Evolving Treatment of Paravisceral & Thoracoabdominal Aortic Disease

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Robert R. Linton MD Professor of Vascular & Endovascular Surgery, Harvard Medical School (Emeritus)

OUTLINE

• The Boston origins and evolution of surgery of the DTA/TAAA (Paravisceral vs Type IV TAA vs Type I-III TAA)

• Evolution of operative strategies and adjuncts → SCI

• The impact and evolution of TEVAR and EVAR → Relevant??

• Role of Open Surgery 2019 and beyond
**Historical Perspective**

LINTON – INTRASACCCULAR WIRING - 1952

50 YEAR FOLLOW-UP!

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**TOTAL ENDOVASCULAR REPAIR**

- B/O variation in topography branched (vs. fenestration) is considered superior design
- many patients treated worldwide with variable results

All grafts custom designed

In U.S. mostly limited to M.D. sponsored IDE sites ➔ Regulatory constraints

≈500 Implants in 2018
BOSTON ORIGINS OF DTA SURGERY

- Robert Gross, M.D. @ The Children’s Hospital 1945 → first direct repair coarc.

- At MGH Dr. Linton’s coarc. repairs and the short lived homograft era

LINTON BEGINS THORACOABDOMINAL AORTIC SURGERY - 1956
Recent Experience With Thoracoabdominal Aneurysm Repair

Richard P. Cambria, MD; David C. Browner, MD; Ashley C. Moncure, MD; Bengt Ivansson, MD; R. Clement Darling, MD; J. Kenneth Davison, MD; William N. Abbott, MD

- Prior to 1985 TAA repair @ MGH → 50% mortality!
- Initial experience after 1986 in 30 patients → 8% mortality
- Impact of elective operation, ↓ op time, blood loss, x-clamp times

Pararenal Aneurysms

DEFINITIONS

- Juxtarenal/pararenal → infrarenal neck ≤ 1cm
  ⇒ implies clamp placement needs to be suprarenal/supraceliac (EVAR IFU Relevant)
DEFINITIONS

- Suprarenal aneurysm → one or both renals originate from AAA → separate reconstruction
Complex Aneurysms

DEFINITIONS

• Type IV TAA → graft carried proximal to celiac
THORACOABDOMINAL ANEURYSMS

Type I  Type II  Type III  Type IV

(27%)  (15%)  (36%)  (22%)

42% WITH STRICT CRAWFORD DESIGNATION

DESCENDING THORACIC AND TAAA SIZE CRITERIA FOR SURGERY
### Distinguishing TAA Characteristics

<table>
<thead>
<tr>
<th>Prior Aortic Resection (32.7%)</th>
<th>n=149 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>88 (59)</td>
</tr>
<tr>
<td>Descending or TAAA</td>
<td>30 (20)</td>
</tr>
<tr>
<td>Ascending/Arch</td>
<td>31 (21)</td>
</tr>
</tbody>
</table>

#### Clinical Presentation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Elective</td>
<td>347 (76.3)</td>
</tr>
<tr>
<td>Urgent non-ruptured</td>
<td>51 (11.2)</td>
</tr>
<tr>
<td>Ruptured</td>
<td>52 (11.4)</td>
</tr>
</tbody>
</table>

≈20% of case → **chronic dissection**

#### Suprarenal AAA

- Suprarecial x-clamp
- Left flank approach
AAA SURGERY
SELECTIVE USE OF SURGICAL APPROACHES FOR AAA

Transperitoneal
- Right renal graft
- Right iliac or complex pelvic repair
- Prior left colectomy
- AAA neck turns to right

Retroperitoneal
- Multiple prior laparotomies
- Obesity
- Selected ABD stoma
- Graft above renals
- Horseshoe kidney, inflammatory AAA

