Iliac Vein Compression Syndrome was first described by May and Thurner in 1956. Left CIV compressed by overlying Right CIA. Chronic repetitive compression causes fibrosis of the vein (synechiae and spurs) which may result in stenosis or occlusion.
Prevalence

- True prevalence of May–Thurner syndrome is unknown
- 20% people may have asymptomatic compression: “Permissive lesion”
- Old data suggests that women between ages 30-50 years are more commonly affected
- New data indicates that its prevalence is more significant than we thought before.
Prevalence

- 50-65% of DVTs occur in the left leg

- Iliac vein compression is thought to occur in up to 69% patients with lower extremity DVT

Classic Iliac Vein Compression
It may also happen on the Right Side - Anatomic Variants
Stages and Development of Symptoms

- **Stage 1**: Iliac vein compression without structural vein changes. Asymptomatic.
- **Stage 2**: Venous spur formation which are fibrous shelves eventually developing in the vein, restricting blood flow and increasing risk for oedema and DVT. Asymptomatic.
- **Stage 3**: Symptomatic obstruction: DVT, oedema and the formation of varicose veins.
Iliac Vein Compression Syndrome

Pathophysiology - Venous hypertension
- Thrombotic (iliofemoral DVT)
- Non-Thrombotic (external compression or intraluminal spurs)

Signs and symptoms
- Swelling
- Pain
- Ulceration
- Lipodermatosclerosis
- venous claudication
Iliac Vein Compression Syndrome
Diagnostic Evaluation

- Ultrasound – Rule out varicose Veins/Venous Reflux
- CT Scan – Rule out pelvic tumours
- CT Venogram – special sequence to see Iliac Vein Compression
- Diagnostic Venogram – 2D only, tend to miss
- IntraVascular Ultrasound – Gold Standard
CT Venogram
CT Venogram
Venography
Venography

Obstruction / compression of left iliac vein with extensive transpelvic collateral venous flow
Venography

Left iliac vein occlusion with extensive transpelvic collateralization
Venography

A-P Projection

Oblique Projection
Venography (Sensitivity ~60%)

External Compression on Iliac Veins

Single-plane venography has even poorer sensitivity
IVUS

- Gold standard diagnostic tool for deep venous stenting
- Catheter based intravascular ultrasound
- Simultaneous 360-degree US imaging of a vein
- 10 MHz frequency is required to achieve adequate penetration (>3cm)

Sensitivity ~90%
IVUS

Allows visualization of:

- % of stenosis
- Real time vessel diameter
- Length of stenosis
- Location of side branches
- Calcium, thrombus, intravenous fibrosis/spurs
- Dissection
- Post treatment assessment
IVUS Imaging

Sensitivity >90%

Compressed Iliac Vein

Flouroscopy to mark lesion

IVUS Probe

Compressed Iliac Vein
IVUS

Diameter Measurement

Area Measurement
IVUS- Common Iliac Vein

Intravenous fibrosis not seen on venography
IVUS Imaging

Venography can hide details (eg, intraluminal webs) that can be revealed with IVUS.

Venography significantly underestimate the degree of stenosis by 30%
Venography vs IVUS

Venography - lack of discrete stenosis

IVUS - small left CIV
Surgical Interventions

External support PTFE graft

Saphenous vein

In-line bypass

Cross-over bypass
Endovascular Interventions

- Endovascular Intervention has become the treatment of choice

- Endovascular stenting of iliac-caval veins has been shown to be safe and effective

- Indication: Patients with symptomatic chronic deep venous disease resistant to conservative therapy
Stentning of Deep Venous Disease is Mandatory

Pre Balloon Dilatation  Post Balloon Dilatation  Post Stenting
Endovascular Interventions

- Angioplasty alone does not have a durable result
  - Narrowing often related to extrinsic compression
  - Inflammatory changes from thrombus cause recoil and restenosis

- Stenting
  - Self expanding, large diameter (16-22mm) stents are needed
  - Good technical results
  - Durable patency
Technical Considerations

