Acute And Chronic IVC Occlusion: Why It Occurs And Options For Treatment

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Venous outflow obstruction

- Deep venous thrombosis
  - Acute
  - Chronic
- Non-thrombotic obstructions
  - May Thurner syndrome
  - Venous webs

Venous outflow obstruction

- Venous thrombosis
- May involve
  - Inferior vena cava
  - Iliac veins
  - Common iliac vein
  - External iliac vein
- Usually caused by or assoc/w
  - Hypercoagulable state
  - Protein C, S deficiency
  - AT III deficiency
  - IVC filter thrombosis


- Thrombosed iliac veins treated by anticoagulation alone completely recanalize, but the iliac vein is the common outflow tract of the lower limb.
- Chronic obstruction results in severe symptoms because of poor compensation by collateral formation.
- Only 20% to 30% of thrombosed iliac veins treated by anticoagulation alone completely recanalize.
Venous outflow obstruction

Non-Thrombotic

- compression of left common iliac vein by right common iliac artery
  - secondary band or web formation
- classically found in younger females
- not uncommon in males
- elderly patients
- may involve the right limb
- more common cause of venous obstruction than previously thought.

Signs and Symptoms

- vary greatly
- moderate swelling
- pain
- stasis ulceration
- main emphasis has been on controlling reflux.
- symptoms not always improved by
  - compression stockings
  - surgery to ablate varicose veins

Obstructive lesions of the inferior vena cava:
Clinical features and endovenous treatment

Raju et al, J Vasc Surg 2006

Venous outflow obstruction

Signs and Symptoms

- Different than venous reflux.
- Chronic venous ulceration
  - exercise-induced "tense" pain
  - requires several minutes of rest and leg elevation to achieve relief.
  - quality of life and moderate disability
- Limb swelling
  - unilateral
  - bilateral
- Previous estimations that obstruction is a major contributor in only 10% to 20%
  - Probably much more common contributor to venous disease

Laboratory Evaluation

- testing for outflow obstruction often omitted
  - reflux emphasized
  - lack of practical treatment alternatives
- What is a hemodynamically significant venous obstruction?
  - plethysmography
    - invasive
    - do not define the level of obstruction
  - hand/foot pressure differential
    - invasive
    - do not define the level of obstruction

Criteria for defining significant central vein stenosis with duplex ultrasound


- Pts with swelling with or without pain
- All patients had DU prior to phlebography
  - two views, pressure measurements, and IVUS
  - pressure gradient of 3 mm Hg across stenosis in defined >50% diameter reduction
- The best criterion by DU to detect a >50% stenosis was a poststenotic peak vein velocity ratio of 2.3
- The overall agreement of DU alone was 90% of phlebography >95% and when combined 100%.
Morphologic Assessment of Venous Stenoses

Single plane Venography

- To date diagnosis and treatment most often based on morphologic findings
- Single-plane transfemoral venography
  - standard investigation
  - definite obstruction
  - development of collateral vessels
- findings often subtle and only suggestive of an underlying obstruction
  - widening of the iliac vein
  - “pseudolocking”
  - “thinning” of the contrast dye
  - partial intraluminal defect [septum]
  - minimal filling of transpelvic collaterals

Morphologic Assessment of Venous Stenoses

Intravascular Ultrasonography (IVUS)

- superior to single-plane venography
- detection of morphology
- degree of stenosis
  - venography underestimated stenoses by 30%
  - venography considered “normal” in one fourth of limbs despite the fact that IVUS showed more than 50% of obstruction

Morphologic Assessment of Venous Stenoses

Intravascular Ultrasonography (IVUS)

- shows intraluminal details
  - trabeculations and webs
  - may be hidden by the contrast dye
- external compression directly visualized
  - wall thickness
  - neointimal hyperplasia
- the best available method for diagnosing clinically significant chronic iliac vein obstruction.

Venous outflow obstruction

Surgical reconstruction

- deep venous obstruction
  - responsible for 10% of CVI pts
- first successful reconstruction
  - reported more than 50 years ago
- open surgical treatment
  - Despite years of performing
  - Results less than satisfactory

Palma procedure

right-to-left femorofemoral crossover vein graft
Venous outflow obstruction
Iliocaval angioplasty and stenting

- alternative treatment for chronic iliofemoral venous obstruction
- less invasive
- relatively safer alternative to open surgery
- can be offered to a larger group of patients
- initial "method of choice"
- In case of stent failure
  - does not preclude subsequent surgery

Venous balloon angioplasty and stenting

- Ipsilateral cannulation of the femoral vein.
- Low thigh access is necessary to allow stent deployment up to and below the inguinal ligament without being impeded by the sheath.

- Ultrasound guidance
  - to avoid inadvertent arterial puncture,
  - femoral vein location variable
  - posterolateral or posteromedial in reference to the femoral artery
Venous balloon angioplasty and stenting

- IVUS used to assess
- Pre and post stent placement
- Apposition of stent to vein wall

Summary

- Relief of acute or chronic venous outflow obstruction is feasible by either endovascular or open techniques
- Iliofemoral venous stenting should be primary technique
- Excellent results in patients with venous claudication
  - Especially with secondary patency rates
- Suggest early referral
  - Should be performed by experienced individuals
  - Requires advanced endovascular skills
  - Need to have continued patient follow up
  - Looking for instent restenosis or thrombosis and need for reintervention