ILIAC ENDOGRAFT THROMBOSIS AFTER EVAR

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Faculty disclosure

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I have **no financial relationships** to disclose.
Iliac endograft thrombosis

- Incidence: 0 – 7.2% of EVAR cases\(^1\)
- Occlusion-related mortality: 0-3%\(^1\)
- >50% in the first 2m; >90% in the first year\(^1\)
- Risk factors\(^2\):  
  - Female gender  
  - Reduced size of the iliac vessel  
  - Extension to the external iliac artery  
  - Arterial dissection  
  - Compromised run-off

1-Van Zeggeren et al; J Vasc Surg 2013, 57:1246-54  
2- Oshin et al.; J Endovasc Ther 2010, 17:108-14
Iliac endograft thrombosis

- *Technical error* present in the majority of the cases

- 73% of early occlusions (≤ 60 days PO)

- 60% of all occlusions

Van Zeggeren et al; J Vasc Surg 2013, 57:1246-54
Iliac endograft thrombosis

*Technical error*

- Angulation, kinking or stenosis of the iliac limbs
  - Narrow and/or calcified aortic bifurcation
  - Difficult iliac anatomy
  - Segments of graft fabric without stent

*Consider performing completion angiograms with different angulations*

↑ Adapted from Carroccio et al; J Vasc Surg 2002; 36:679-84
Technical error

- Extreme oversizing
- Distal landing zone in a kink of the artery

Adapted from Van Zeggeren et al; J Vasc Surg 2013, 57:1246-54
Iliac endograft thrombosis

**Technical error**

- Completion angiogram performed without removing the stiff guidewire

- Overlooked indication for PTA/Stenting
  - Within the endograft
  - In the external iliac artery
Clinical presentation:

- Acute limb ischemia (>50% of the cases)¹
- Intermittent claudication
- Asymptomatic (diagnosis during regular follow-up)
  - Relevance of progressive thrombus formation
    - May increase iliac limb occlusion
  - Consider
    - oral anticoagulation
    - endovascular treatment

¹ Van Zeggeren et al; J Vasc Surg 2013, 57:1246-54
Iliac endograft thrombosis
Iliac endograft thrombosis
Iliac endograft thrombosis - Treatment

- Depends on the initial clinical presentation
  - Asymptomatic
    - Consider conservative treatment
  - Claudication
    - Elective procedure
  - Acute limb ischemia
    - Urgent procedure

- Etiology
- Early versus late
FemoroFemoral Bypass

- Most classic approach for iliac limb occlusion
- Downsides:
  - Insertion of a prosthetic device
  - extra-anatomic repair
  - remaining patent iliac limb serving as inflow to the femoral-femoral graft can also be compromised by stenosis or kinking.
    - Bilateral limb ischemia
Open surgical treatment

Thrombectomy

- May lead to graft migration/disruption
- Consider using Fogarty balloon with radiopaque contrast medium;
- avert inflation of the balloon to any degree when it appears to be actively engaging the walls of the stent-graft limb;
- May result in internal iliac artery embolization
- Underlying occlusion cause may remain unclear
- More efficient in recent thrombosis

- Axilofemoral bypass (thrombosis of both limbs)
- Endovascular therapy
  - Catheter directed thrombolysis
  - Catheter-based thrombectomy
    - Angiojet
    - Other devices
  - Aspirative thrombectomy
  - Add PTA/Stenting
Modified Aspirative Thrombectomy

- Large sheath introduction (>16 F)
- Complementary Fogarty balloon thrombectomy
- May lead to graft migration - Prevention
  - use Fogarty balloon with radiopaque contrast medium
  - avert inflation of the balloon to any degree when it appears to be actively engaging the walls of the stent-graft limb.

Modified Aspirative Thrombectomy

Adapted from Milner et al, J Vasc Surg 2003; 37:13-29
Endovascular thrombectomy

- Highly effective
- Allow preservation and correction of the iliac limb
- Avoids potentially fatal hemorrhagic complications of thrombolysis
- May be of limited use in endoskeleton grafts (Endologix AFX)
  - Guidewire through the skeleton interstices
    - Disruption of the fabric
Still, the best therapy is...

- **PREVENTION!**
  - High index of suspicion
  - Through completion evaluation (soft GW)
    - Multiplanar angiography
    - IVUS
    - Pullback pressure measurement
  - Liberal use of angioplasty ± stenting
    (avoid compromising a previously normal contralateral limb)
IVUS

Adapted from Woody JD et al, Semin Vasc Surg 2004, 17:262-7
Conclusions

- Iliac limb occlusion after EVAR is still an important complication even in newer-generation devices.

- The risk of occlusion is highest within the first 2 months after EVAR, rarely occurring after 1 year.

- Technical justification for occlusion can be found in 60% of patients.
  - Responsible for the vast majority of early events.
Conclusions

- Can be potentially prevented by adopting a more aggressive strategy for identification and treatment of intraoperative and early postoperative signs of kinking, stenosis, or irregularities.

- Endovascular techniques have been overcoming more classic open surgery solutions.