
  - Preservation of vascularity
  - Preservation of peribronchial tissue
  - Hand sewn or stapled
Surgical Stapling Devices

Aladar Petz
1920
Director of Surgical Department Gyor, Hungary
“Because hospitals and care centers were few and far between, there was a need for instruments that would allow 

*inadequately trained surgeons*

to carry out standardized surgical procedures quickly in emergencies.”
<table>
<thead>
<tr>
<th>Author (year)</th>
<th>Reference</th>
<th>Number of patients</th>
<th>Incidence of PBSF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H. Dienemann (1990)</td>
<td>[22]</td>
<td>261</td>
<td>6.8</td>
</tr>
<tr>
<td>A.V. Protsenko (1991)</td>
<td>[23]</td>
<td>542</td>
<td>5.4</td>
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<tr>
<td>D. Weissberg (1992)</td>
<td>[17]</td>
<td>75</td>
<td>2.6</td>
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<tr>
<td>Present series (1999)</td>
<td>–</td>
<td>129</td>
<td>0.8</td>
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</tbody>
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Comparative Data

- 533 consecutive bronchial closures
  - National Cancer Center Hospital Tokyo

- Overall BPF 1.3%
  - Manual (n = 50) 4%
  - Stapling (n = 483) 1%
  - No statistical significance

- Flaws
  - Indication for manual suturing
    - Tumor located close to resection line
    - Calcified bronchial wall
    - Hilar adenopathy
  - Surgeons more familiar with stapling
Hand Sewn

- 332 pneumonectomies
  - 1974 - 1984
  - Manchester England

- Hand sewn
  - Posterior flap - pliable membranous bronchus
  - Suture line proximal to carina
  - 0 BPF
Hand Sewn

- Retrospective review
  - 1980-1993
  - London

- 471 pneumonectomies
  - 2-0 Prolene
  - Continuous double row
  - 3rd row with 2nd Prolene

- 7 BPFs = 1.5%

- Senior surgeon
  - 374 pneumonectomies
  - 2 BPF = 0.5%
COST

• Hand Sewn
  – 3-0 Prolene = $1.75
  – 4-0 Vicryl = $1.25

• Stapled
  – TA-30 = $105.50
  – Each reload $91.15

• Stapled = 20x cost or $100 difference

$100 feeds 5,000 children
(www.feedthechildren.org)
Threshold for air leak

• Tolerance to normal mechanical stresses
  – Sneezing, coughing
  – Endobronchial pressures – 200 mmHg (cough)

• 40 cadaveric tracheobronchial trees
  – 20 stapled, 20 hand sewn
  – Median leakage pressures
    • Hand sewn = 200 mmHg (150 – 300 mmHg)
    • Stapled = 105 mmHg (45 – 300 mmHg)
Conclusions

• Bronchopleural Fistula Rates
  – Overall similar
  – Those dedicated to hand sewn = superior

• Stapled Closure
  – Can be faster
  – Requires less technical skill
  – Minimal access
  – Not appropriate for all situations

• Hand Sewn Closure
  – More versatile, appropriate for every resection
    • Thickened, calcified bronchus
    • Endobronchial lesion
    • Lesion close to planned resection line
  – Less expensive
  – Gold standard – excellent BPF rates even in most difficult cases!
Real surgeons know how to sew…
But anyone can use a stapler…
7. Dr. Mitchell