Routine Infrarenal Aortic Surgery

EVAR

Retroperitoneal Approach

For Aneurysms → LT Kidney Up
Total Exposure of Visceral Segment

Retroperitoneal Approach
Thoracoabdominal Incision

Transpleural / Transabdominal
Partial lateral division of diaphragm
**Suprarenal Type IV TAA Repair**

![Diagram of suprarenal type IV TAA repair]

**Current Results**

**Open Juxta/Para Renal Aneurysm Repair**

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Patients</th>
<th>Op Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chong et.al.</td>
<td>2009</td>
<td>171</td>
<td>1.8%</td>
</tr>
<tr>
<td>Landry et.al</td>
<td>2009</td>
<td>82</td>
<td>6.1%</td>
</tr>
<tr>
<td>Knott et.al</td>
<td>2008</td>
<td>126</td>
<td>0.8%</td>
</tr>
<tr>
<td>Chiesa et.al</td>
<td>2006</td>
<td>85</td>
<td>3.5%</td>
</tr>
<tr>
<td>Nathan et.al</td>
<td>2011</td>
<td>97</td>
<td>3.4%</td>
</tr>
<tr>
<td>Tsai et.al</td>
<td>2012</td>
<td>199</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

**TOTALS**

760 mean ≥3 %

*Rutherford 9th ed. 2019*
CLINICAL RESEARCH STUDIES
From the New England Society for Vascular Surgery

Durability of open repair of juxtarenal abdominal aortic aneurysms

Shirling Tsui Waller, MD, New York, NY, USA; K. Robert Price, MD, Newton, Mass;
Glenn M. Reul, MD, Newton, Mass

Objective: To evaluate the durability of open repair of juxtarenal abdominal aortic aneurysms (JAAAs), a contemporary approach to the treatment of juxtarenal abdominal aortic aneurysms (JAAAs), focused on improving outcomes. Methods: Patients undergoing open JAAA repair were studied. Patient demographics, outcomes, and endovascular grafts were obtained by a need for suprarenal exposure. Results: Of 37 patients, 31 were treated by a suprarenal approach. There were no procedure-related deaths or major complications. The overall survival was 97% at 3 years and 93% at 5 years. No major complications were observed. Conclusions: JAAAs can be treated safely and effectively. The results of this study are consistent with previous reports. doi:10.1016/j.jvasc.2012.08.032

J Vasc Surg 2012; 56: 2-7

• 200 pts (all suprarenal x-clamp) treated 2001-07
• 30-day mortality → 2.5%
• 20% CRI
• 5 year survival → 74%
• 2% late graft complications
• F/U imaging for DTA

Stent Graft Repair Juxtarenal AAA

• SLOW Regulatory Evolution

• Oct 2001 first Z-FEN (RG)

• 2018 ≈ 1,600 implanted in USA
Current Results
EVAR for Complex AAA (only)

- 16 Publications (2004-12) detailing 1,187 patients with mean F/U 19 months
- Technical Success nearly uniform
- Branch patency → 95% range
- 30 day Mortality (range 0-3.5%) → mean 1.8%
- GLOBALSTAR Registry (n=318) → 3.5%

Source: Endovascular Aortic Repair ed. Oderich: Springer 2017
Open repair versus fenestrated endovascular aneurysm repair of juxtarenal aneurysms

Rohit W. Arora, MD, MBBS, PhD

Background: Endovascular aneurysm repair (EVAR) has become the standard of care for abdominal aortic aneurysms (AAA), and there is increasing interest in endovascular management of juxtarenal aneurysms. The aim of this study was to review published results of EVAR for juxtarenal aneurysms by comparing pooled outcome data from all studies that included juxtarenal aneurysms during the period 2007 to April 2013. The study includes exclusions and patient characteristics associated with mortality as well as long-term survival.

