Endografting of the Aortic Arch: Current Results and Future Techniques

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Disclosures

* Research-grants, travelling, proctoring speaking-fees, IP, royalties with Cook.
* Consultant with Philips
* Research, consulting, royalties with Vascutek.
* Shareholder Mokita Medical
Indications

- Aneurysm and PAU of the arch
- Chronic dissection
- Acute Type A dissection
Contemporary FET-Results

Total aortic arch replacement with a novel 4-branched frozen elephant trunk prosthesis: Single-center results of the first 100 patients

Malakh Shrestha, MBBS, Tim Kaufeld, MD, Erik Beckmann, MD, Felix Fleissner, MD, Julia Umminger, MD, Firas Abd Alhadi, MD, Dietmar Boethig, MD, Heike Krueger, RN, Axel Haverich, MD, and Andreas Martens, MD

- Single center; n=100
- Age 62y, 37% acute
- Perioperative mortality 7%
- Stroke 9%
- Paraparesis 7%
- Dialysis 8%
- Recurrent nerve palsy 25%

Endovascular Advantages:

- No Clamping of the Aorta
- No cardio-pulmonary Bypass
- No cardiac arrest
- Reduced access trauma
- Repair while „engine running“
Endovascular Options for the Aortic Arch

- Chimney Grafts
- In-Situ Fenestration
- Fenestrated/ Branched Stent-grafts

Bail-out Techniques
Complex Arch Endografts

Branched SG ≠ Fenestrated SG
Branched Arch Repair

- 2003-2013
- N=89 Inoue Stent Graft (ISG)
  - 64 single branch
  - 18 double branch
  - 7 triple branch
- Mortality
  - 3% single branch
  - 0% double branch
  - 29% triple branch
- Stroke
  - 8% single branch
  - 33% double branch
  - 42% triple branch

Tazaki et al. 2017; J Vasc Surg: epub
Branched Arch Repair

Outer Branches

Inner Branches
Cook Arch-Branch Graft
Cook Zenith Branched Arch Endograft

Global experience with an inner branched arch endograft

Stéphan Haulon, MD, PhD, Roy K. Greenberg, MD, Rafaëlle Spear, MD, Matt Eagleton, MD, Cherrie Abraham, MD, Christos Lioupis, MD, Eric Verhoeven, MD, PhD, Krassi Ivancev, MD, Tilo Kölbl, MD, PhD, Brendan Stanley, MD, Timothy Resch, MD, Pascal Desgranges, MD, PhD, Blandine Maurel, MD, Blayne Roeder, PhD, Timothy Chuter, MD, and Tara Mastracci, MD

- 2009-2013
- Multicenter Study
- n = 38
- Technical success 32/38
- Mortality 5/38 (13%)
- Stroke/TIA 6/38 (16%)

Cook Zenith Branched Arch Endograft

n = 27; Hamburg, Tokio, Lille

4/2013 - 11/2014

Technical success 27/27

30d Mortality 0/27

1y mortality 1/27 (4%)

Stroke/TIA 3/27 (11%)

Spear et al 2016; Eur J Vasc Endovasc Surg 51: 380-5
Cook Branched Arch Endograft

Hamburg Experience 2012-2017:

* Cases: 54
  * Aneurysm/PAU: 28
  * Residual dissection: 24
  * Acute Type A: 2

* 30d-Mortality: 3 (5.5%)

* Stroke: 4 (7%)

Unpublished data
Post TAAD-Repair

Inner-Branched Endografts for the Treatment of Aortic Arch Aneurysms After Open Ascending Aortic Replacement for Type A Dissection

Charles P. E. Milne, MBBS (Hons), FRACS (Vasc), Mau Amako, MD, PhD, Rafaeille Spear, MD, PhD, Rachel E. Clough, MRCS, PhD, Adrien Hertault, MD, Jonathan Sobocinski, MD, PhD, Wendy Brown, MBBS (Hons), PhD, and Stéphan Haulon, MD, PhD

- N=73; 2009-2015 Type 1 AD
- Eligibility for B-TEVAR
- Access, diameter, angulation
- 70% anatomically suitable
Residual Dissection
Residual Dissection

Bilateral carotid-subclavian bypass

Axillo-axillary bypass
Combined Ascend + Branched Arch Endograft in acute TAAD

Acute Type A Aortic Dissection Treated Using a Tubular Stent-Graft in the Ascending Aorta and a Multibranched Stent-Graft in the Aortic Arch

Kölbel et al. 2017, J Endovasc Surg 24: 75-80
Combined Ascend + Branched Arch Endograft in acute TAAD
Cook Branched Arch with 3 Inner Branches

Total Endovascular Treatment of Aortic Arch Disease Using an Arch Endograft With 3 Inner Branches

- N=3; 2016-2017
- Technical success all 3
- Procedure time 3h
- All 3 uncomplicated course

Spear et al. 2017; J Endovasc Surg 24:534-8
Aortic arch aneurysm repair with a new branched device

Gabriele Piffaretti, MD, PhD, Nicola Rivolta, MD, Federico Fontana, MD, Gianpaolo Carrafiello, MD, Giovanni Mariscalco, MD, PhD, and Patrizio Castelli, MD, Varese, Italy

* Casereport
* Single branch
* Technical success
Osaka experience

* Single center
* $n = 32$, 22 male, Age 80
* All elective
* Technical success $32/32$
* Mortality $0$
* Stroke $3/32$ (9%)

Kuratani, T at Veith 2017, unpublished
European experience

- Multicenter
- n = 15, 12 male, Age 76
- All elective
- Technical success 15/15
- Mortality 1/15 (7%)
- Stroke 3/15 (20%)

Czerny, M, J Vasc Surg in press
Zone 0 – Fenestrated Stent-Graft
Fenestrated Arch Anatomical Suitability

- Diameter $\leq 38$mm
- Proximal landing zone $\geq 20$mm
- Appropriate access vessels
- Landing zone in mid-arch
Fenestrated Arch Endograft

Hamburg Experience 2011-2017:

- Cases: 40
  - Aneuysm: 25
  - Chronic dissection: 8
  - PAU: 7
- 30d-Mortality: 4
- Stroke: 4
Fenestrated Arch Endograft

Advantage of a precurved fenestrated endograft for aortic arch disease: Simplified arch aneurysm treatment in Japan 2010 and 2011

Yoshihiko Yokoi, MD, Takashi Azuma, MD, and Kenji Yamazaki, MD, PhD

- Multicentre Japan; n=383
- Zone 0: n=363
- Technical success: 99%
- 30d mortality: 1.6%
- Stroke: 1.8%

Conclusion

- Endovascular aortic arch repair offers valid alternative to open surgery in patients with increased surgical risk.
- Current devices under development.
- Stroke remains main risk of arch treatment.
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