AIM session 1:
VARICOSE VEINS:
FROM COSMETIC TO SEVERE DISEASE

The Ultrasound: Straightforward And Complex

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Relevant Disclosures

• IAC Vein Center Board
  – SIR appointed representative to the inaugural Board

Cosmetic and severe disease
Straightforward…


SVS 2011 Guideline Highlights
Lower Extremity DUS to evaluate chronic venous disease

• Standing (or reverse Trendelenberg)
• Examine veins at “3-5 cm intervals”
• Components
  – Visibility
  – Compressibility
  – Flow and reflux measurement
  – Augmentation
• Reflux significance
  – 500 msec (including PV)
  • 1 sec for Fem and Pop vein
• Use of accepted nomenclature

SVS 2011 Guideline Highlights
Lower Extremity DUS to evaluate chronic venous disease

• Standing
  – GSV
  – SSV
  – Ant and Post and Superficial Accessory GSV
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• Components
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  – Compressibility
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Lower Extremity DUS to evaluate chronic venous disease

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Cosmetic and severe disease

...more complex

- During this lecture I will share some thoughts on the topic

SPJ reflux

"typical" pattern, with SSV reflux

- If preterminal and terminal valves reflux
  - "typical" SSV/SPJ reflux case
  - Fills varicos veins
  - Blood returns to the deep veins via a lower leg re-entry point

SPJ reflux

less "typical"

- If the preterminal valve is competent and the terminal is not
  - "Reflux" may go up the TE
  - Can drain directly to a re-entry pathway
  - No treatment necessary

SJP reflux

less "typical"

- Re-entry to the GSV as a "vein of Giacomini" via the
  - superficial external pudendal ven
  - posterior circumflex vein of the thigh
  - Posterior Accessory GSV

SPJ Reflux

less "typical"

- If pre-terminal is competent and the terminal is not
  - Reflux up the TE re-entry pathway
  - Early escape directly to VV
  - Variable terminal anatomy with different connections and sizes
SPJ reflux
"Paradoxical reflux"

- If preterminal is competent and the terminal is not,
  - Can lead to GSV reflux in the thigh and calf
- Has been termed
  - Paradoxical reflux
  - In the TE of the SSV
- Distinguish from SPJ outward flow
  - Post thrombotic FV occlusion
  - Collateral pathway
  - Careful evaluation of the popliteal and femoral veins required with systolic SPJI

Deep vein variants
Sciatic vein

Sciatic embryological remnants

Potential connections
Complete Sciatic Vein
Gculomemessus Dorsalis
Sciatic remnant to DFV:
Common Smaller FV

Small FV, large "Sciatic vein"

Deep vein variants
Congenital smaller Fem vein with larger Sciatic-Deep Fem vein

Popliteal - Sciatic - Deep Femoral vein pathway with Femoral DVT
Popliteal - Sciatic - Deep Femoral vein pathway
with Femoral DVT

Outward flow with calf muscle systole
May not be clinically important if inward flow with diastole
- Re-entry points for reflux
  - Perforators in calf serve this role

Outward flow with calf muscle systole
May not be clinically important if inward flow with diastole
- Diately with increase blood transport
  - Valve function affected
- Treating PV like this does not help

Outward flow with calf muscle systole
May not be important if inward flow with diastole
- Many of these re-entry perforating veins
  - return to normal or become more normal in function
  - after elimination of GSV reflux

Non-saphenous veins
- Little discussion about them with most US reporting
- Frequently seen
- Often the solution to the puzzle
- Common patterns
  - Pelvic derived
  - Pudendal
  - Gluteal
  - IPV directly to varicose veins as mentioned
  - Lateral venous system
  - Sciatic nerve associated refluxing veins

Non-saphenous veins
- Sciatic nerve associated veins
  - Sciatic and CPN "varicies"
Saphenous reflux
- non SFJ derived
- segmental

- Not all GSV reflux is the same
- Origination points other than SFJ
  - External pudendal
  - Medial thigh IPV
  - Paratibial IPV to below knee GSV reflux

- Segmental reflux
  - Skip segments
  - Bucket handle varicose veins
  - Reflux in and out from another trunk
  - Remnant GSV segment reflux after prior treatment

Superficial Phlebitis
- May explain symptoms
  - In patient referred to r/o DVT
- Non compressible subcutaneous or saphenous vein

Superficial Phlebitis
- Relevant issues to assess
  - Is there a concurrent DVT?
    - Junctions and perforators
    - DVT anatomically independent of SVT
    - Systemic coagulation disorder
  - SVT in varicose veins alone
    - SVT in normal veins
      - Coagulation disorder
  - SVT in the GVS or SSV
    - Above/below knee
      - If in GSV, how close to the junction

Superficial Phlebitis
- Acute or chronic changes should both be reported
- With acute SVT: Report how extensive
  - Approximate length of veins involved (and the length of GSV/SSV)
  - Location relative to
    - Knee
    - SFJ or SPJ when saphenous vein involved

Old DVT
DUS is an excellent tool below the inguinal ligament
- Assessment of the femoral, popliteal and perforating veins
  - Caliber
    - Larger than the artery
    - Narrowed
      - Webs
    - Occluded
    - Continuity
    - Inflow and outflow
DUS: Prior recanalized DVT

Old DVT

- Look for acute DVT on top of evidence of old DVT
  - Common complication
  - Increased risk of PTS after recurrent DVT
- Look for reflux
  - Common in superficial and deep veins after prior DVT
  - Not only in veins involved with thrombus
  - Common in femoral, popliteal and iliac veins after they recanalize
- Look for large collaterals

Pre-stent evaluation of post-thrombotic patient

What is the status of the CFV confluence

- CFV diameter
- Femoral vein
- Deep femoral vein
- External iliac vein

Determining iliac vein patency:

How does DUS do?

- Indirect approach used most commonly
  - CFV waveform
    - Sensitivity may be inadequate
      - Raju - 40%
      - (136 women stented for postmenopausal swelling)
    - Specificity likely better
  - CFV waveform ipsilateral to a CIV stenosis

Normal CFV waveform
Raju JVS 2011: 53:123–130

Images courtesy of S. Daugherty MD
Ablation follow-up
Standards for reporting DUS outcomes

- Length of stump
  - < 2 cm
  - 2-5 cm partial failure
  - > 5 cm failure

- Skip segments
  - Uniform closure expected
    - Report all patent segment location and lengths
    - Evaluate competence
    - Reflux in segments not treated
    - Below treatment levels

- Thrombus
  - Acute a junction
  - In tibial and gastrocnemius veins
  - Length and diameter of veins

Segmental reflux after prior treatment

Duplex Ultrasound
Conclusions

- Very powerful technique
  - High information return
  - Low risk and cost

- Quality DUS is a cornerstone of quality care

- High value information available going “off plate”
  - Consider the exam as a puzzle to solve

Thank you for your attention