Methods: The PubMed, Cochrane Library, and Science Citation Index were searched for all publications that reported results of EVAR for juxtarenal aneurysms. The results from 35 publications were pooled for analysis. The criteria for inclusion were prospective studies that reported long-term survival after EVAR for juxtarenal aneurysms. Results: A total of 747 patients with juxtarenal aneurysms were included in the analysis. The pooled incidence of mortality was 11.1% (95% CI, 7.4%-14.8%), and the pooled incidence of major adverse events was 35.1% (95% CI, 30.0%-40.2%). Conclusion: Endovascular management of juxtarenal aneurysms is a viable alternative to open repair and carries lower mortality. However, patients with juxtarenal aneurysms require close follow-up because of the risk of endoleak and embolization. EVAR is a favorable option in high-risk patients, and open repair remains viable as the gold standard.


Open repair of thoracoabdominal aortic aneurysms in experienced centers

Konstantinos G. Moulakakis, MD, Georgios Karadimas, MD, Constantine N. Antonopoulous, MD, Joses Katsaris, MD, Christos Klonaris, MD, Daria D. Prezant, MD, FACS, Joseph S. Cortelli, MD, and George Geroulakos, MD, Athens, Greece, and Houston, Texas

Objectives: Published data on open repair of thoracoabdominal aortic aneurysms (TAAA) are limited. The objective of the study was to assess the results of open repair of TAAA performed at experienced centers. Methods: This study included 65 patients (21 male, 44 female; mean age 69.1 ± 10.9 years) who underwent open repair of TAAA at 10 centers in the United States between January 1992 and December 2008. The primary endpoints were in-hospital mortality and long-term survival. Results: The overall in-hospital mortality rate was 5.3% (95% CI, 1.8%-9.9%) and a stroke rate of 3.1% (95% CI, 2.3%-5.9%), whereas the need for permanent graft coverage was 9.6% (95% CI, 3.9%-14.3%). Respiratory complications after surgery were as high as 23.0% (95% CI, 16.7%-30.3%). Logistic regression analysis evidenced a statistically significant inverse association between mortality and the volume of cases performed in the vascular center (β = −2.00, P = .005). Interestingly, a more recent year of study publication tended to be associated with decreased in-hospital mortality (β = −1.35, P = .19). Conclusions: Our study showed that despite the advances in open surgical techniques, the mortality and mortality of the technique continue to remain considerable. Despite the focus on mortality and spinal cord ischemia, respiratory complications, permanent postoperative renal dialysis, stroke rate, and cardiac events also affect the outcome. The estimated trend of lower mortality in high-volume centers suggests that perhaps this type of service should be provided in a few reference centers that have an established record and experience in the management of these patients. J Vasc Surg 2018;68:634-451

Keywords: Open repair; Surgery; Thoracoabdominal
CURRENT RESULTS WITH OPEN AND ENDOVASCULAR REPAIR

Type I       Type II       Type III       Type IV

Outcomes and operative strategies vary with TAA extent for Open and Endovascular Repair

Type IV TAAA

Conduct and mode of Operation

• Risk of SCI << in Type IV ?? Higher with TEVAR

• Adjuncts not utilized in Type IV repair:
  Atrial-femoral bypass
  CSF drain
  Motor evoked potential monitoring
  Permissive hypothermia

• Type IV ? Open   ? Endo   ? hybrid
# Current Results Open Type IV TAA Repair

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>#Patients</th>
<th>Op Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coselli et.al</td>
<td>2002, 07</td>
<td>329</td>
<td>3.6 %</td>
</tr>
<tr>
<td>Chiesa et.al</td>
<td>2006</td>
<td>34</td>
<td>2.9 %</td>
</tr>
<tr>
<td>Kieffer et.al</td>
<td>2008</td>
<td>171</td>
<td>13.4 %</td>
</tr>
<tr>
<td>Richards et.al</td>
<td>2010</td>
<td>53</td>
<td>6.0 %</td>
</tr>
<tr>
<td>Nathan et.al</td>
<td>2011</td>
<td>83</td>
<td>5.6 %</td>
</tr>
<tr>
<td>Patel et.al</td>
<td>2011</td>
<td>179</td>
<td>2.8 %</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td></td>
<td>849</td>
<td><strong>5.7 %</strong></td>
</tr>
</tbody>
</table>

Source: Rutherford 9th ed. 2019

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# TYPE IV RESULTS

Continued favorable results with open surgical repair of type IV thoracoabdominal aortic aneurysm (TAA) repair. This has set no other alternative app/IV TAA, and the g continuum of surgical General Hospital & details, and all the n-Meter analysis.

