Endovascular Repair of Aortic Arch Pathologies; What is available/possible in the U.S. in 2018?

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Endovascular Symposium
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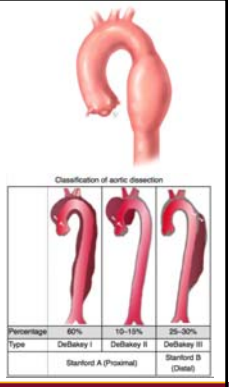
DISCLOSURES

- Cook Medical: Consultant, Proctor for TX2, Zenith, Alpha, Zenith Fenestrated
- Gore & Associates: Consultant

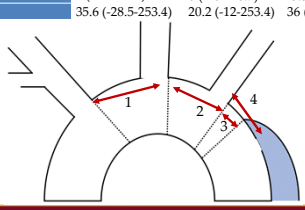
ISOLATED DTA LESION?

- Degenerative Aneurysms
  - 60% in ascending aorta
  - 10% arch aneurysm
  - Descending thoracic aortic aneurysm approaching arch branch vessels
- Aortic Dissections
  - 2/3 Type A, 1/3 Type B
  - Post type A repairs with residual arch, thoracoabdominal dissection



TYPE B DISSECTIONS

Median distance (mm)	Overall (range)	Group A	Group B	p
1. Innominate to LCCA	8.7 (0-16.6)	8.3 (0-12.8)	8.9 (0-16.6)	0.744
2. LCCA to LSCA	17.2 (6.3-37.2)	17.1 (6.3-33.1)	17.8 (6.3-37.2)	0.691
3. LSCA to IMH	0 (-83-216.9)	0 (-16-216.9)	-3.5 (-83-67.3)	0.002
4. LSCA to entry tear	35.6 (-28.5-253.4)	20.2 (-12-253.4)	36 (-28.5-237.6)	0.627



TREATMENT OPTIONS

- Open repair
- Hybrid repair
- Parallel grafting TEVAR
- Fenestrated/Branched TEVAR

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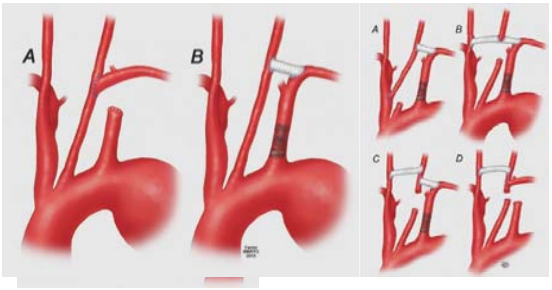
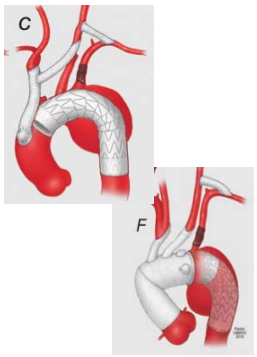
HYBRID REPAIRS

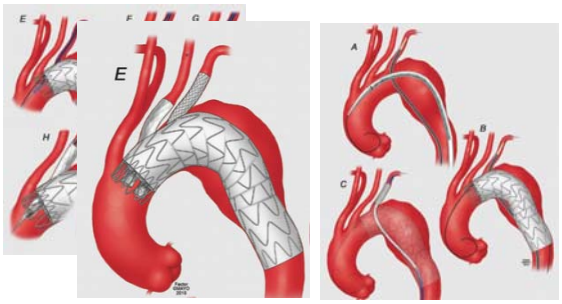


HYBRID REPAIRS

- Meta-analysis of total arch debranching + TEVAR
  - Type I reconstruction
    - 10.8% endoleak
    - 3.9% 30-day mortality
  - Type II reconstruction
    - 12.5% endoleak
    - 5.3% 30-day mortality
    - 2.5% stroke

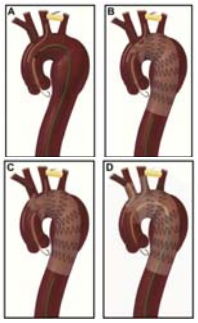


PARALLEL GRAFTING

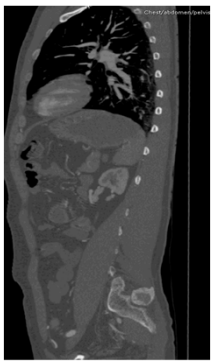


PARALLEL GRAFTING

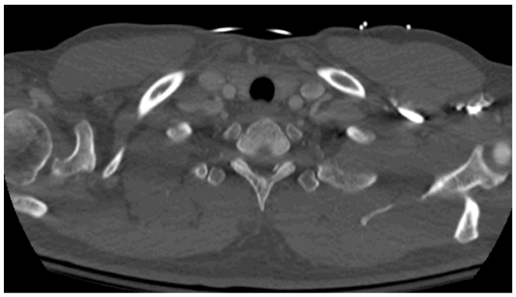
- N=27 high risk pts with 32 target arch branches
  - 33% emergent cases
  - 4% 30-day mortality (N=1)
  - 100% primary branch patency at 9 months
  - 11% stroke (N=3)
  - 33% aortic reintervention (N=9)

