

**Objective:** The National Kidney Foundation has recommended utilizing autogenous arteriovenous fistulas (AVFs) in at least 50% of all new patients with endstage renal disease (ESRD). Some studies suggest that black patients are less likely to receive first time AVF than other ethnicities, although the reason for this disparity is unclear. The purpose of our study was to determine whether racial differences influence AVF preference over grafts and whether this may be related to differences in vein diameters.

**Methods:** Consecutive patients undergoing first-time hemodialysis access from 2006 to 2010 at two institutions were retrospectively reviewed. Data collected included age, gender, ethnicity, weight, height, body surface area (BSA), diabetes, hypertension, congestive heart failure, smoking history, intravenous drug abuse, need for temporary access placement, and preoperative venous ultrasound scan measurements. Categorical variables were compared using  $\chi^2$  and odds ratios, whereas the Wilcoxon-rank sum test was used to compare continuous variables.

**Results:** Two hundred eighty patients (99 black) were identified for the study. Median age in black and nonblack patients was 63 years old. All patients underwent preoperative duplex scan, and black patients demonstrated statistically significant, smaller median basilic and cephalic vein diameters at all measured sites except at the cephalic vein distal forearm and proximal upper arm. Overall, 249 patients (90%) underwent AVF first. Arteriovenous (AV) graft was created in 18% of black patients vs only 7% of nonblacks (odds ratio [OR], 2.9; 95% confidence interval [CI], 1.3-6.1;  $P = .0005$ ). Weight and BSA were statistically significantly different between black and nonblack patients, whereas the need for temporary access before haemoaccess was similar between the cohorts. After adjusting for weight and BSA, black patients were still more likely to undergo AV graft (OR, 2.9; 95% CI, 1.3-6.6;  $P = .007$ ).

**Conclusions:** Black patients are less likely to undergo AVF during first time hemodialysis access surgery, likely due to their smaller preoperative measurements in basilic and cephalic vein diameters.

#### Duplex Ultrasound Criteria for Re-intervention after Mesenteric Artery Revascularization

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**Objective:** Currently, there are no well established duplex ultrasound (DUS) scan criteria for the evaluation of the superior mesenteric artery (SMA) after stenting for occlusive disease. Previous studies suggested DUS velocity criteria in native SMA overestimate stenosis in stented arteries, but no study has evaluated DUS after SMA stenting longitudinally. This study was undertaken to determine the accuracy of DUS in evaluation of SMA in-stent restenosis.

**Methods:** We identified all patients who underwent SMA/cealic artery stenting and mesenteric bypass grafting from January 2004 to December 2010.

**Results:** Twenty-seven patients with symptomatic mesenteric ischemia were treated with mesenteric stenting and 15 patients with mesenteric bypass grafting. Eighteen pre-stent DUS showed SMA peak systolic velocity (PSV) of  $471 \pm 118$  cm/second. Pre-stenting angiography revealed SMA stenosis of  $72 \pm 15\%$ . Completion angiography revealed  $<15\%$  residual stenosis. No significant correlation was identified between SMA PSV and angiographic stenosis pre-stenting and post-stenting. Follow-up SMA DUS showed a PSV of  $365 \pm 130$  cm/seconds at  $2 \pm 5$  months, PSV of  $377 \pm 145$  cm/seconds at  $5 \pm 3$  months, and a PSV of  $375 \pm 103$  cm/seconds at  $15 \pm 4$  months. A significant difference existed between pre-stenting and the first post-stenting SMA PSV ( $P$  value  $< .05$ ), but no significant difference existed between each post-stenting interval. Six patients (5 asymptomatic, 1 symptomatic) had repeat mesenteric angiography for elevated SMA stent PSV of  $490 \pm 87$  cm/seconds (vs  $343 \pm 146$  cm/seconds in patients who did not undergo reintervention). Angiography demonstrated  $57\% \pm 13$  stenosis of the SMA. Four patients underwent re-stenting and 1 patient had angioplasty. PSV decreased to  $380 \pm 57$  cm/seconds postprocedure. In the patients who had SMA bypass grafting, DUS did not show a change in PSV over time.

**Conclusion:** As has been previously shown in DUS studies of carotid and renal artery stents, our data demonstrate that PSV in successfully stented SMAs is higher than the PSV of  $275$  cm/seconds used for diagnosing stenosis of non-stented SMAs. More importantly, PSV of stented SMAs do not significantly change over time. DUS should be considered early after mesenteric intervention to identify significant residual stenosis that may need early reintervention and to provide a baseline for future follow-up.