*J Vasc Surg 2011;53:1492-8*
STANDARDIZED CLAMP/SEW OPERATION

- Cold renal perfusion
- Preserve diaphragm
- Beveled prox. suture line
- Routine lt. renal sidearm

Clinical features in 178 Type IV pts

- Age: 73 ± 8
- HTN: 153 (86%)
- Smoker: 147 (83%)
- CRI (>1.8mg/dl): 32 (18%)
- Symptomatic: 32 (18%)
Clinical Outcomes

N=178

- Mortality: 5 (2.8%)
- SCI: 4 (2.2%)
- HD / renal failure: 5 (2.8%)
- Any complication: 45 (25%)

Predictors of Mortality/Complications

Composite outcome: death + any complication

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRInsuff</td>
<td>3.4</td>
<td>[1.4 – 8]</td>
<td>0.016</td>
</tr>
</tbody>
</table>
Multi-center French Experience

Results and Factors Affecting Early Outcome of Fenestrated and/or Branch Stent Grafts for Aortic Aneurysms
A Multicenter Prospective Study
J. Marcette, MD,* E. Preedes, Msc.,1 and J. P. Recuereux, MD, PhD.1 On behalf of the windows main participants (see appendix)

Objective: To present results and to identify predictive factors of early aneurysm growth.

Keywords: aortic aneurysm, fenestration, stent graft, total spinal cord ischemia, mortality, complications.

(Ann Surg 2014;00:1-10)

Op mortality → 14.3%
SCI → 4.8%

Ann of Surgery 2014;00:1-10

OPEN TAA REPAIR BACKGROUND

Experience with 1509 patients undergoing thoracoabdominal aortic operations

Lars G. Svensson, MD, PhD, E. Stanley Crawford, MD; Kenneth R. Hess, MS, Joseph S. Coselli, MD, and Hastin J. Suh, MD, Houston, Texas

Purpose: The purpose of this study was to retrospectively identify variables associated with early death and postoperative complications in patients undergoing thoracoabdominal aortic operations.

Methods: The data on 1509 patients who underwent 1679 thoracoabdominal aortic repairs between 1990 and 1993 were retrospectively reviewed. The mean age was 66 years, 837 patients were women, and 1052 were men.

Mortality ≈ 10%
Total Spinal Cord Ischemia → 16%
half (8%) devastating paraplegia

J Vasc Surg 1993; 17:357-70
IMPACT OF SPINAL CORD ISCHEMIA

Adjuncts to prevent paraplegia → operative conduct

SUMMARY OF OPERATIVE TECHNIQUE
1986- 2005

- Emphasis on expediency and simplicity
  - clamp/sew without external bypass/perfusion
- In-line mesenteric shunt to decrease visceral ischemia
- Cold renal perfusion
- Epidural cooling for spinal cord protection
- Aggressive reimplantation of T9-L1 intercostals
Spinal Cord Perfusion and Protection During Descending Thoracic and Thoracoabdominal Aortic Surgery: The Collateral Network Concept

Randall B. Griepp, MD, and Eva B. Griepp, MD
Department of Cardiothoracic Surgery, Mount Sinai School of Medicine, New York, New York

In the last two decades, an increasing number of network concept has resulted in falling rates of spinal cord injury. This is due to the understanding of the collateral network. Routine sacrifice of segmental aortic branches can be carried out in a way that will allow surgical and endovascular therapy of extensive distal aortic aneurysms without neurologic injury.

