Color Doppler Ultrasound Imaging in Varicoceles: *Is the difference in venous diameter encountered during position change predictive of varicocele grade*?

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Background

The clinical grading system for varicoceles is subjective and dependent on the experience of the clinician. While physical examination has been shown to have a specificity of about 70% for varicocele diagnosis, diagnostic ultrasound has a sensitivity and specificity of 97% and 94%, respectively. Nonetheless, no method using Doppler interrogation has been standardized in the diagnosis of varicoceles.

Objective

The primary objective of this study was to determine whether the difference in venous diameters which occurs when patients go from resting to Valsalva can be used to predict varicocele grade according to WHO criteria in patients with varicoceles.

Methods

- 102 men who presented for either scrotal pain or fertility workup at our clinic were physically examined and graded following WHO criteria (0 = subclinical, I, II, and III).
- Color Doppler ultrasound was used to measure largest venous diameter in the pampiniform plexus bilaterally at rest and during Valsalva maneuver.
- Wilcoxon signed-rank test was used to compare right to left-sided venous diameters.
- Receiver operator characteristic (ROC) curve analysis was used to determine if resting diameter, diameter during Valsalva, or difference in diameter provided the highest sensitivity and specificity for determining clinical grade with ultrasound.
  - Cutoff values for diameter were determined from these ROC curves.

Conclusions

- Our results correlated with other studies that have shown some ability of ultrasonographic parameters to differentiate amongst clinical grading. However, the diameter cut point values are widely variable. These differences are likely due to operational variability in clinical grading and ultrasound technique.
- No one measurement was best at determining the differences in clinical classifications, and sensitivity never exceeded 0.8 for any of the ultrasound parameters.
- Our study was unable to correlate findings between ultrasonographic investigation and physical examination with high certainty.

Future Directions

The development of ultrasonographic parameters that do correlate with physical exam findings would be the ultimate goal for varicocele diagnosis.

Acknowledgments

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Results

Table 1. Cut-off values of venous diameter to distinguish between clinical grades of varicocele

WHO grade	Best Measurement	Cut-off value (mm)	Sensitivity (%)	Specificity (%)	AUC
0 vs I-III	Diameter at rest	3.0	79	42	0.67
I vs II	Diameter during Valsalva	5.7	71	33	0.57
II vs III	Diameter at rest	3.6	71	58	0.65

Diameter at rest is the best indicator between subclinical and clinical varicoceles

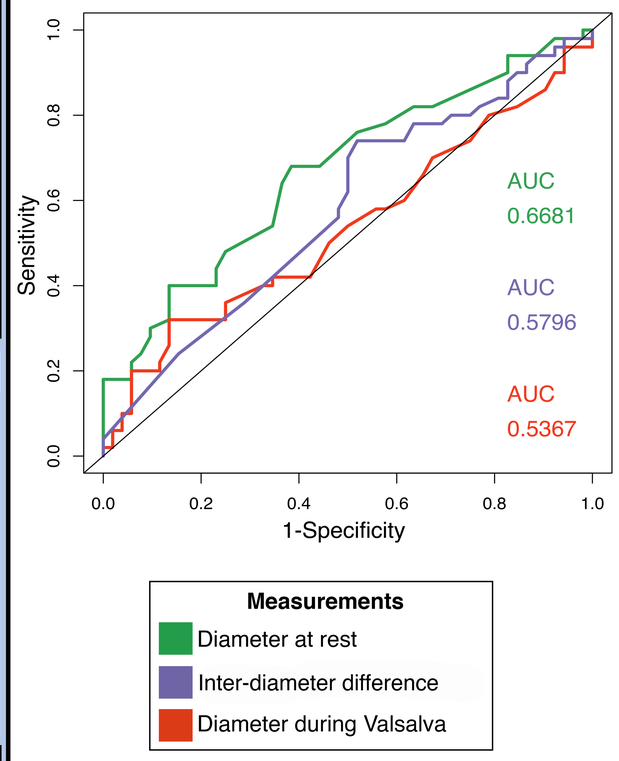

Figure 1. Diameter at rest was the best ultrasonographic discriminator between subclinical and clinical varicoceles (AUC = 0.67) with a diameter threshold of 3 mm (sensitivity 79%, specificity 42%).

Diameter during Valsalva is the best indicator between grades 1 and 2 varicoceles

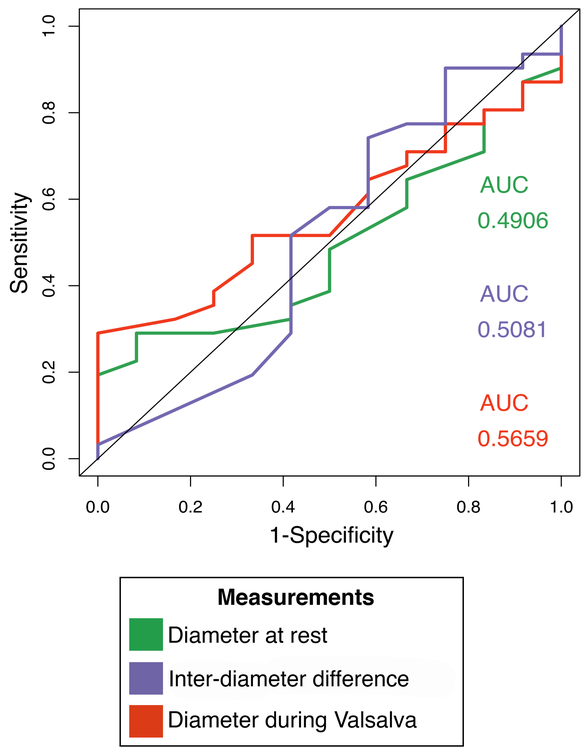

Figure 2. Diameter during Valsalva had the greatest AUC for determining clinical grades 1 versus 2 (AUC = 0.57) with diameter threshold of 5.7 mm (sensitivity 71%, specificity 33%).

Diameter at rest is the best indicator between grades 2 and 3 varicoceles

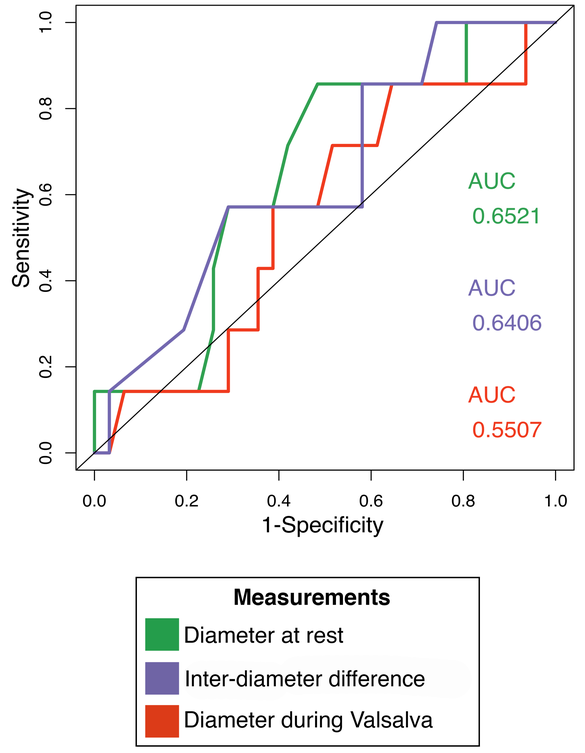

Figure 3. For differentiating between grades 2 and 3, diameter at rest had the greatest AUC of 0.65 with a threshold of 3.6 mm (sensitivity 71%, specificity 58%).