What Is the Nature of In-Stent Stenosis after Venous Stenting?

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Disclosures
• Boston Scientific, Medical Advisory Board
• WL Gore & Associates, Consultant

Few data on venous in-stent stenosis, presumed to be a precursor of stent occlusion.
Post-operative management of venous stents is inconsistent with respect to medications, follow-up, and imaging.
At UM, our venous-stent management is based on INR, d-dimers and biopsy of in-stent stenosis: goal is to stop anticoagulant when possible, but continue aspirin.

Biopsy of Venous In-Stent Stenosis
Challenges in interpretation
• Sample (1x2x2 mm$^3$) is small
• Biopsy may be unrepresentative both in what is sampled and what is presented on the slide.
• Histological evolution of thrombus is not precisely defined
  - Inconsistent vocabulary (intimal hyperplasia, mature thrombus, organized thrombus, organizing thrombus, fragments of vein wall)
  - Uncertain relation of histology to lysability

Evolution of thrombus
• Procedural
• Minimally organizing
• Organizing
• Organized, sometimes called mature thrombus or intimal hyperplasia

Clinical history
• 58 year old woman on aspirin, left iliac vein recanalization and stenting 4/29/2011
• 9/30/2015 1 week after surveillance venogram and d-dimer 0.28 she presented with distal left thigh "burning" and pain, d-dimer 1.68, outside DVU exam said "acute iliofemoral DVT".
• Venography showed no change in iliac and femoral veins.
Biopsy iliac vein 9-30-2015  “Organized thrombus”

Biopsy popliteal vein 9-30-2015  “Fresh clot with minimal organization”

SVC and IVC stents with transfemoral central vein catheter

• 38 yo man with SVC and IVC stents 10/8/2014
• 5/1/2015 venography showed filling defect in IVC stent close to catheter.
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Procedural clot, approximately 30 min old

Clot with early organization

Clot with early organization, higher power

• No intervention between May and October biopsies
• “Organizing thrombus” in IVC stent is therefore new since last exam
• Either patient is slowly accumulating thrombus or there is turnover with balanced lysis and thrombogenesis.

32 yo woman, 5/28/2014 iliacaval recanalization and stenting
• Inconsistent INR’s, including many subtherapeutic
  - 9/29 INR 1.6
  - 10/9 INR 2.5, d-dimer 0.25
• venography 7/31/2015, focal moderate in-stent stenosis in bilateral iliac vein and IVC stents. Biopsy

Organizing thrombus with adjacent procedural clot
47 year old male with right iliofemoral recanalization and PTA 7/12/2013 and repeat PTA and stenting 11/11/2013
Patient off coumadin at 6-month follow up venography

**Conclusions**

- Evolution of thrombus not known in detail and requires special stains in precisely timed specimens
- Pathological nomenclature is non-standardized.
- In-stent stenosis characterized by early organizing thrombus can diminish after anticoagulation, possible mechanisms including lysis and/or organization with contraction
- Conventional histological staining suggests that venous in-stent stenosis may begin with early deposition of thrombus followed by gradual organization.