#### Durability and Stroke-Free Survival after Carotid Stenting: Long-Term Follow-up in a Community Setting

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**Objectives:** The purpose of carotid angioplasty and stent (CAS) is stroke prevention. Large trials have been conducted or are underway to understand the results of CAS. However, two significant questions remain: (1) What are the long-term results, beyond the reports of 2 to 4 years? (2) Do the results of major trials correlate with similar results in the community at large? The purpose of this study is twofold: to evaluate the long-term results of CAS with respect to stroke-free survival, re-stenosis, and reintervention; and, to assess the overall result of CAS in a community setting.

**Methods:** Over a 9-year period (2002-2010), we used CAS as a treatment for significant carotid stenosis in 162 procedures in 150 patients. In most of the patients, there was one or more anatomic or physiological indication for CAS due to high-risk status for carotid endarterectomy. After CAS, patients were followed with surveillance duplex scan in a certified vascular laboratory at 1 month, 6 months, 1 year, and annually thereafter. Peak systolic velocity (PSV)  $>200$  cm/seconds was considered to be a re-stenosis of  $>50\%$  and PSV  $>300$  cm/seconds was considered to be  $>70\%$  re-stenosis. Repeat interventions were performed at the discretion of the treating surgeon.

**Results:** The risk of perioperative stroke was 3.1% and death was 0.6%. Mean follow-up was 2.6 years with a range of 0 to 8.9 years. One hundred twenty of the procedures (74%) had a follow-up of at least 1 year. Stroke-free survival at 1, 3, and 5 years was 91%, 70%, and 53%, respectively. Freedom from all causes of stroke was 96% at 1 year, 95% at 3 years, and 92% at 5 years. Re-stenosis of 50% or more occurred in 4% at 1 year, 8% at 3 years, and 8% at 5 years. Re-stenosis of 70% or more occurred in 2% at 1 year, 6% at 3 years, and 6% at 5 years. Only three (1.9%) of the index procedures required re-treatment. None of the patients with recurrent stenosis presented with neurologic symptoms. None of the patients died of stroke during long-term follow-up.

**Conclusion:** Long-term stroke-free survival was diminished in this population at high risk for carotid surgery. The rates of re-stenosis, reintervention, and stroke from any cause were acceptable after CAS. These data suggest that CAS can be performed in a community setting with acceptable long-term durability and stroke prevention.

#### Perioperative Complications Associated with Femoral Vein Harvest

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**Objectives:** The femoral vein is increasingly used as a conduit in major arterial and venous reconstructions. However, the perioperative complications associated with femoral vein harvest (FVH) are not well described. The purpose of this study was to determine the incidence and risk factors for the development of deep venous thrombosis in patients who undergo FVH.

**Methods:** All patients who underwent FVH over a 5-year period were reviewed. Patient clinical characteristics and indications for surgery were determined from an electronic medical record query. Postoperative venous duplex scans and computerized tomography scans of the chest were reviewed. Data were analyzed using  $t$  test.

**Results:** Fifty-seven patients (53% male, mean age 62 years old) underwent 58 FVH procedures. Fifty-three percent of procedures were performed for arterial reconstruction and 47% for major venous reconstruction after cancer resection (80% portomesenteric reconstruction). Perioperative ipsilateral deep venous thrombosis (DVT) was detected in 17 of 58 FVH procedures (29%). Eleven (19%) were isolated to the veins distal to the FVH site, and 6 (10%) occurred proximal to the FVH site. The incidence of DVT was significantly greater in patients with malignancy (56% vs 13%;  $P$  value = .003). All DVTs proximal to the vein harvest site occurred in patients with malignancy. Pulmonary embolism occurred in 2 patients, and none of the patients developed compartment syndrome or limb loss. Eight patients (14%) required bedside or operative FVH wound debridement.

**Conclusions:** FVH is frequently associated with ipsilateral DVT, and the incidence is significantly higher in patients with malignancy. Aggressive thromboprophylaxis may be warranted after femoral vein harvest, especially in patients with known malignancy. Longer-term studies are needed to determine the natural history of DVTs associated with femoral vein harvest.

#### Development of a Rapid, High Resolution Magnetic Resonance Imaging Protocol for the Assessment of Arteriovenous Fistula Remodeling

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**Objective:** To investigate the relationship of hemodynamic forces to structural remodeling in the maturing arteriovenous fistula (AVF), we developed a rapid MRI-based AVF imaging protocol from a series of newly created and mature AVFs. In addition, we report, for the first time, use of a non-gadolinium-based contrast agent, ferumoxytol, for contrast-enhanced MRA (CE-MRA) of an AVF.

**Methods:** This was a cross-sectional study of subjects with stage IV or V chronic kidney disease before and after AVF creation. The imaging