

# Alternative Vein Imaging: Is There A Role For CT & MRI



DONALD AND BARBARA  
ZUCKER SCHOOL *of* MEDICINE  
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# DISCLOSURE

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# Noninvasive Diagnosis Of Venous Disease

- Ultrasound, CT and MRI are utilized for evaluation of vascular disease
- All can detect presence of disease
- US is primary modality for assessment of peripheral venous disease
- Each has advantages and limitations

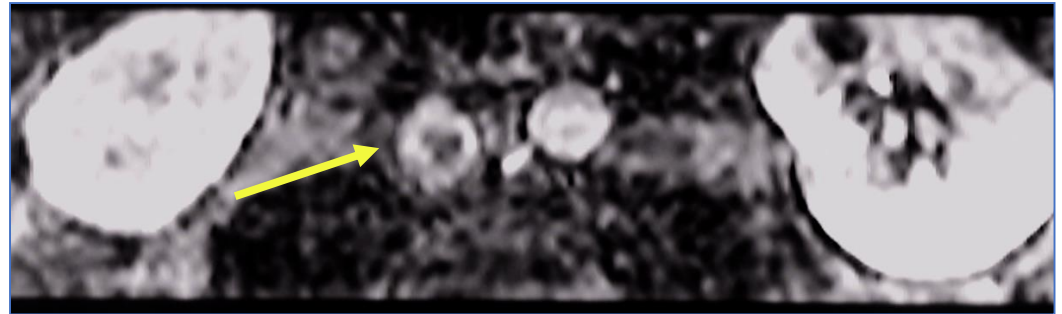


# Magnetic Resonance Venography (MRV)

- Gradient - recalled - echo imaging technique
- Contrast improves visualization
- Effective in DX of DVT
- Well - suited to evaluation of IVC, iliac, SVC and brachiocephalic

