Exactly what is the Tissue Causing Post-thrombotic Venous Obstruction?

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Post-Thrombotic Syndrome
Anticoagulation Alone

Iliofemoral DVT

Post-thrombotic Syndrome

Iliofemoral DVT: Post Spinal Reconstruction

Post Op: Phlegmasia Cerulea Dolens

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Disclosures
– NONE –
Femoral Vein Exposure

Iliofemoral DVT: Post Spinal Reconstruction

Venous Thrombectomy

Iliofemoral DVT

3 Years Post-Op

- Hairdresser
- Asymptomatic
- No edema
- Normal valve fct.

Chronic, Post-thrombotic Iliofemoral Venous Obstruction

If thrombus remains in vein... it will evolve from...

To...

But... over what period of time?

Endovenectomy and Endoluminal Recanalization

- 7 Months -

Guidewire passed into IVC.
Post-Thrombotic Venous Obstruction

- Intraop Visual Inspection -

Fibrosis (7 months)

Thrombus (2.5 months)

Endovenectomy and Endoluminal Recanalization

Endovenectomy Specimen

- 7 Months -

CFV

FV

Endovenectomy and Endoluminal Recanalization

Chronic, Post-thrombotic Iliofemoral Venous Obstruction

Patient Presentation

- Venogram: Popliteal Vein Access -

Leading to...

This is not chronic thrombus!

Chronic Iliofemoral Venous Obstruction

Venogram: Popliteal Vein Access

Leading to...

Chronic non healing ulcer
Painful lower leg
Results

– Intraop Visual Inspection –

No evidence of thrombus

– Typical Specimens –

7 months – 25 years

CFV Specimens

Femoral Vein

7 months

2 years

8 years

25 years

Results

– Phase 1 –

• Staining for Ca++ salts demonstrated that cell turnover was occurring (dynamic process) in all specimens
• Tissue was predominantly collagen
  - 80 – 90% Type I
  - 10 – 20% Type III

Immunohistochemistry

– Collagen I and III –

Collagen I (20X)

Collagen III (20X)

Abundant

Modest

Hematoxylin and Eosin Stain

– Tissue Characteristics –

Abundant Collagen

Neovascularization

Chronic Inflammation

Recanalization and neovascularization…

...potentially, a common stimulus!
Post-Thrombotic Venous Obstruction

Observations

1. Post-thrombotic tissue is collagen, predominantly Type I.
2. Older specimens had large recanalization channels
3. Younger specimens appeared to have more neovessels

4. CD31/vWF staining found in all specimens (mature cells)
5. VEGF-R2 found in neovessels and additional cells clustered around the neovessels (appear to be progenitor cells)
6. Experiments of acute DVT in animal models indicate similar pathophysiological processes

Purpose – Phase 2 –

To Determine:
1. If there is an evolution of this tissue over time
2. Specimens ≤ 1yr vs. 10>years
3. Focus on endothelium of recanalization and neovascularization channels

Thank You

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Post-Thrombotic Venous Obstruction

CD-31

- Neovascular Channels -

Indicates mature endothelial channels exist in both young and older specimens

p=0.19

VEGF-R2

- Neovascular Channels -

More neovascular channels stained with VEGF-R2 in younger specimens

p=0.016

VEGF-R2 Periluminal Cells

- Neovascular Non-Channel Cells -

Neovessel progenitor cells more frequent in young tissue

p=0.01

vWF

- Neovascular Channels -

Greater concentration of vWF in mature specimens

P<0.0001
Chronic Post-thrombotic Obstruction

- Strategy of Thrombus Removal

  - Endovenectomy

  - Endovenectomy and Endoluminal Recanalization

- Chronic Post-thrombotic Obstruction

- Guidewire passed into IVC.

- Obstructing Collagen

- Vein Wall

- Pop-IVC Catheter