- 18G puncture needle
- Ultrasound scanner for cannulation of femoral vein (to reduce access complications) Mid thigh approach allows for
- 5F sheath initially and then upsize to 12F sheath
- 0.35 guide wire (Terumo and Supra core)
- IVUS (Volcano)- 0.35 catheter
Left Iliac Vein Stenting

No obvious stenosis but presence of collaterals

Balloon dilation

Post Stenting
Left Iliac Vein Stenting: Non-thrombotic lesion
Iliac Vein stenting: Results

Non thrombotic

Iliac Vein stenting: Results

Thrombotic

IVUS Imaging
IVUS Catheters (Volcano)

Visions® PV .035 Catheter
88901

Visions® PV .018 Catheter
86700

Min Sheath: 8.5F
Min guide Catheter: 6F (I.D. ≥ .064")
IVUS

Must have for venous stenting (sensitivity ~90%)
  - sensitivity of transfemoral venography is ≈50% to identify iliac vein lesions (Negus et al.; Raju et al).
  - Sensitivity of standard ascending venography worse.

IVUS:
  - Visualization of Primary & Postthrombotic lesions
  - Localization of Iliac-caval junction more precisely
  - guide stenting procedure.

- No radiation exposure
- Can stent with fluroscopy and IVUS alone in renal patients and those with contrast allergy
Technical Considerations

- **Always stent** - balloon dilation alone results in recoil
- **Use big stents same size as normal lumen** to adequately decompress the leg veins. Otherwise symptoms will persist despite patency. 22 mm for IVC, 16 for CIV and 14 for EIV and 12 for CFV
- **Extend the stent 3-4 cm into IVC.** Contralateral flow not a problem
- **Stent all lesions without skip areas** - skip areas result in restenosis/occlusion
- **Overlap stents generously** - to avoid separation, at least 3 cm
**IVUS**

- Planimetry is crucial to estimate % stenosis

- **Normal Lumen Sizes**
  - CIV: 16 mm Diameter; 200 sq mm Area
  - EIV: 14 mm Diameter; 150 sq mm Area
  - CFV: 12 mm Diameter; 125 sq mm Area

The basis of symptoms in CVD is elevation of peripheral venous pressure.

Peripheral venous pressure begins to rise with as little as 20% area stenosis and becomes significant at 50% stenosis.
Venous Stents

Ideal stents

- Flexible
- Good radial force / crush resistance
- No foreshortening
- Allow accurate placement
- No risk of fracture
- Good visibility
- Low profile delivery system
Venous Stents

- Wallstent (Boston Scientific) Stainless steel
- Sinus Venous Stent (Optimed) Nitinol
- Vici Stent (Veniti) Nitinol
- Zilver Vena Stent (Cook) Nitinol
Only one make of stent, the Wallstent (Boston Scientific Corporation, Natick, MA), has been available in such large sizes and has seen predominant use in venous applications.

- Braided stainless steel self-expandable stent
Wallstent- Delivery System

Co-axial over the wire delivery system
‘Pin and Pull’ deployment technique
### WALLSTENT® Endoprosthesis

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<th>Fully Open Dimensions (as labeled on box)</th>
<th>Approximate Implanted Stent Length</th>
<th>Sheath Compatibility</th>
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Post Treatment Assessment

Left CIV compressed by right CIA

Stenting of left CIV
Left Iliac Vein Stenting
Venography
(Sensitivity ~60%)

External Compression on Iliac Veins
IVUS Imaging

Sensitivity >90%

Compressed Iliac Vein

IVUS Machine

IVUS Probe

IVUS Probe
Left Iliac Vein Stenting
Pre Stenting

One month post Stenting
Summary

• Symptomatic chronic deep venous disease can be debilitating
• Iliac Vein Obstruction/occlusion is often under-diagnosed
• Endovascular stenting, a relatively simple way to treat these conditions has been shown to be effective and safe
Any questions?
Thank You !