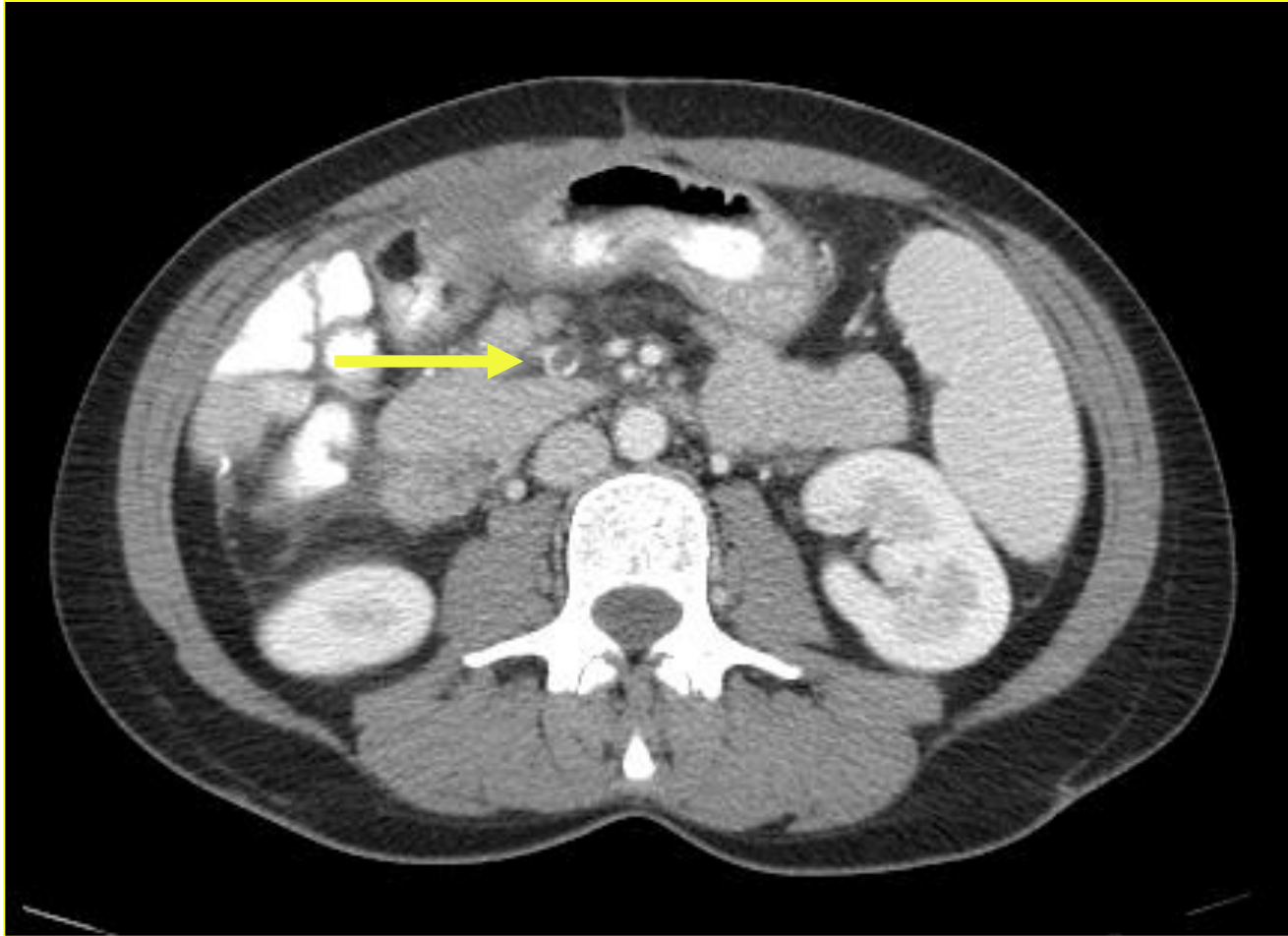


# MRV

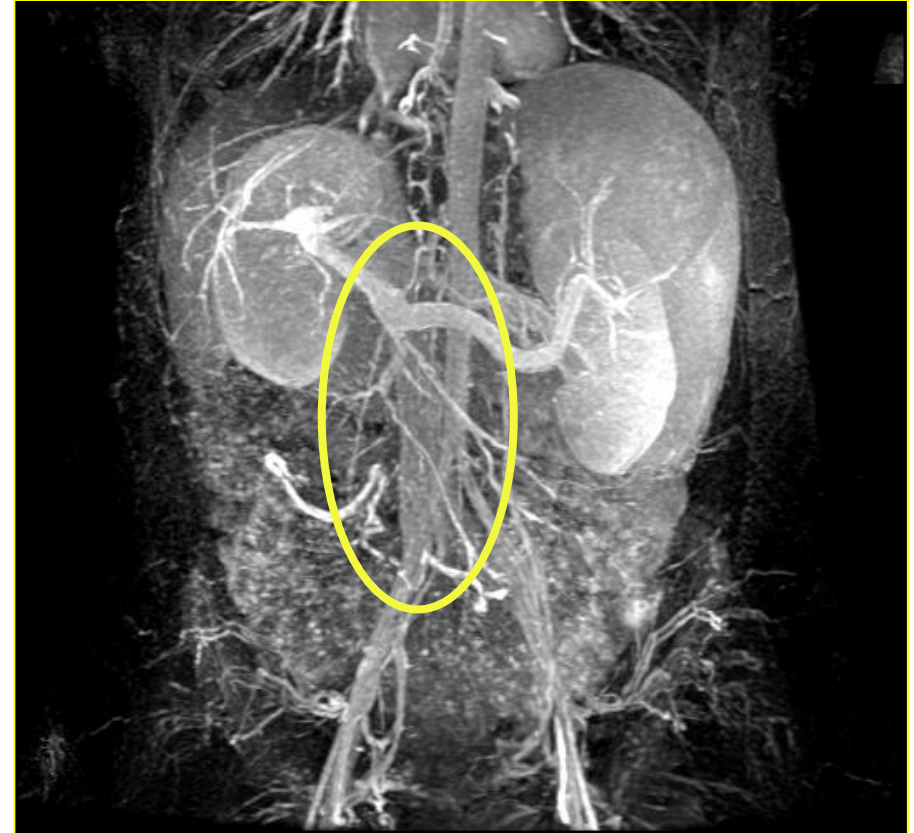


- Criteria
  - No signal in vein
  - Distended vein with low signal intensity mass
- Accuracy
  - > 90% at pelvic and thigh
  - > 85% at calf level
  - May be more accurate than venography in IVC and iliacs
  - > 90% in upper extremity veins

