Value of Intrathecal Papaverine in Decreasing Spinal Cord Injury During TAA and TAAA Repair

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Thoracoabdominal Aneurysm Repair: the PAST  n = 1,509

Svensson LG, Crawford S, et al. ATS, 1986

AFB Protective
Normothermic AFB increased risk

Cross-Clamping of the Thoracic Aorta


Disclosures

Bolton Consultant, Investigator
Cook Speaker, Investigator
Gore Consultant, Investigator
Edwards Consultant, Investigator
Medtronic Consultant, Investigator
LivaNova Consultant, Investigator
St Jude Speaker, Investigator
Vascutek Speaker, Investigator

Clamp Time is Predictive Across Extents

Svensson LG et al.
Annals of Surgery
1986

Blood Flow
\( \text{mL} \cdot 100 \text{g}^{-1} \cdot \text{min}^{-1} \)

P = 0.008

Papaverine: opium alkaloid anti-spasmodic

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**CSF Drainage**
- 3 randomized, prospective trials
  - Crawford (1991)
    - N=100, Type I or II TAAA
    - Adjuncts: hypothermia, left heart bypass, re-implant intercostal arteries
    - Drained 50 ml intra-operatively
    - <10 mm Hg in only 20 (43%) of patients
    - 30% (SA drain) v. 33% (no SA drain) - - - no difference

**SA Drain**
- Svensson 1998
  - N=33, terminated early
  - Other: intrathecal papaverine, left heart BP, ↓T, re-attachment of intercostal
  - Free drainage to 10 cm H$_2$O
  - Rates 12% v. 44% in favor of CSF drainage

**Coselli 2002**
- N=156
  - Other: Left heart BP, ↓T, re-attachment of intercostal
  - Free drainage to 10 mm Hg
  - Neuro deficit 2.7% v. 12% in favor of SA drain

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**Spinal Cord Injury**
- No cooling
- CSFD + IP
- Active cooling
- Cooling CSFD + IP

**Clinical Comparison**
- 2001 – 2009
  - n=398 Repairs
  - DHCA n=68
  - IP n=250
  - No IP n=80

**Propensity Analysis**

**Spinal Cord Injury**
- Unmatched
  - IP
  - Non-IP
  - P=.006
  - P=.07

**Permanent Deficits**
- Unmatched
  - IP
  - Non-IP
  - P=.01
  - P=.4
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SCI by Extent of Disease

Complications

Survival

TEVAR: SCI

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>SCI</th>
<th>Permanent</th>
<th>Delayed Onset</th>
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<td>Ulery</td>
<td>2011</td>
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<td>Chiesua</td>
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<td>4%</td>
<td>0%</td>
<td>100%</td>
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</table>

SCI Rates: 2-9%
Permanent SCI Rates: 0-5%
Delayed Onset: 60-100%

Survival

Biggest predictor: length treated

• Occlusion of at least one other collateral network vessel
  – Hypogastric Artery
  – Subclavian Artery

• Associated with
  – Early onset SCI
  – Reduced recovery SCI
  – Reduced survival
Advantage of Staging
• Limits insult & Allows collateral adaptation

Value of Intrathecal Papaverine
Open Repair
• IP adds spinal cord protection
• IP associated with reduced
  − Mortality
  − Renal failure
  − Stroke
  − Length of stay
TEVAR
• IP needs further evaluation

Bischoff MS et al., Ann Thorac Surg 2011; 92: 138-146