TEVAR and distal septostomy in chronic dissection – a new approach in selected patients with descending aorta aneurysm

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Disclosure

- Mario LACHAT - NONE
Open surgical repair for chronic type B aortic dissection: a systematic review

David H. Tian, Ramesh P. De Silva, Tom Wang, Tristan D. Yan

Background: The treatment of chronic type B aortic dissection (CBAD) remains complicated. Thoracic endovascular aortic repair (TEVAR) has supplanted open surgical repair (OSR) as the preferred surgical treatment for CBAD. Despite TEVAR's superior short-term results, much less is understood about its long-term outcomes. As much of the understanding of OSR originates from historical reports, contemporary series, with modern surgical techniques and technologies, may present an alternative to TEVAR. The present systematic review will assess the short- and long-term outcomes of historic and contemporary series of OSR for CBAD.

Methods: Electronic searches were performed using six databases from their inception to March 2014. Relevant studies with OSRs for chronic type B dissection were identified. Data were extracted by two independent reviewers and analyzed according to predefined criteria. Studies were stratified into the pre-endovascular treatment era and endovascular era (contemporary series) depending on whether the majority of cases were performed post-1999.

Results: Nineteen studies were identified for inclusion for quantitative analysis. Pooled short-term mortality was 11.1% overall, and 7.8% in the nine contemporary studies. Stroke, spinal cord ischemia, renal dysfunction, and reoperation for bleeding were 5.9%, 4.9%, 8.1%, and 8.1%, respectively, for the contemporary series. Absolute life reinsertion was identified in 13.1% of patients overall, and in 11.3% of patients in the contemporary series. Aggregated survival at 1-, 3-, 5-, and 10-years of all patients were 82.1%, 74.1%, 68.3%, and 50.9%, respectively.

Conclusions: OSR for chronic type B dissection in the contemporary era offers acceptable results. Management approaches should be considered carefully, taking into account both short- and long-term complications. More research is required to clarify specific indications for OSR and TEVAR in chronic type B dissections.

Keywords: Open surgical repair (OSR), thoracic endovascular aortic repair (TEVAR), chronic type B dissection, descending aorta

Table 4 Summary of clinical outcomes of open surgery for chronic type B aortic dissection

<table>
<thead>
<tr>
<th>First author</th>
<th>30-day mortality (%)</th>
<th>Stroke (%)</th>
<th>Spinal cord ischemia (%)</th>
<th>Renal ischemia (%)</th>
<th>Reoperation for bleeding (%)</th>
<th>Late reintervention (%)</th>
<th>Hospital stay (days)</th>
</tr>
</thead>
</table>
| Historic series
| Nair          | 6                     | 0         | 2 (3)                   | 0                | 0                           | 0                      | NR                  |
| Maeda         | 5 (14)               | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Takagi        | 3 (13)               | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Zoll          | 10 (10)              | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Mutzga        | 0 (2)                | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Pulver        | 14 (8)               | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Conner        | 2 (3)                | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Osipovich     | 2 (3)                | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Conway        | 5 (9)                | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Mean          | Historic series      | 8 (9)     | 0 (2)                   | 2 (3)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Contemporary series
| Nair          | 6                     | 0         | 2 (3)                   | 0                | 0                           | 0                      | NR                  |
| Maeda         | 5 (14)               | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Takagi        | 3 (13)               | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Zoll          | 10 (10)              | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Mutzga        | 0 (2)                | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Pulver        | 14 (8)               | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Conner        | 2 (3)                | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Osipovich     | 2 (3)                | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Conway        | 5 (9)                | 0 (2)     | 2 (3)                   | 0 (2)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Mean          | Contemporary series  | 8 (9)     | 0 (2)                   | 2 (3)            | 0 (2)                       | 0 (2)                  | 0 (2)               |
| Overall [range]| 11.1 (9-13)          | 5.8 (5-10)| 4.8 (4-5)              | 11.9 (10-13)     | 9.9 (8-13)                  | 13.3 (12-15)           | NR                  |

Surgical outcomes include paraplegia or paraparesis. Renal ischemia includes renal dysfunction or requiring permanent dialysis. *p < 0.05; NR, not reported.

Figure 1 Overall survival based on reconstructed individual patient data. Data of 458 patients from seven studies were reconstructed and presented. Dotted lines represents Kaplan-Meier curves of individual studies, while the solid line represents aggregate reconstructed survival data of the entire cohort.
Graft replacement & distal fenestration

Maintain distal perfusion
- Aortic branches
- Spinal arteries
Long-Term Survival After Open Repair of Chronic Distal Aortic Dissection

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Background. The optimal treatment of chronic distal aortic dissection remains controversial, with endovascular stent-graft techniques challenging traditional surgery.

