

BURNETT SCHOOL of MEDICINE MAY-THURNER SYNDROME AND OTHER PELVIC VEIN COMPRESSION SYNDROMES: EARLY DETECTION WITH DUPLEX ULTRASOUND AND VENOGRAPHY

RESEARCH QUESTION

Can duplex ultrasound or venography be used to detect May-Thurner Syndrome (MTS) and other pelvic vein compression syndromes at an earlier stage of disease for adults with lower extremity leg pain and edema?

BACKGROUND

- Classical MTS is left CIV compression
- Changes in biofluid mechanics contribute to vascular pathology and clinical sequelae

$$\tau = \eta \gamma = \eta \frac{av}{dz}$$

- $\tau = \text{shear stress}, \eta = \text{viscosity}, \gamma = \text{shear rate},$ $\frac{dv}{dt}$ = velocity change / point distance change dz
- Endothelial plasma membrane stressors \rightarrow cellular injury \rightarrow neointimal hyperplasia \rightarrow ↑ shear stress, ↑ turbulent flow, ↓ venous outflow \rightarrow venous hypertension
- Absence of reliable non-invasive diagnostic imaging delays appropriate care

METHODS

237 patients over 7 years at a single center with LE pain, edema, & venous compression

Raw data obtained from electronic medical record and imaging studies

Data securely stored using a protected Excel spreadsheet on a remote server

Imaging variables transformed into discrete outcomes and then numbers

Logistic regression analysis on R statistical software

Kevin J. Rivera, MS¹; Sam S. Ahn, MD² ¹TCU School of Medicine; ²DFW Vascular Group

Patients with lower extremity leg pain and edema may be diagnosed with May-Thurner duplex ultrasound.



Figure 1. Duplex Ultrasound of the popliteal vein. Left: Normal popliteal vein. Right: Incompetent popliteal vein



Figure 2. Normal pelvic vascular anatomy relevant to MTS pathology



Thesis





Figure 3. A) Venography showing stenotic left CIV. B) IVUS showing a portion of same stenotic segment.







RESULTS **Duplex Ultrasound to Venography Analysis** Left **CFV Ultrasound** p-value = 0.0245* Compressibility Reduced Normal Venography <50% 101 Stenosis 56 ≥50% Stenosis **CFV Ultrasound** Right p-value = 0.0135* Compressibility Normal Reduced or Absent Venography <50% 81 Stenosis $\geq 50\%$ 52 9 Stenosis Right **CFV Ultrasound** p-value = 0.0325* Spontaneity Reduced, Absent, Normal or Pulsatile <50% Venography 69 Stenosis 19 ≥50% Stenosis

compressibility at L CFV on duplex US predicts ≥50% stenosis on venography or absent compressibility at R CFV on duplex US predicts ≥50% stenosis on venography ↓, absent, or pulsatile spontaneity at R CFV on duplex US predicts ≥50% stenosis on venography

Duplex Ultrasound to IVUS Analysis

Left o-value = 0.008**		CFV Ultrasound Competency	
		Normal	Reduced
VUS	<50% Stenosis	34	28
	≥50% Stenosis	63	20

Normal competency of left CFV on duplex ultrasound predicts ≥50% stenosis on IVUS

FUTURE DIRECTIONS

Prospective multi-center study correlating refined imaging to the presence of MTS **Post-intervention clinical outcomes for patients** diagnosed with MTS using refined imaging