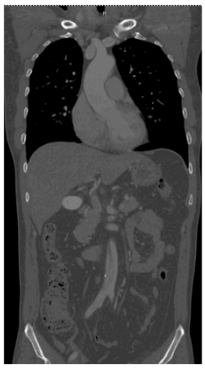


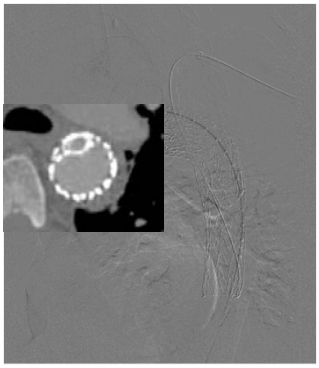
Case 1

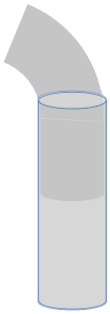


Postop CTA

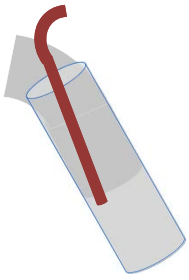


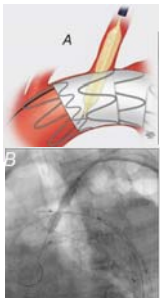




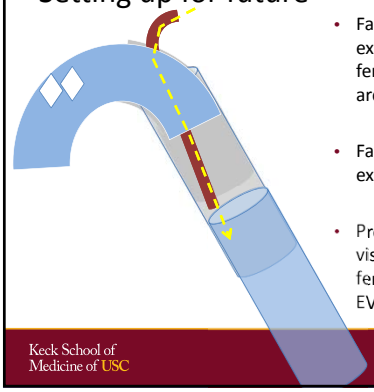


Potential advantages over other endovascular LSCA incorporation





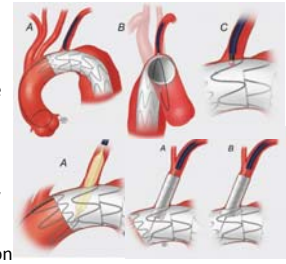
Setting up for future



- Facilitates proximal extension with fenestrated/branched arch TEVAR
- Facilitates distal extension TEVAR
- Preserves L SCA path to visceral/renal targets for fenestrated/branched EVAR

IN SITU FENESTRATION

- Systematic review 34 articles
- 58 pts with 73 fens
  - 3.4% 30-day mortality due to aorto-aerodigestive fistulae
  - 1.7% L SCA restenosis
- Needle, Stiff wire, Energy (RFA, Laser)
  - Less fabric tear with Dacron and Laser

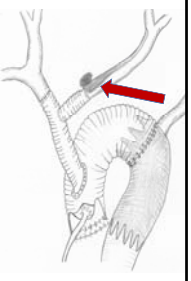


CASE

- 75 M underwent emergent ascending, arch replacement with frozen elephant trunk procedure for type A aortic dissection
  - Antegrade deployment of 34mm x 15cm cTAG)

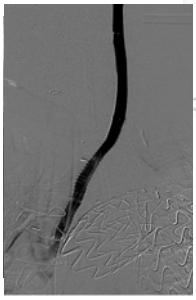
POSTOP COURSE

- Altered mental status
- Pseudoaneurysm at the carotid BPG anastomosis
- Dissection of L CCA to proximal ICA



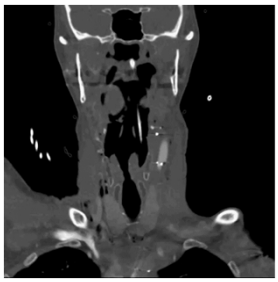
L CCA REPAIR

- Left CEA exposure
- Interposition graft CCA to ICA
- Bridging Viabahn Covered Stent from intrathoracic CCA to cervical CCA

