

## 22. Assessment of the Duplex Ultrasound Criteria for Renal Artery Stenosis

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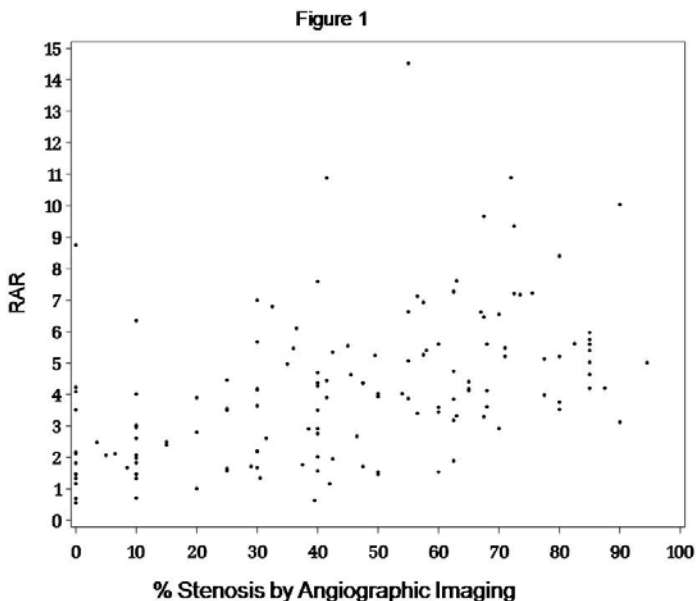
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**OBJECTIVES:** Duplex (DU) criteria for renal artery stenosis (RAS)  $\geq 60\%$ , renal-23 Management of Spontaneous Carotid Dissections aortic-ratio (RAR)  $\geq 3.5$  and peak systolic velocity (PSV)  $\geq 200$  cm/sec, were established by angiographic correlation in the 1980's. Changing technology has improved DU image resolution and incorporated the use of computed tomography angiography (CTA) and magnetic resonance angiography (MRA). We sought to correlate the DU with angiographic imaging (AI) and determine whether alternative criteria may be better suited for diagnosis of RAS.

**METHODS:** We reviewed renal vascular DU performed between 10/2005 and 10/2007. Cases with AI within 3 months of DU were analyzed. Two independent, blinded staff reviewed all AI to determine %RAS; simultaneous review resolved discrepancies. Occlusions (23), elevated aortic velocity  $\geq 290$  cm/sec (5), and poor AI were excluded (1). SAS version 8.2 was used for statistical analysis. The sensitivity and specificity of RAR and PSV cutoffs were analyzed with AI stenosis  $\geq 60\%$ ,  $70\%$  and  $80\%$ .

**RESULTS:** We included 186 renal DU for this interim analysis. AI included 129 angiograms, 20 CTA and 37 MRA; 70/186 (37.6%) had RAS  $\geq 60\%$ . Figure 1 illustrates the variability in RAR vs % stenosis by AI. Table 1 denotes the sensitivity and specificity for RAR values compared to AI stenosis  $\geq 60-80\%$  in cases with aortic velocity 40-100 cm/sec (n=142/186, 76%). Table 2 provides the sensitivity and specificity for PSV values in the total population (n=186) when compared to AI stenosis  $\geq 60-80\%$ . For RAR  $\geq 3.5$  the sensitivity and specificity was 84% and 53% and for PSV  $\geq 200$  the sensitivity and specificity was 90% and 48%, respectively.

**CONCLUSIONS:** Despite improvement in DU imaging quality, the sensitivity and specificity of diagnosing RAS with the current DU criteria has not improved. The specificity of our DU data for diagnosis of RAS  $\geq 60\%$  is not what has been previously reported. The distribution of RAR compared to % stenosis varies widely and contributes to the low specificity of this technique. Using an RAR of  $\geq 3.0$  improves the sensitivity for RAS  $\geq 60\%$  slightly, without significant loss in specificity, compared to the current criteria of  $\geq 3.5$ . From our results it is difficult to identify criteria which may be better suited for diagnosing  $\geq 70\%$  RAS.



Sensitivity (+/- SE) and specificity (+/- SE) for RAR and stenosis 60-80% by angiographic imaging

N=142	AI ≥60% (n=49)		AI ≥70% (n=27)		AI ≥80% (n=16)	
RAR	Sens	Spec	Sens	Spec	Sens	Spec
≥3.0	94 (3)	51 (5)	96 (4)	43 (5)	100 (0)	40 (4)
≥3.5	84 (5)	53 (5)	93 (5)	48 (5)	94 (6)	44 (4)
≥4.0	71 (6)	62 (5)	82 (7)	58 (5)	81 (10)	55 (4)
≥4.5	59 (7)	76 (4)	74 (8)	73 (4)	69 (12)	68 (4)
≥5.0	55 (7)	80 (4)	70 (9)	77 (4)	63 (12)	71 (4)

Sensitivity (+/- SE) and Specificity (+/- SE) for PSV and stenosis 60-80% by angiographic imaging

N=186	AI ≥60% (n=70)		AI ≥70% (n=41)		AI ≥80% (n=25)	
PSV (cm/sec)	Sens	Spec	Sens	Spec	Sens	Spec
≥200	90 (4)	48 (5)	98 (2)	43 (4)	96 (4)	39 (4)
≥250	83 (5)	53 (5)	90 (5)	48 (4)	92 (5)	45 (4)
≥300	79 (5)	62 (5)	83 (6)	55 (4)	88 (7)	52 (4)
≥350	61 (6)	78 (4)	68 (7)	72 (4)	72 (9)	69 (4)