Methods. From January 1994 to April 2007, 104 patients (82 male, median age 60.5 years) with chronic distal aortic dissection underwent surgical repair, 0 to 21 years after initial diagnosis of acute type A or B dissection (median 2.1 years). Twenty-three (22%) patients underwent urgent-emergent surgery. Mean aortic diameter was 6.9 ± 1.4 cm. Indications for surgery, other than aortic expansion, were pain in 66% patients, malperfusion in 60%, and rupture in 11%. Forty-nine (47%) had previous cardiogenic surgery (9% dissection-related), 21 (20%) had coronary artery disease, 12 (12%) had Marfan syndrome, and 4 (4%) were on chronic dialysis. Twenty-six (25%) had a thrombosed false lumen. Thirty (29%) patients required reimplantation of visceral arteries; 83 ± 2.7 segmental artery pairs were sacrificed.

Results. Hospital mortality was 9.6% (10 patients). Paraplegia occurred in 5 (4.8%). Twenty-seven patients (26%) experienced adverse outcome (death within one year, paraplegia, stroke, or dialysis). Adverse outcome was associated with atheroma (p = 0.04, odds ratio = 4.3). Survival was 78% at 1, 68% at 5, and 59% at 10 years (average follow-up, 7.7 ± 4.1 years). Freedom from distal aortic reoperation was 99% at 1, 93% at 5, and 83% at 10 years. After one year, patients enjoyed longevity equivalent to a normal age-sex matched population (standardized mortality ratio = 1.38, p = 0.23). By multivariate analysis, atheroma (p = 0.0005, relative risk = 9.32) and age (p = 0.0003, relative risk = 1.15/year) were risk factors for long-term survival.

Conclusions. The efficacy of open repair for distal chronic dissection is highlighted by normal survival after the first year, and a low reoperation-reintervention rate.

Fig. 1. Kaplan-Meier survival curve for all patients in 104 after surgical repair of chronic distal dissection. Vertical marks represent censored patients.

Fig. 2. Longevity of one-year survivors.

Fig. 3. Freedom from distal aortic reoperation for the entire cohort of 104 patients.
Optimization of distal landing zone for TEVAR in chronic dissection

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24 pts
30-day mortality 4% (1)
Remodelling 70% (16/23)
2 pts with distal workup
Distal LZ Endovascular Fenestration (Septosotmy)
DLZ EF TECHNIQUE
Cases demonstration
Proximal DTAA
Arch anastomotic aneurysm
After DLZ EF

DTAA
Arch aneurysm

Arterial phase

Venous phase
Stent-graft distal extension/EF

TAG 45mm/10cm
Complete sealing after distal extension/EF
After DLZ EF
Distal TAA

Distal landing zone = visceral aorta level

Post deployment of TAG and periscopes
Post moulding with Reliant
After distal landing zone EF
Patients

• 8 patients, mean age 65+/-6 years

• Pathologies (dissections, all chronic)
  – 4 type A, 4 type B
  – 58+/- 6mm

  • All with rapid growth dynamic (>5mm/6mo)
Results

• No mortality
• Technical success rate: 8/8
  – Stent-graft deployment
  – Fenestration
  – Distal perfusion
• Sealing
  – Immediate complete sealing: 3/8 (37%)
  – Significant flow reduction: 8/8 (100%)
Results

• Follow-up
  – mean 4 (SD 3, 9-1) months
  – Reintervention (1)
    • Planned coiling of LSA
      – «Paraplegia prevention»
  – Maximal Aneurysm Diameter
    • Remodelling (decrease > 5mm; 3/8)
    • stable (5/8)
Discussion

• Limited series of DLZ EF with short follow-up
• DLZ EF achieved immediately significant true lumen re-expansion and complete seal in patients with distal neck diameter < 38mm
Recommended areas for fenestration
Distal LZ Endovascular Fenestration

Appropriate landing zone
≥ 20mm in length
≤ 40mm in diameter

No floating dissected channel
Discussion

- Limited series of DLZ EF with short follow-up
- DLZ EF achieved immediately significant true lumen re-expansion and complete seal in patients with distal neck diameter < 38mm
- During follow-up after DLZ EF
  - MAD remained stable or decrease (in patients with complete seal)
- No need for unexpected aortic redo intervention
  - One planned Type II EL sealing
Conclusions

• Longer follow-up is mandatory to validate this technique, but so far the concept seems to be an effective and attractive less invasive option in selected patients to rule out high pressure and retrograde flow in thoracic false lumen
Thank You!

Leipzig
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