MRA demonstrates cord collaterals

- 85 TAA pts studied with MRA and intraoperative MEVOK potentials
- p < .0015 correlation between collateral demonstration of preservation MEVOK with x-clamp
- Most collaterals originated caudal to the distal clamp → pelvic arteries

Ann Thorac Surg 2007;83;S865-9
J Vasc Surg 2008;48:261-71
Impact of Collateral Network Concept

Evolution of operative strategies in open thoracoabdominal aneurysm repair

Mark F. Conrad, MD, MMSc, Emel A. Ergul, MA, Virendra I. Patel, MD, Matthew R. Cambria, BS, Glenn M. LaMuraglia, MD, Mirela Simon, MD, and Richard P. Cambria, MD, Boston, Mass.

Objective: During a 24-year interval, we managed >90% of thoracoabdominal aortic aneurysm (TAA) repairs with a clamp-and-sew (clamp/sew) approach supplemented with protective adjuncts, including renal hypothermia and epidural cooling with aggressive intercostal reconstruction for spinal cord protection. A finite paraplegia rate led to operative modifications using distal aortic perfusion (DAP) through anteromedial bypass to support cord collateral circulation and selective intercostal reconstruction based on motor evoked potential (MEP) monitoring. This study evaluated the effect

- Refined techniques for spinal cord protection
- Operative mortality for Extent I-III TAA under 5%

Significantly lower incidence of paraplegia occurred for the clamp/sew group (0% vs 15%, P < .0001), but none was in the DAP cohort vs 5% in clamp/sew (P = .11). The composite death/paraplegia rate was decreased with DAP at 1 of 52 (2%) vs clamp/sew at 11 of 137 (9%, P = .01). Paraparesis with complete recovery occurred in 5 of 52 (10%) of the DAP group.

Conclusion: Elective TAA repair was accomplished with a low mortality in the DAP and clamp/sew cohorts. The use of MEP in the DAP cohort (despite a higher spinal cord ischemic risk due to the number of chronic dissection patterns) decreased the need for intercostal reconstruction, with no paraplegia to date. DAP with MEP is the preferred operative strategy for extent I to III TAA repair. (J Vasc Surg 2011;53:1195-201.)

J Vasc Surg 2011;53:1195-201

Shift in Spinal Cord Protection

- Support of the cord collateral network with distal aortic perfusion
- Monitoring of MEVOP during sequential clamping

![Diagram of spinal cord protection](image)
Literature Review

Open TAAA Repair (?? Includes acute)

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>#pts</th>
<th>30-day mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coselli et.al</td>
<td>2007</td>
<td>2,286</td>
<td>6.6%</td>
</tr>
<tr>
<td>Schepens et.al</td>
<td>2007</td>
<td>500</td>
<td>12.4%</td>
</tr>
<tr>
<td>Etz et.al</td>
<td>2007</td>
<td>858</td>
<td>9.7%</td>
</tr>
<tr>
<td>Achweck et.al</td>
<td>2007</td>
<td>130</td>
<td>12%</td>
</tr>
<tr>
<td>Jacobs et.al</td>
<td>2004</td>
<td>279</td>
<td>8.6%</td>
</tr>
<tr>
<td>Safi et.al</td>
<td>2005</td>
<td>1,106</td>
<td>14.6%</td>
</tr>
<tr>
<td>Lancaster et.al</td>
<td>2013</td>
<td>485</td>
<td>8%</td>
</tr>
</tbody>
</table>

TOTALS 5,644 ~ 10%

Source: Endovascular Aortic Repair ed. Oderich. Springer 2017

Current Results

Further experience with distal aortic perfusion and motor-evoked potential monitoring in the management of extent I-III thoracoabdominal aortic aneurysms

Robert T. Lancaster, MD, MPH, Mark F. Conrad, MD, MMSc, Virendra I. Patel, MD, Matthew R. Cambria, BS, Emel A. Ergul, MA, and Richard P. Cambria, MD, Boston, Mass

Background: Prior studies indicated improved early mortality and paraplegia rates in a small cohort of patients with type I III thoracoabdominal aortic aneurysms (TAAA) after distal aortic perfusion (ADP) technique. Our institution has developed a multimodal method, which includes motor-evoked potentials (MEVP) monitoring, as a way to enhance the safety and effectiveness of ADP. This study aimed to evaluate the outcomes of patients who underwent TAAA repair at our institution.

