**Table.** Patient demographics

| Demographic | Patients, No. |
|---|---|
| Sex | |
| Male | 101 |
| Female | 39 |
| Race | |
| White | 106 |
| Black | 33 |
| Hispanic | 0 |
| Asian | 0 |
| Other | 1 |
| Insurance status | |
| Yes | 133 |
| No | 6 |
| Insurance provider | |
| Private | 28 |
| Medicare | 101 |
| Medicaid | 4 |
| SES | |
| Poor/near poor | 15 |
| Lower middle class | 80 |
| Middle class | 41 |
| Upper middle class | 4 |
| Comorbidity | |
| CAD/MI | 72 |
| CHF | 21 |
| COPD | 37 |
| CVA | 30 |
| PVD | 31 |
| CKD/ESRD | 31 |
| DM | 30 |
| Cancer | 47 |

*CAD,* Coronary artery disease; *CHF,* congestive heart failure; *CKD,* chronic kidney disease; *COPD,* chronic obstructive pulmonary disease; *CVA,* cerebrovascular accident; *DM,* diabetes mellitus; *ESRD,* end-stage renal disease; *MI,* myocardial infarction; *PVD,* peripheral vascular disease; *SES,* socioeconomic status.

**Author Disclosures: K. M. Hessel:** None. **Z. Brannan:** None. **J. Quinn:** None. **T. Satroplus:** None. **C. McQuinn:** None. **A. Gobble:** None. **R. Beaulieu:** None. **J. Starr:** None. **M. Haurani:** None.

## A Deep Dive into the Meaning of the Renal Resistive Index, its Limited Correlation With Renal Function, and a Theoretical Way Forward to Improve its Usefulness

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**Objective:** Debate has ensued regarding the meaning and significance of the renal resistive index (RRI), with some reports evaluating a limited number of patients and correlating it with renal function, and studies reporting no correlation. We investigated the correlation of the RRI with renal function as measured by creatinine in the largest study to date and the effects of the aortic pulsatility index (API) and renal artery stenosis on the RRI.

**Methods:** The renal cortex and medulla RRI was measured in a single, experienced vascular laboratory in 1414 patients with concurrent creatinine measurements. The creatinine level was correlated statistically with the RRI and with the lowest RRI between the two kidneys using Pearson's correlation. We measured the central aortic pressure in 32 patients using applanation tonometry and correlated and modeled the RRI with the API in these patients. To evaluate the effects of renal artery stenosis, we used a paired *t* test to compare the RRI in the patients in whom only one side had renal artery stenosis >60%. We evaluated 192 patients in 3076 studies performed from 2009 to 2021.

**Results:** The creatine level correlated poorly with the renal cortex RRI (correlation coefficient, 0.14; $P < .005$). The correlation was not improved with the use of the medullary RRI or the kidney with the lowest RRI. A scatterplot is shown in Fig 1. The RRI correlated highly with the API (correlation coefficient, 0.65; $P < .001$). When analyzed using linear regression in our model: RRI = (0.78 × API) + 0.33 ($P < .001$). The scatterplot and regression line are shown in Fig 2. Paired *t* test analysis revealed that renal artery stenosis had no practical effect on the RRI ($P = .78$). The mean RRI for the patients with unilateral >60% renal artery stenosis was 0.69 ± 0.01 on the side with stenosis, equal to an RRI of 0.69 ± 0.01 on the side without stenosis.

**Conclusions:** In our largest study to date, renal function, as measured by the creatinine level, did not correlate well with the RRI. The RRI was highly correlated and modeled by the API. Renal artery stenosis did not appear to have any practical effect on the RRI. The RRI was overwhelmed by the API, and its effect must be removed to have a useful index that could correlate well with renal function.

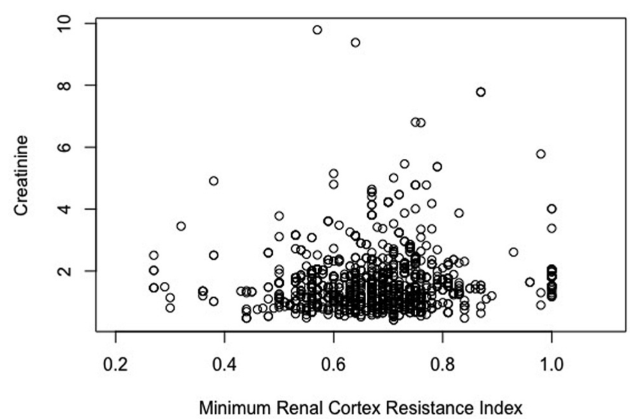


**Fig 1.** Creatinine vs minimum renal cortex resistive index.

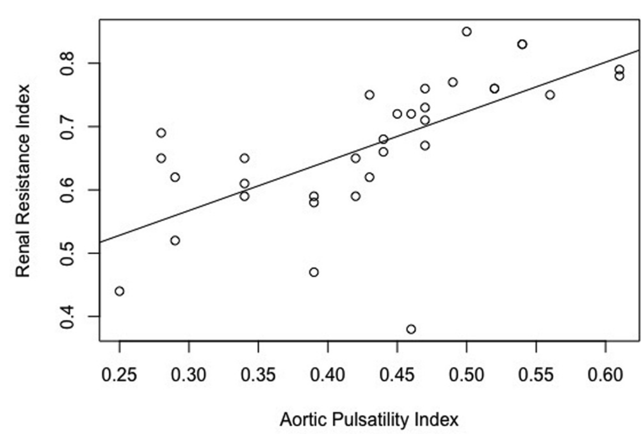


**Fig 2.** Renal resistive index (RRI) vs aortic pulsatility index (API).

**Author Disclosures: A. P. Sawchuk:** None. **W. Yu:** None. **J. Talamantes:** None. **W. Hong:** None. **D. Rollins:** None. **R. Motaganahalli:** None.

