




Veins Aren't Round-Stented Veins Don't Need to Be Either




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The Link Between Morphology and Iliac Veins and Outcomes: Does Roundness Matter?






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Disclosure


Consultant: InVera, MedVasc
 Speakers Bureau: Angiodynamics, Boston Sci, BD, InVera
 Research: Boston Sci, BD, InVera, Amsel
 Royalties: Angiodynamics

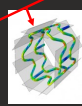
Round Santa Claus Vs Elliptical Santa Claus



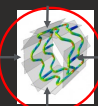

Stent Strength



Chronic Outward Force (COF) – Force stents exerts on vessel during expansion



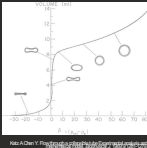
Crush Resistance – Force stent exerts as it resists external, focal or distributed loads

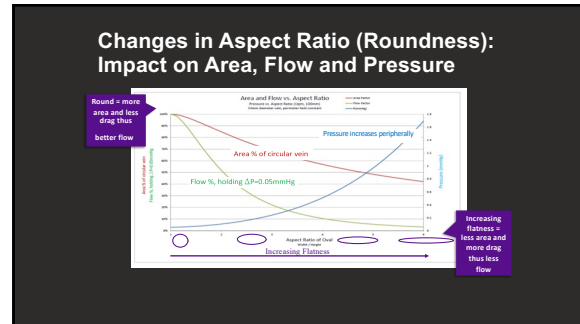
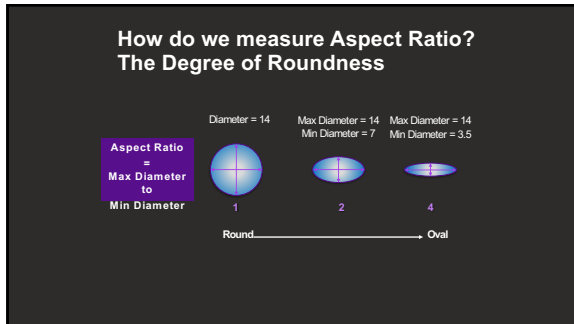


Radial Resistive Force (RRF) – Force stent exerts as it resists constriction

Relationship of Area and Degree of Roundness, Pressure and Flow

- Large changes in flow are related to small systemic pressure changes
- Decreasing transmural pressure impacts both area and flow
- As round becomes less round, flow decreases, and pressure and turbulence increase
- Round vessels have less resistance and better flow





2015 Publication Demonstrates that: Better Patency Associated with Rounder Lumen

- 48 patients with iliac compression and acute DVT followed for avg. of 20 months
- Follow-up was performed with CT venography
- Stent compression considered significant if lumen compression was greater than 50% (Aspect Ratio 1:2)
- Significant stent compression was inversely correlated with stent patency ($p < 0.001$).

Does Shape Result in Better Patient Outcomes?

- Healthy veins are highly compliant and change shape dynamically when pressure and flow change
- VIRTUS Study – Feasibility and Pivotal Cohorts – Provides a rich database of patient imaging studies and outcomes
- Is change in post-stenting vessel shape a predictor of patient outcomes?

Anatomic Measurements in Feasibility Cohort Before and After Stenting (median measurements N=27)

AREA IS IMPORTANT and so is ROUNDNESS (aspect ratio)

HOWEVER, THE QUESTION IS What degree of roundness or cross sectional area matters

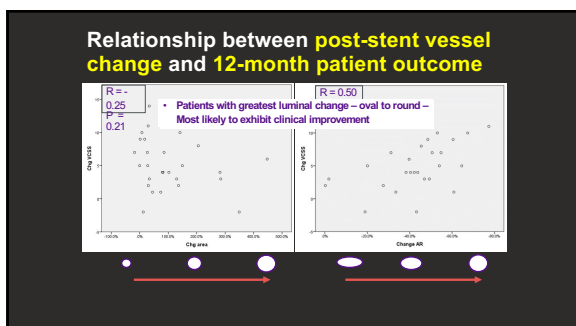
VIRTUS

Pre-Stent, Post-Stent and 12 month Changes in Aspect Ratio and Area were Performed

Aspect Ratio (Max Dia : Min Dia)			Area		
Pre-Stent	Post-Stent	12 months	Pre-Stent	Post-Stent	12 months
2.51	1.33	1.23	82.68	134.96	145.79

Significantly Rounder Shape (1:1 is a Circle)

Increased Area



Predictors of Clinical Improvement

When adjusting for other factors, clinical improvement was significantly associated with:

- Greater increase in cross-sectional area post-stenting
- Greater post-stent decrease in aspect ratio - getting rounder

Multivariate Logistic Regression Model

Variable	N	Odds Ratio [95%CI]	P
Baseline VCSS	115	1.36 [1.17, 1.57]	<0.0001
Post-stent change in cross-sectional area	115	1.02 [1.00, 1.03]	0.0047
Post-stent change in aspect ratio	115	2.12 [1.06, 4.26]	0.0340

In Conclusion

Area is important, and so is roundness but...
 Roundness impacts area
 Lumen shape impacts flow and pressure

Roundness (Aspect Ratio) is a **good** predictor of stent performance and patient outcomes

What degree of roundness matters

