New Development in the endovascular Treatment of uncomplicated TBAD patients
The FLIRT concept – What has changed?
TEVAR is indicated in most at 2-8 weeks after onset – Who are they and what else is needed?

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The role of false lumen intervention to promote remodelling via induced thrombosis – The FLIRT Concept

Disclosures
• None

TEVAR in Type B dissection: True Lumen Intervention induce remodeling

CTAG Active Control in chronic type B dissection
• 69 years old lady
• Chronic type B AD (2 years)
• Expansion > 5.5 cm
• Narrow true lumen
• Elective procedure using a WL GORE CTAG Active Control system

The ultimate goal in treating any dissection is mending the layers and healing of the aorta which requires stent-graft induced FL thrombosis and remodelling

Sakalihasan N, Nienaber CA et al. in preparation
Latest case & standard True Lumen Intervention last week...

SOP in distal dissection
- LSA bypass/single branch
- LSA occluder
- Proximal Stentgraft
- Open extension (PETTICOAT)
- Distal management

Great example of remodeling with TEVAR…true lumen only!

Complete false lumen thrombosis in the descending thoracic aorta

...late advantage also supported by MGH Cohort study

ESC Guidelines 2014

All Type B Dissection
- Complicated
- Chronic
- Uncomplicated

Recommendations for treatment of aortic dissection

Group A included 2340 patients (25.78%) treated surgically for type A AD
Group B included 1344 patients (15.38%) treated endo/surgically for type B AD
Group C included 5608 patients (61.68%) with any type of AD treated with medical therapy only.
2 predictors of long-term stability: FL thrombosis and Remodeling

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Hazard Ratio OR</th>
<th>95% CI</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.031</td>
<td>0.991-1.072</td>
<td>0.030</td>
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<tr>
<td>Female</td>
<td>0.334</td>
<td>0.094-1.193</td>
<td>0.030</td>
</tr>
<tr>
<td>STJ diameter</td>
<td>0.153</td>
<td>0.044-0.532</td>
<td>0.025</td>
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<tr>
<td>Complete FLT</td>
<td>5.354</td>
<td>1.229-23.329</td>
<td>0.003</td>
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</tbody>
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Even after Stent-grafting No or Partial FL Thrombosis is not uncommon

False Lumen Failure selected for elective FLIRT at distal reentries

What is a FLIRT?

- Exclusively percutaneous minimalistic technique (based on the use of occluders, coils and ONYX)
- Promotes false lumen thrombosis to initiate remodelling
- Amenable to communications in any kind of dissection (A/B)
- Avoids the risk of (add’l) BEVAR/FEVAR or open surgery

Typical FLIRT in Subacute/Chronic dissection to induce remodelling?

64 y/o male patient
- Sudden onset of chest/back pain
  - History of chronic HTN
  - Triple rule out CT diagnosis:
    - Acute type B dissection
    - Lusoria anatomy
    - Distal malperfusion
    - Right arm claudication/ischemia
    - Lower extremity hypotension

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- Promotes false lumen thrombosis to initiate remodelling
- Amenable to communications in any kind of dissection (A/B)
- Avoids the risk of (add’l) BEVAR/FEVAR or open surgery
Sequential follow-up CT scans after the 1st procedure:
- Tear in fabric of SG and partial thrombosis of FL at day 5 post TEVAR.

Strategy:
Subacute/Chronic dissection...induced remodelling!
3D CT guided reintervention with FLIRT concept in type B dissection
- Colas, occluder and iliac stentgraft to isolate FL.

Follow-up CTA scan 3 days after 2nd procedure:
- Post-procedure CTA scan showing complete thrombosis of the false lumen and sealing of the tear.
- Sagittal view after endovascular reconstruction confirming complete sealing by coils and occluder and a nonperfused false lumen.
- Patient will be followed in annual intervals.

Subacute/Chronic dissection...induced remodelling!
...or false lumen coils & occluder to facilitate thrombosis and aortic remodeling

Fully percutaneous FLIRT in the ascending aorta

CASE M.P
Inoperable type A Euroscore II 21%
Interventional Repair of type A aortic dissection

- Admitted from a routine surveillance CT of thoracic aortic aneurysm showed a new dissection in aortic root
  - Hypertension
  - Apronectomy in Feb 1999
  - Coronary angiogram: LAD 70% stenosis in 2005
  - Intra-renal AAA repair in 2006
  - Permanent pacemaker implantation in Mar 2007
  - Osteoarthritis with total knee replacements
  - Lower gastrointestinal haemorrhage with bowel resection in 2015, end-to-end anastomosis
  - Aorto-femoral bypass

Type A dissection confined to just above the aortic root to mid ascending aorta. Measured 26 x 42 mm Entry tear diameter 5mm

CT and also images pre-procedure (A), at discharge (B) and 6-month follow-up (C) showing entry false lumen thrombosis and shrinkage with true lumen expansion (remodelling) patient no.2. Star shows the ASD occluder.

At discharge

6 months F/U

Yuan X et al. CCI 2018

FLIRT with the impossible – FL management in this type A dissection?

75 y/o female

- Hypertension
- Apronectomy in Feb 1999
- Coronary angiogram: LAD 70% stenosis in 2005
- Intra-renal AAA repair in 2006
- Permanent pacemaker implantation in Mar 2007
- Osteoarthritis with total knee replacements
- Lower gastrointestinal haemorrhage with bowel resection in 2015, end-to-end anastomosis
- Aorto-femoral bypass

Individual approach – false lumen management in type A dissection

- 15 x 5 mm coils deployed via MP followed by a 10mm Amplatzer PFO closure device placed across the entry tear.
- Final angiogram showed tear sealed and coronary ostium unblocked.

Demographic information, pathology and procedures

Yuan X et al. JEVT 2017

Yuan X et al. CCI 2018
Procedural details (FLIRT concept) and success rate

Impact of FLIRT on anatomic details, remodelling and false lumen thrombosis in proximal (type A) and distal (type B) aortic dissection

Proximal dissection cases treated with FLIRT (occluders and coils), demonstrated the increasing true lumen area and shrinking maximum diameter of the aorta over time.

FLIRT outlook

- Concept of a minimalistic approach to promote false lumen thrombosis, and induce remodelling after dissection.
- By use of coils and closure devices to manage the false lumen as an efficient (minimalistic) strategy likely to avoid problems of additional stent grafts (e.g. FEVAR and BEVAR) and open surgery in selected cases.
- First observations will be followed by systematic documentation of any false lumen intervention in either the ascending or descending aorta.

Brompton Aortic Centre 2018

Highly complex case selected for elective FLIRT at distal reentries
54 y/o male patient
- Type A dissection & surgical repair on 10.10.16
  - post-op CT found a residual dissection flap and tear at the level of the very proximal arch.
  - True lumen in descending aorta is very small with partial occlusion of the left and right renal artery.
- Chronic HTN

**TEVAR in type A ? – post type A surgical repair residual dissection**

5 days after procedure
6 months after procedure

**TIMING**

Midterm outcomes and remodeling are similar to acute and subacute type B dissection undergoing stent-graft treatment; the window of plasticity and remodeling is open until 3 months.