Endovascular management (petticoat technique) for the type B dissection

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• TEVAR for type B dissection:
  – 1999
  – Gold standard vs open repair: mortality

TEVAR for aortic dissection

• Aim of TEVAR
  – Closure of the proximal entry tear
  – To direct aortic flow preferentially into the true lumen

1. Decrease false lumen pressure
2. Promote false lumen thrombosis
3. Thoracic aorta remodelling
TEVAR for aortic dissection

• Limitations

  – Acute complicated dissection: malperfusion
    malperfusion of a branch vessel can persist

  – Acute and chronic dissection:
    • despite thrombosing the false lumen adjacent to the
      stent-graft
    • thrombosis of the false lumen is not complete owing to
      retrograde flow through:
        – the residual re-entry tear
        – or intimal fenestrations related to branch vessels.
TEVAR for aortic dissection

• Limitations: patent false lumen

Effects of the patent false lumen on the long-term outcome of type B acute aortic dissection

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Clinical courses

- n=146
- Excluded 10 patients:
  - Unknown onset
  - Computed tomography on admission not available

n=136

- Thrombosed n=70
- Patent n=66

Acute therapy:

- Surgical n=4
- Stent n=1
- Medical n=66

Survivors at discharge (survival rate):

- n=62: Thrombosed group (95%)
- n=48: Patent group (95%)

Chronic therapy:

- Surgical 3
- Medical 59
- Surgical 17
- Medical 31

Dissection-related death-free ratio

P = 0.0048

Thrombosed group
Patent group
Petticoat concept
Petticoat concept

• First reported in 2005 by Mossop


• 2006 a series of 12 patients was reported

Systematic review of outcomes of combined proximal stent-grafting with distal bare stenting for management of aortic dissection

• **Methods**
  Studies involving combined proximal stent-grafting with distal bare stenting for management of aortic dissection were systematically searched and reviewed.

• **Results**
  • 4 studies were included
  • 108 patients:
    - acute (n = 54)
    - chronic (n = 54)

Systematic review

- **Indication for intervention**
  - Malperfusion: 70.3%
  - Refractory hypertension: 37.9%
  - Refractory chest pain: 33.3%
  - Rapid aortic enlargement or aortic diameter > 40 mm: 32.4%
  - Periaortic effusion/hematoma: 9.2%
Systematic review

- **Perioperative outcomes**
  - Technical success rate: 95.3% (range 84-100)
  - *Surgical conversion: bare-metal strut became lodged:* 0.9%
  - *Adjunctive endovascular procedures:* 29.6%
  - 30-day mortality rate: 2.7% (range 0-5)
  - Morbidity rate (<30d): 51.8% (range 0-65)
    - Stroke 2.7%
    - Paraplegia 2.7%
    - Retrograde dissection 1.8%
    - Renal failure 14.8%
    - Severe cardiopulmonary complications 5.5%
    - Bowel ischemia 0.9%
  - Type I endoleak: 9.2% (10/108)
Systematic review

• Postoperative outcomes
  • Deaths related to aortic: 4.6%
  • Re-intervention rate: 12.9%
  • Delayed retrograde type A: 1.9%
  • Aorto-bronchial fistula: 0.9%
Systematic review

- **Stent-graft complications:** 9.3%
  - Thoracic stent-graft migration: 4.7%
  - Device failure: 4.6%
Discussion
Comparison of outcomes

Review of series reporting results of stent-graft placement without distal bare stenting

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
<th>Acute</th>
<th>Technical Success, %</th>
<th>Retrograde Dissection, %</th>
<th>Stroke, %</th>
<th>Paraplegia, %</th>
<th>Renal Failure %</th>
<th>Adjunctive distal reperfusion %</th>
<th>Aortic rupture, %</th>
<th>30-Day Mortality, %</th>
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Note: The table provides a comparison of outcomes for stent-graft placement without distal bare stenting, including technical success, retrograde dissection, stroke, paraplegia, renal failure, adjunctive distal reperfusion, aortic rupture, and 30-day mortality rates across different series.
Comparison of outcomes
Review of series reporting results of stent-graft placement without distal bare stenting

- The technical success rates: 95.3% (ST+BS) vs 98.3%
- The mean 30-day mortality: 2.7% (ST+BS) vs 2.9%
- Severe morbidity: 33.3% (ST+BS) vs 11.1%
  - Dissection into the ascending aorta (3.7 vs 1.8%)
  - Neurological complications (5.5 vs 3.1%)
  - Aortic rupture (3.7 vs 2.5%)

63.8% of the patients presenting with malperfusion or impending rupture
Comparison of outcomes

Review of series reporting results of stent-graft placement without distal bare stenting

• Nienanber et al reported severe morbidity:
  16.6% (ST+BS) vs 11.1%
  • Staged approach to the procedure
  • Allowing recovery from the acute insult
  • Evaluating the need for extension of the graft using the bare metal components: Persistence of a distal malperfusion

Comparison of outcomes

Review of series reporting results of stent-graft placement without distal bare stenting

- **Device concerns**
  - Stent misalignment: 1
  - Focally ruptured bare stent: 1
  - Component separation or device: 2
  - Bare stent becoming dislodgment: 1

- **Thoracic stent-graft migration:** 4.7%
Comparison of outcomes
Review of series reporting results of stent-graft placement without distal bare stenting

- Adjunctive endovascular: 17.6% (SG+BS) vs 1% (SG)
  - Bare-metal stenting can compromise branch vessel perfusion
  - Experimental study in Montpellier

Comparison of outcomes

Review of series reporting results of stent-graft placement without distal bare stenting

Comparison of outcomes

Review of series reporting results of stent-graft placement without distal bare stenting

- Pressure gradient drop in 25% of the cases in the abdominal branches
- Pressure gradient drop in 54.5% of these arteries were supplied by the false lumen

Comparison of outcomes
Review of series reporting results of stent-graft placement without distal bare stenting

- **False lumen patency**
  - Improved true lumen perfusion and diameter
  - But apparently failed to suppress false lumen patency
  - At 1-year false lumen patency:
    - 29.6% of the patients at the thoracic level
    - 86.5% of the patients at the abdominal level

- **Yang et al\(^9\)** studied aortic remodeling after TEVAR
  False lumen patency of 19.4% of at the thoracic level

Conclusion
Endovascular management (petticoat technique) for the type B dissection

- Improved true lumen perfusion and diameter however it failed to completely suppress false lumen patency

- Carries not negligible risks of severe morbidity 33.3%

- Device complications: 9.3%
Endovascular management (petticoat technique) for the type B dissection

- Can compromise branch vessel perfusion
  - Adjunctive endovascular procedure 17.6% vs 1%
  - Experimental study

- Could be proposed in case of persistence of a distal malperfusion syndrome
  - After primary entry tear closure
  - Rather than a single stage extensive repair of the thoracoabdominal aorta