Endo-Treatment of Arch and Ascending Aorta

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Disclosures

- Research-grants, travelling, proctoring speaking-fees, IP, royalties with Cook.
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- Shareholder Mokita Medical
Endovascular Options for the Aortic Arch

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

Ball-out Techniques
Complex Arch Endografts

Branched SG ≠ Fenestrated SG
Branched Arch Repair

Outer Branches

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

* Editor’s Choice — Subsequent Results for Arch Aneurysm Repair with Inner Branched Endografts,

R. Spear a, S. Haulon a, T. Ohki b, N. Tsilimparis c, Y. Kanaoka b, C.P.E. Milne a, S. Debus c, R. Takizawa b, T. Kölbel c

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* 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%)
- Clinical stroke: 4 (7%)

Tsilimparis et al. 2018, J Vasc Surg accepted
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, Raffaella 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

Milne et al. 2016; Ann Thor Surg; epub
Anatomical Suitability

Suitable: 70%

Graft too short: 21%

Major Kink: 7%

False Lumen Occlusion Techniques

A-Branch + Candy Plug

A-Branch + Knickerbocker
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 Ascending Aortic Stent-Graft and Inner Branched Arch Device for Type A Aortic Dissection

Yuk Law, FRCS, Nikolaos Tsilimparis, MD, Fiona Rohrffs, MD, Vladimir Makaloski, MD, E. Sebastian Debus, MD, PhD, and Tilo Kölb, MD, PhD

Law et al. 2018; J Endovasc Ther 25:561-5
Branched Arch with 3 Inner Branches
Cook Branched Arch 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 et al. 2018; Eur J Cardio Thorac Surg 53:1007-1012
Fenestrated Arch Repair
Fenestrated Arch
Anatomical Suitability

- Diameter ≤ 38mm
- Proximal landing zone ≥ 20mm
- Appropriate access vessels
- Landing zone in mid-arch
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%

Ascending TEVAR

Indications:

- Lesions post surgery:
  - Pseudoaneurysm
  - Postsurgery bleeding
  - Residual Dissection
  - Lost TAVI

- Ascending aneurysm

- Type A dissection
Post-surgery Lesions
Post-surgery Lesions
Lost TAVI
Ascending Aneurysm

- Most are conical and lack proximal landing zone.

- Endovascular exclusion usually not possible in native vessel

Kolvenbach et al. 2011; J Vasc Surg 53: 1431-8
Ascending Aorta and Arch:
Endograft Choice

- **Length:** measure at outer curve 6-10cm
- **Diameter:** measure on Centerline
- **Tapered grafts**
  - **Reverse tapering**
- **On-table customization**
Endograft Choice

Cook Zenith TBE ProForm

77-81mm
Oversizing

- Native aorta or graft
- Gated or non-gated CT
- Systolic or diastolic
- Age
- Bloodloss....
- Generally: 15-25%
Pulsatility

Toward Endografting of the Ascending Aorta: Insight into Dynamics Using Dynamic Cine-CTA

Joffrey van Prehn, MD; Koen L. Vincken, PhD; Bart E. Muhs, MD, PhD; Gijsbrecht K. W. Barwegen, BS; Lambertus W. Bartels, PhD; Mathias Prokop, MD, PhD; Frans L. Moll, MD, PhD; and Hence J. M. Verhagen, MD, PhD

J ENDOVASC THER 2007;14:551–560

15% Max Diameter Change
Limitations of Femoral Access

- Distance to ascending and arch
- Tortuosity and kinking
- Left ventricular wire-position
- Difficult true lumen access
- Apposition
Acute Type A Dissection
Transapical TEVAR

Transapical TEVAR
Acute Type A Dissection
Transapical TEVAR

Ascending TEVAR

Hamburg Experience 2010-2017:

- Cases: 24
  - Dissection: 15
  - Pseudoaneurysm: 5
  - Dislocated TAVI: 2
  - Other: 2
  - Urgent/emergent: 14

- Access:
  - Transfemoral: 18
  - Transapical: 4
  - Transsubclavian: 2

- 30d-mortality: 5 (21%)
- 1y-mortality: 6 (25%)
- Stroke: 3 (13%)

Unpublished data
Outcomes of Endovascular Repair of Ascending Aortic Dissection in Patients Unsuitable for Direct Surgical Repair

Zhenjiang Li, MD, Qingsheng Lu, MD, Rui Feng, MD, Jian Zhou, MD, Zhiqing Zhao, MD, Junmin Bao, MD, Xiang Feng, MD, Jiaxuan Feng, MD, Yifei Pei, MD, Chao Song, MD, Zaiping Jing, MD, PhD

- 2009-2011 n=15
- Intervall: 26 days
- Technical success: 15
- Open conversion: 1
- Mortality: 0

Li et al. 2016; J Am Coll Cardiol 68:1944-54
Valved Conduit – Endo-Bentall?

Courtesy of E. Dietrich, Arizona

Courtesy of C. Nienaber, Rostock

Courtesy of M. Czerny, Freiburg
Conclusion

- Endovascular aortic arch repair offers valid alternative to open surgery in patients with increased surgical risk.

- Endovascular Treatment of ascending aorta potentially beneficial in selected patients.

- Transfemoral delivery challenging, transapical access route potentially easier.

- Current devices under development.

- Stroke remains main risk of arch treatment.
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AORTIC LIVE 2018
October 29-30, 2018
Congress Center Essen, Germany

In 2018 Aortic Live Symposium will return to Essen, Germany again. We are looking forward to welcoming you again next year!