# Abdominal Pain

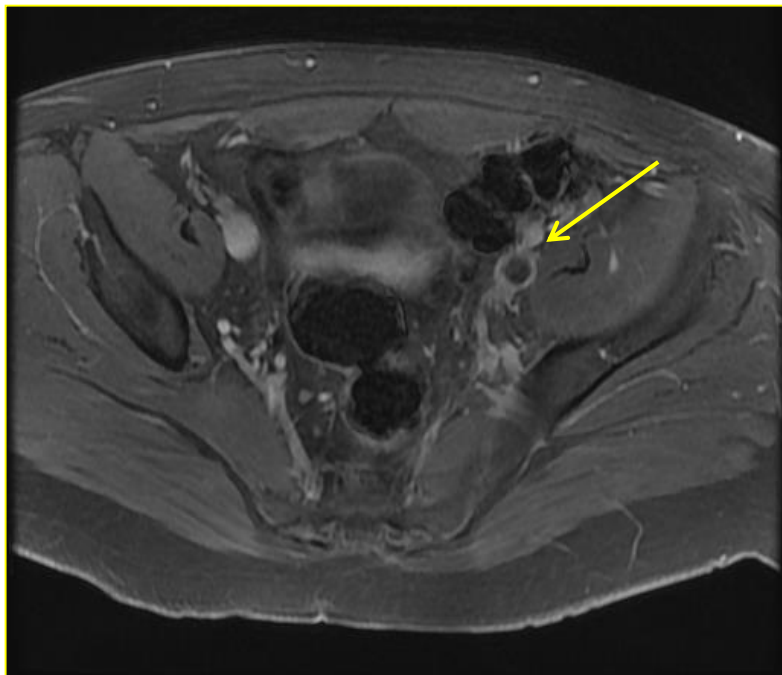


# SMV Thrombosis



3D GADOLINIUM

# May-Thurner Syndrome (Iliac Vein Compression Syndrome)





# MRV

## Advantages



- Body habitus not problem
- Sensitive for calf, pelvic and upper extremity DVT
- No adverse effects
- Useful in pregnant patients and suspected pelvic mass
- Cost effective compared to venography

# MRI Of Ilio - Caval DVT

- 25 Patients
- MRI, Doppler US And Venography

	Sens	Spec
MRI	100%	98%
US	97%	91%

Dupas B, Lancet 1995



# MRV

## Disadvantages

- Expensive, time consuming
- Artifacts
  - Motion
  - In-plane flow
  - Metallic implants
- Quality variable
- Entire extremity not always evaluated

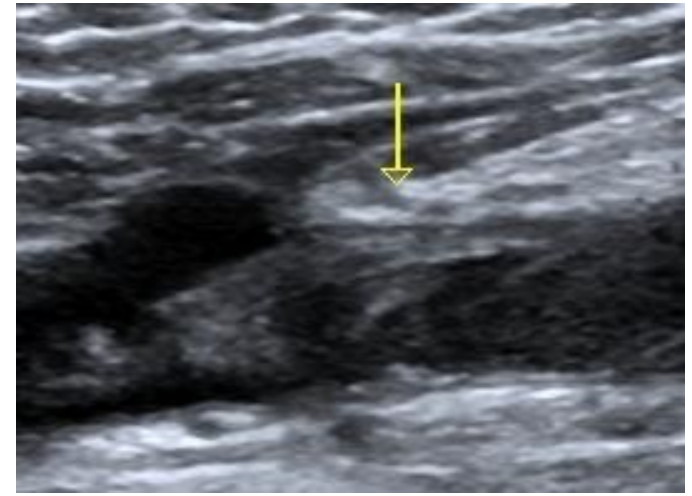
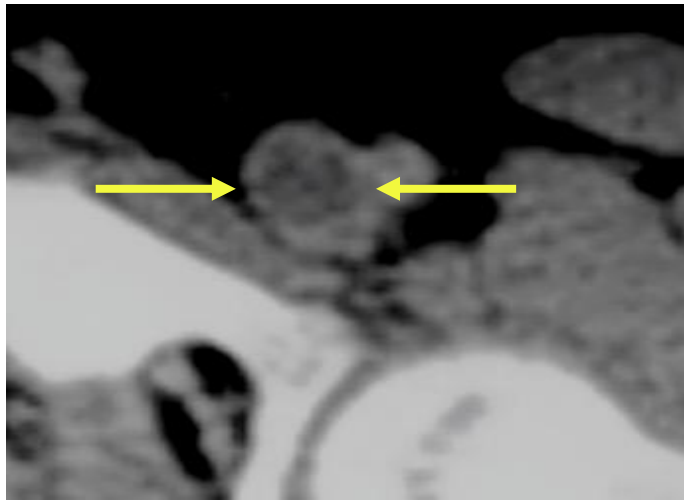


# CT Venography (CTV)

- Performed after CT of pulmonary arteries to diagnose PE
- Axial images obtained through abdomen to popliteal level
- No additional contrast material given



