Off-the-shelf options to treat challenging aortic anatomies

Treatment and embolization of endoleak TYPE IA and II

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Disclosure

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I have the following potential conflicts of interest to report:

- Consulting: Abbott, ab medica, Biotronik, BTG, Endoscout, Medtronic, Straub
Available embolic agents

• Particulate
  – Coils
  – Particles
    + Broadly available, easy, safe
    - Unable to fill complex endoleak cavities completely
    - Recanalization, limited control
Available embolic agents

- Liquids
  - Thrombin
  - Cyanoacrylate
  - Onyx™ liquid embolic system
  + Immediate occlusion
  + Shapeable
  + Reach the nidus
- Complex
- Expensive
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- **Advantages of Onyx™ liquid embolic system**
  - Excellent visualization even in CT fluoro
  - Flow directed
    - Expansion of embolic cast follows blood flow
  - Different viscosities
    - Even in high-flow conditions
  - Slowly hardening embolic agent
    - Shapeable, fills endoleak cavity completely
  - Excellent control
    - Stop of injection = Stop of embolization
  - Compatible with ePTFE
  - Very low recanalization rate
  - Lower risk of catheter occlusion or encasement
Type 1 endoleaks: insufficient sealing at the landing zones

- Systolic blood pressure in aneurysm sack - supposedly high risk of growth / rupture

- Treatment options: Repeat stenting / stent-grafting / ballooning / endostapling
  - in case of insufficient landing zone / stent disconnection

- Endovascular embolization: During or post EVAR
Trans-Catheter Embolization of Type 1 Endoleaks: Step by step

Avoid combination of coils and Onyx™ to fill large endoleak cavities:
- Coils will prevent Onyx from filling the endoleak cavity completely
  ➢ High risk of re-perfusion!
CTA prior to embolization

CTA after the embolization
- DSA via left subclavian artery
- DSA via superselective microcatheter
- Imaging of the whole EL entity
- Placement of the tip of the micro catheter at the deepest point of the EL cavity
- Start of Onyx injection at the deepest point
- Continuing Onyx injection from distal to proximal
- Catheter withdrawal from time to time
- Continuing Onyx injection from distal to proximal
- Catheter withdrawal from time to time
- Final angiogram with complete filling of the EL entity
Type 2 endoleaks: treatment strategies

- **Typical finding:**
  - Fed by the inferior mesenteric or a lumbar artery via iliolumbar artery.

- **Follow-Up surveillance**
  - As long as there’s no sack growth
    - 40% occlude spontaneously

- **2 possible treatment strategies**
  - Trans-arterial via SMA / hypogastric
    - Can be difficult
    - Reaching the nidus prerequisite for success
  - **Trans-lumbar direct puncture**
    - E.g. CT guided
Variants of iliolumbar endoleak embolization

Direct access cannot be catheterized!
Indirect embolization of the nidus via Plug-n-Push

High recurrence rate if nidus cannot be reached / occluded!
Type II endoleak with lumbar inflow, no trans-arterial treatment option

Planning scan already in prone position

CT guided puncture with aortography needle (short pain): you may orientate by wall calcifications of the aorta

Placement of a Rebar™-18 Microcatheter

Introduction of micro catheter into catheter needle after withdrawal of steel core by use of Y-adaptor
Move to the Angio-Suite, needle and catheter are secured by a sterile person

Endoleako graphy with depiction of inflow and outflow vessels and to estimate the volume and the whole extent of the endoleak

Trans endoleak probing of outflow vessels with microcatheter

Embolization of outflow with MVP™ Microvascular Plug System 3: safes material and reduces pain

Protective embolization of lumbar outflow

Embolization with mit Onyx™ liquid embolic system 34

Occlusion of puncture defect and canal with Onyx™ liquid embolic system during catheter pullback (slightly painful)
Available Data EL embolization

Type I EL

- Graif A, et al. 2017:
  - 6 type Ia / 2 type Ib EL
  - Ø Follow-Up 6.9 mths
    - 5 EL 100% occluded
    - 3 recurrent EL

Embolization of type I EL
- Technically feasible
- High success rate
  - Ø Follow-Up 13.2 mths
    - 9 EL 100% occluded
    - 1 reperfusion
  - Diameter reduction 12M:
    - 1 – 1.2cm

Type II EL

- Meta-analysis Sidloff DA, et al.

Embolization of type II EL
- Historical data with material mix and without nidus embolization:
  - Poor outcomes
  - Direct puncture in favour
- Newer observations with nidus embolization:
  - Better outcomes
  - Comparable results for direct puncture and transarterial access
    - 31% vs. 23%, p < .001

- Yang RY, et al. 2016:
  - 23 type II with Onyx™, DSP or TA
  - 70% freedom from EL
Summary: endoleaks

• **Type 1 endoleaks** may require prompt therapy
  – Re-Stenting, ballooning, endostapling, embolization as available treatment options

• **Type 2 endoleaks**
  – Intensive follow-up (40% occlude spontaneously)
  – Otherwise endovascular or percutaneous embolization as a safe treatment alternative

• **Published data: trans lumbar = trans arterial**
  – Technical success in 85 – 100%, clinical success > 60%
  – Reaching the nidus essential
  – Try trans-arterial first, change to direct puncture in case of failure
    • Allows to embolize relevant outflow vessels as protection

• **Onyx™ liquid embolic system so far best performer**
  – Safe, fast, easy to use
  – High technical and clinical success rates
  – lower recanalization rate than other embolics
Thank you very much for your attention!

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