Methods: From January 2008 to June 2013, 485 patients were identified. Patients were stratified according to operative approach (AFR/MEVP vs CS). The cohorts differed in that the AFR/MEVP group was younger (65.8 ± 12.5 years vs 70.9 ± 9.7 years; P < .001), had more extent I/II aneurysms (66% vs 39%), and were more likely to have a diseased infrarenal aorta (29% vs 16%). The 30-day mortality rate was significantly lower in the AFR/MEVP group (8% vs 22%; P < .001).

Results: There were 485 patients (CS = 385 [79%]; AFR/MEVP = 100 [21%]). The cohorts differed in that the AFR/MEVP group was younger (65.8 ± 12.5 years vs 70.9 ± 9.7 years; P < .001), had more extent I/II aneurysms (66% vs 39%), and were more likely to have a diseased infrarenal aorta (29% vs 16%). The 30-day mortality rate was significantly lower in the AFR/MEVP group (8% vs 22%; P < .001).

# Results - Outcomes

<table>
<thead>
<tr>
<th>Variable</th>
<th>Clamp/Sew (n=385)</th>
<th>DAP/MEVOP (n=100)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Post-op Death</td>
<td>9.9%</td>
<td>4.0%</td>
<td>0.072</td>
</tr>
<tr>
<td>Permanent SCI</td>
<td>11.9%</td>
<td>3.0%</td>
<td>0.008</td>
</tr>
<tr>
<td>ARF with HD</td>
<td>11.4%</td>
<td>5.1%</td>
<td>0.063</td>
</tr>
</tbody>
</table>

> MEDICARE DATABASE (2004-07)

> SIGNIFICANT IMPROVEMENT IN EARLY MORTALITY (P = .02), COMPLICATIONS (P < .01) AND 1 YEAR SURVIVAL (P < .01)

From the Society for Clinical Vascular Surgery

Use of extracorporeal bypass is associated with improved outcomes in open thoracic and thoracoabdominal aortic aneurysm repair

J Vasc Surg 2018; 68; 941-7
Multi-center French Experience

Results and Factors Affecting Early Outcome of Fenestrated and/or Branched Stent Grafts for Aortic Aneurysms

A Multicenter Prospective Study

"F/B-EVAR carries a significant rate of mortality and complications...the complexity of the procedure"

Ann of Surgery 2014;00:1-10

- 112 TYPE IV and 73 TYPES I-III
- MORTALITY FOR I-III ➞ 8.2%
- REINTERVENTION AT 5 YEARS ➞ 50%
Durability of Open Surgical Repair of Type I-III Thoracoabdominal aortic aneurysm

Christopher A. Latz, MD,1 Richard P. Cambria, MD,1 Virendra I. Patel, MD, MPH,1 Jahan Mohebali, MD,1 Emer A. Ergul, MS,2 R. Todd Lancaster, MD, MPH,1 Mark F. Conrad, MD, MMSc,2 and W. Darrin Clouse, MD,1
Boston and Brighton, Mass and New York, NY

Summary Results

Endovascular TAAA Repair

- 15 clinical series (of pioneers e.g. Chutter, Greenberg, etc) detailing 1,517 patients
- Many include JRA, SRA, and few non-elective cases
- Technical success uniform
- 30-day mortality (edited) range (2-9 %) and SCI (2-16.7 %)