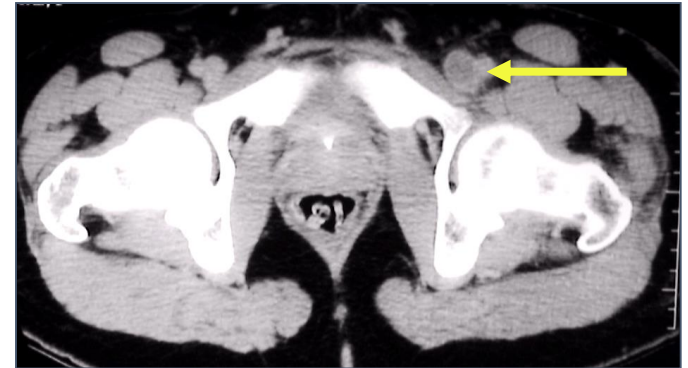
# CTV



- Criteria
  - Intraluminal filling defect +/- venous dilatation
  - Seen on multiple images
- Accuracy
  - Limited studies performed
  - Variable accuracies reported

# CTV

## Advantages



- May demonstrate improved opacification of veins compared to venography
- Image both legs simultaneously
- Diagnose DVT in patients with normal pulmonary arteries
- Assess IVC and iliac veins

# DVT: Detection with Combined CTV and CTPA

- 650 patients (5-10mm slices, 5 cm intervals, 3-3.5 min delay)
- Diaphragm to upper calf
- Compared to US in 308
- Sens 97% Spec 100% for femoral-popliteal DVT
- 2 false (-) due to intervals

Loud P, Radiology 2001;219:498-502



# CTV for Diagnosis of Lower Extremity DVT

- 136 patients with suspected PE
- CTV performed after CTPA
- Correlation with US
- CTV Sens 71% Spec 93%

Peterson DA, J Vasc Surg 2001





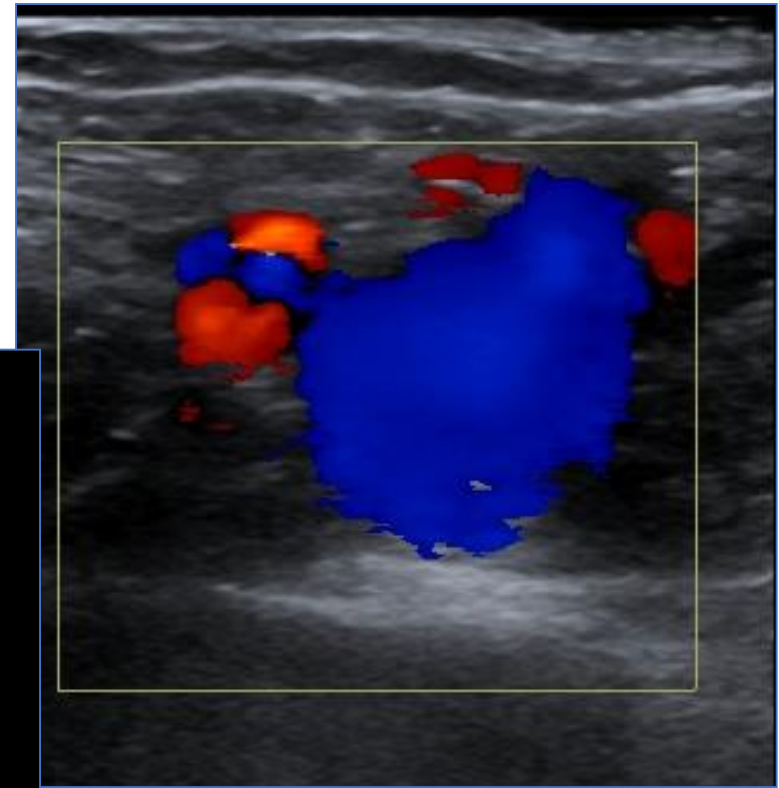
# CTV

## Disadvantages

- Absence of standard criteria and protocols
  - Timing of venous enhancement variable
  - Scan intervals uncertain
- ? Sens and PPV compared to US
  - (+) Studies should be correlated with ultrasound
- Contrast material and radiation
- Higher cost



(-) DVT (+)PE



# Conclusions

- US is primary modality
  - DVT in upper and lower extremities
  - Guidance for vascular procedures
- MRV / CTV important for
  - Obese or uncooperative patients
  - Abdominal, pelvic and thoracic vein DVT
  - Mapping of extensive and complex cases