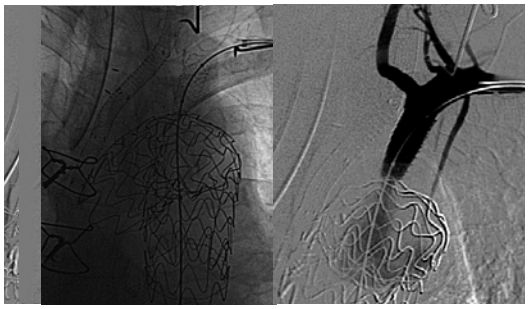


POSTOP COURSE

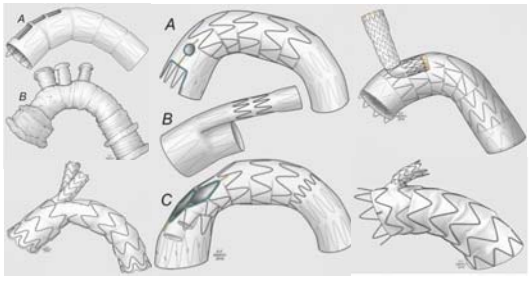
- Dizziness, left arm, hand weakness with left arm exercise during rehab
- Duplex: retrograde flow in left vertebral artery



IN-SITU LASER FENESTRATION

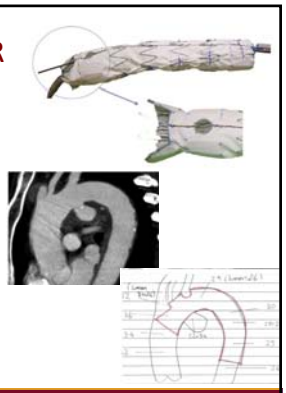


BRANCHED, FENESTRATED TEVAR



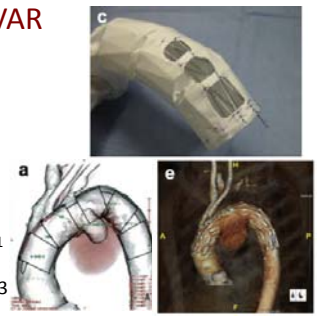
FENESTRATED TEVAR

- Cook Arch Fenestrated
  - Preloaded catheter
- N=15 high risk pts
  - 6 Post dissection
  - 9 Aneurysms
- 93% technical success
- 20% 30-day mortality
  - 1 stroke, 1 access complication, 1 MI



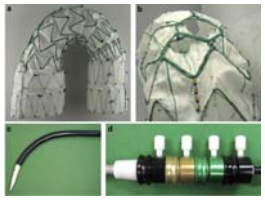
FENESTRATED TEVAR

- Najuta Fenestrated
  - Custom precurved
  - Unreinforced fen
- N=32
  - 91% Technical Success
    - 2 RTAD, 1 Stroke, 1 SCI, 1 Celiac occlusion
  - 97% Branch Patency at 3 years



MULTIBRANCHED TEVAR

- Cook Inner Branch
  - Custom dual branch
  - Curved delivery system
  - Bullet nose cone option
- N=27
  - 100% technical success
  - 0% 30-day mortality
  - 7.4% major stroke
  - 3.4% minor stroke
  - 7.4% transient SCI

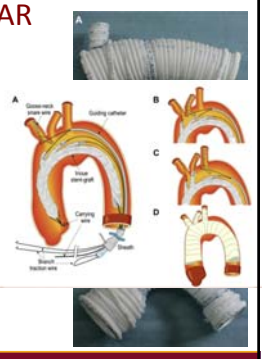


MULTIBRANCHED TEVAR

- Bolton Relay Mutlibranch
  - Custom dual branch
  - Curved delivery system
  - Two internal branch cuffs for innominate and CCA
  - No pre-wire/catheters

MULTIBRANCHED TEVAR

- Inoue Arch Graft
  - Custom Unibody Graft (1~3 branches)
- N=89 (64 single, 18 double, triple branches)
  - 100% technical success
  - 4.5% 30-day mortality (29% triple branches)
  - 16% stroke (33% double, 42% triple)

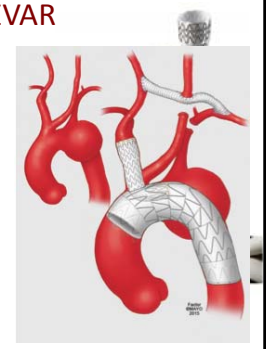


SINGLE BRANCHED TEVAR

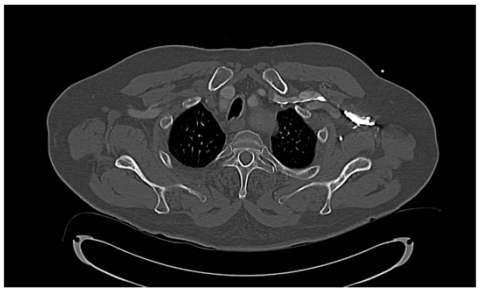
- Medtronic Mona LSA
  - Off-the-shelf
  - Designed for zone 2
  - Requires ≥ 10mm between CCA and LSCA, ≥ 5mm LSCA and aneurysm, ≥ 20mm proximal seal
- N=9
  - 100% technical success
  - 4 minor strokes