## Vascular Surgery-Specific Ultrasound Model for Vascular Access

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**Objective:** Our objective was to develop a realistic, inexpensive, and accessible model for vascular surgery residents to improve their access skills for both nondiseased and diseased vessels.

**Methods:** The gelatin model was made simply with gelatin powder and water. Straws were used to mimic the size of an average femoral vessel (Fig 1). To create a nondiseased vessel model, the straw was used to cut out a slice of the gel to create a phantom vessel. A pipe cleaner can be used to push the slice of gel out before removing the straw. To create a diseased vessel model, small openings were made along the straw first to create soft spots for access. Next, the straw was inserted and kept inside the gel. To create a branched vessel model, the straw was inserted at an angle to the phantom vessel and then used to cut out slices of gel to mimic branches. The resulting model was then submerged in water to allow for aspiration to confirm proper access. A micropuncture kit should be used but a 21-gauge needle and 0.018-in beading wire can be easily substituted.

**Results:** Our model visually mimics real life tissue under ultrasound, physically mimics real life tissue during access, and realistically mimics both nondiseased and diseased branched vessels (Fig 2). Needle and wire access to the vessel can be clearly visualized using this model.

**Conclusions:** To the best of our knowledge, we have described the first vascular surgery-specific ultrasound model. It is tailored toward vascular surgery residents but can be used by any trainee wishing to improve their access skills. It is an inexpensive and easy to make model that provides realistic simulation and results in access confidence.


**Fig 1.** Photograph showing the appearance of our phantom vessel with ultrasound. The diseased, calcified vessel can be clearly visualized, along with its soft spot anteriorly for access and its side branch.

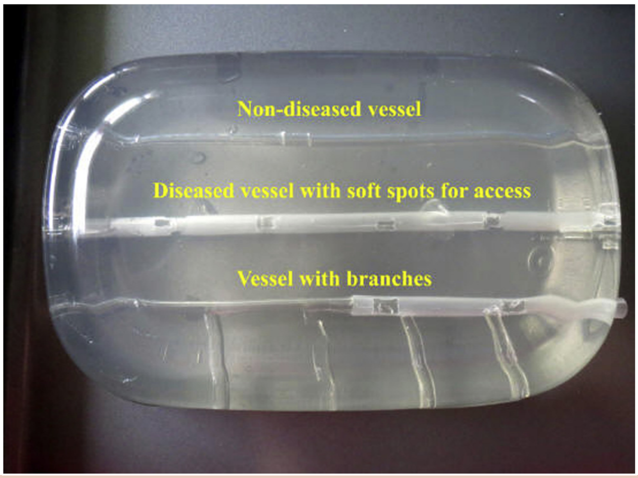


**Fig 2.** Vascular surgery-specific ultrasound model featuring a non-diseased vessel (**Top**), a diseased vessel with soft spots for access (**Middle**), and a vessel with branches (**Bottom**).

**Author Disclosures: J. Man:** None. **R. Nicholson:** None. **M. Aboul Hosn:** None.

## Female Gender: A Leading Predictor of Decline in Renal Function 5 Years After Endovascular Abdominal Aortic Aneurysm Repair

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**Objective:** Although copious short-term data exist regarding renal function after infrarenal endovascular abdominal aortic aneurysm repair (EVAR), long-term data are sparse. We performed a single-institution retrospective review to identify the predictors of renal function 5 years after elective EVAR.

**Methods:** All EVAR cases performed at a single institution from 2007 to 2015 were queried. Patients for whom renal function was documented 5 years postoperatively were included in present analysis. The exclusion criteria were ruptured aneurysms, mortality before 56 months, lack of follow-up, end-stage renal disease status, and concomitant renal intervention. The primary outcome was a ≥20% decrease in the glomerular filtration rate (GFR) at 5 years postoperatively. The following variables at surgery were investigated as potential predictors: age, gender, hypertension, hyperlipidemia, diabetes, coronary artery disease or prior myocardial infarction, chronic obstructive pulmonary disease, prior stroke, baseline estimated GFR <60 mL/min/1.73 $m^2$, suprarenal fixation, infrarenal fixation, neck diameter, neck length, and number of contrast computed tomography scans.

**Results:** A total of 354 EVARs were identified, of which 143 met the inclusion criteria (211 were excluded). Univariate analysis revealed that female gender, hypertension, baseline renal insufficiency, larger neck diameter, and suprarenal fixation (relative to infrarenal fixation) were all predictive ($P < .05$) of a GFR decrease at 5 years postoperatively. Multivariate binary logistic regression analysis found female gender and baseline renal insufficiency were significant predictors ($P = .02$ for both) of a >20% GFR decrease at 5 years (Table). Only 2 of the 143 patients in the present study had required to dialysis at 5 years.

**Conclusions:** Women and patients with baseline renal insufficiency are more vulnerable to a significant decline in renal function at 5 years