Source: Endovascular Aortic Repair
A systematic review and meta-analysis of early outcomes after endovascular versus open repair of thoracoabdominal aortic aneurysms

Rodolfo Barbas, MD, PhD, Christian Büchter, MD, F, Thierry A. Bellenger, MD, MPH, Joëlle Denissen, MD, PhD, and Takeo Nagawa, MD, PhD

AEB 2018; 68: 1936-1945

- 8 Comparative studies of various sources (French Registry, NSQIP, NIP and single institution)
- 2,434 Endo vs. 5,875 open (unmatched but published 2008-18)
- Survival benefit ENDO only in unmatched studies (RR Q:63)
- “Few studies with high BIAS”

Role of Hybrid Operation (?)
Hybrid Operation: Question Less Invasive Alternative

- Combination of debranching bypasses creates distal seal zone for TEVAR
- Aortic Arch
- Visceral Segment

Preliminary Results of the North American Complex Abdominal Aortic Debranching (NACAAD) Registry


For the NACAAD investigators
NACAAD registry
Mortality

30 early deaths (14%)
- Multisystem organ failure, 11
- Cardiac event, 10
- Ruptured aneurysm, 4
- Ischemic stroke, 2
- Intracranial hemorrhage, 2
- Intraoperative hemorrhage, 1

Mortality in centers with > 10 cases: 11% (0 – 21%)

TAAA, thoracoabdominal aortic aneurysm
PRAA, para-renal aortic aneurysm
Early death, 30-day and/or in-hospital
Thoracoabdominal aortic aneurysm: hybrid repair outcomes

G. Chad Hughes, Nicholas D. Andersen, Jennifer M. Hanna, Richard L. McCann

1Division of Cardiovascular and Thoracic Surgery, 2Vascular Surgery, Department of Surgery, Duke University Medical Center, Durham, North Carolina, USA

Corresponding to G. Chad Hughes, MD, Division of Aortic Surgery Program, Duke University Medical Center, Division of Cardiovascular and Thoracic Surgery, Box 3041, Durham, NC 27710, USA. Email: ghughes@duke.edu.

- 58 pts Type I-III TAA
- Mortality 9%, SCI 4%
- “Elderly high-risk patients”
- Type IV → Open

Key words: Thoracoabdominal aortic aneurysm (TAAA), pulmonary disease, endovascular aneurysm


From the Western Vascular Society

Arch and visceral/renal debranching combined with endovascular repair for thoracic and thoracoabdominal aortic aneurysms

Sung Won Kim, Robin P. Stoney, Fred Cohen

Objective: To describe and report the outcomes and experience with endovascular repair of thoracoabdominal aortic aneurysms (TAAA) with combined thoracic and abdominal debranching. Methods: A retrospective analysis of 77 patients who underwent TAAA repairs at the Cleveland Clinic. Results: Of these patients, 24 had combined endo-debranching and endovascular repair. There were no deaths, and one paraplegia. Conclusions: The hybrid approach results in acceptable rates of mortality and paraplegia which were used for treatment of arch/proximal descending thoracic aortic problems. These results support this procedure as a reasonable approach to difficult surgical problem; however, long-term follow up is required to appraise its ultimate clinical utility. (J Vasc Surg 2011;54: 30-41.)

JVASC Surg 2011 Jul; 54(1): 30-40

- 24 TAAA pts → few I-III
- Mortality 4%, 1 paraplegia
- 86% 1 year survival
Summary

• The Evolution of total Endovascular repair of TAA HAS BEEN SLOW!

USA Regulatory Environment
INTERNATIONAL MARKET

• Surgeon Experience and Expertise recalls the Evolution of Open Repair

• Current Results
  Pararenal
  Type IV TAAA
  Type I-III TAA

“Hybrid and total Endovascular Repair are here to stay... the best Rx. Approach... will likely be made based on the patient’s health... and clinician familiarity with technology”