SINGLE BRANCHED TEVAR

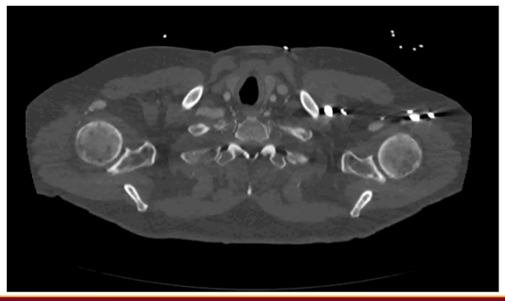
- Gore TBE
  - Off-the-shelf: 8mm, 12mm inner portal
- N=22
  - Zone 2 with LSCA branch stent
  - 100% technical success
  - 0% 30-day mortality, stroke, SCI
  - 100% branch patency @ 1mo
- Multi-center Pivotal Trial
  - Including Zone 0,1,2
  - Dissection, Aneurysm, Transection



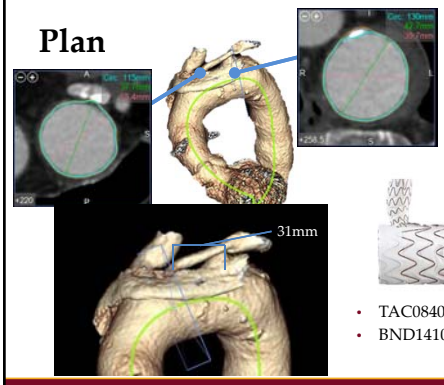
CASE



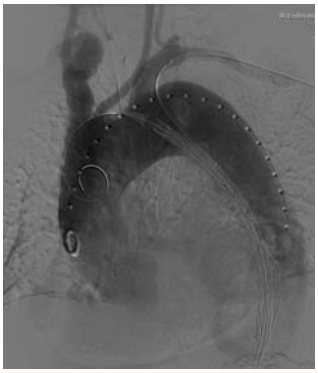
Persistent chest pain- Repeat CTA 2 days later

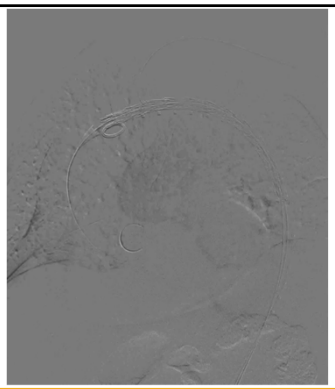


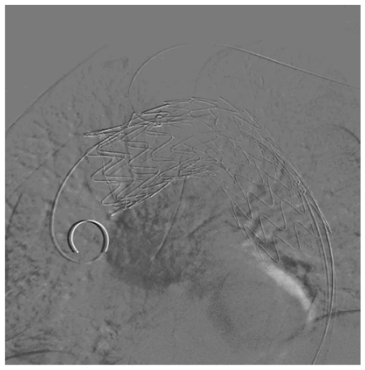
Plan

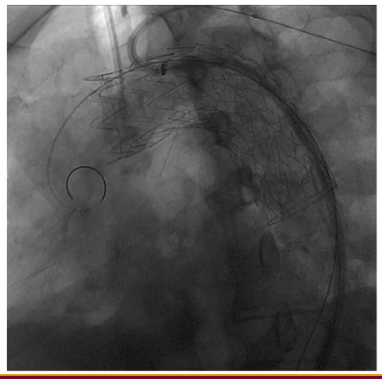


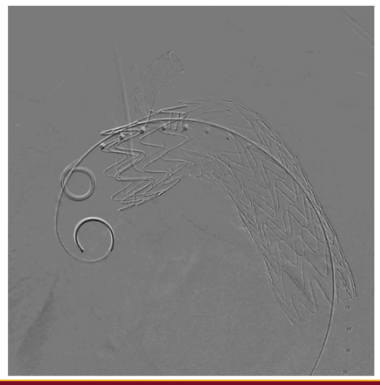
- TAC084015C
- BND14102C











CONCLUSIONS

- Hybrid repair allows proximal extension of seal zone
- Parallel grafting TEVAR and In-situ Fenestrated TEVAR enables total endovascular arch repair in urgent settings
- Fenestrated, Branched TEVAR rapidly evolving technology

THANK YOU!

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