used to treat the endoleak in such patients, and the current series reports the outcome of therapy in the Aneurysm Treatment Using the Heli-FX EndoAnchor System Global Registry (ANCHOR).

Methods: During a 29-month period ending in July 2014, 201 patients were enrolled in ANCHOR and treated with EndoAnchors for immediate type Ia endoleaks after endograft deployment (primary arm; n = 109 [54.2%]) or type Ia endoleaks remote from EVAR (revision arm; n = 92 [45.8%]). Patients were followed up for clinical outcomes over a mean of 15 ± 6 months after EndoAnchor implantation. Computed tomography (CT) images were reviewed by an independent core laboratory in 145 patients (72.1%) preoperatively and in 109 (54.2%) postoperatively (108 with contrast). Continuous variables were assessed with the Student *t*-test and dichotomous variables with the Fisher exact test. Bonferroni corrections were used for multiple comparisons.

Results: Aneurysms averaged 60 ± 16 mm in maximum diameter, with infrarenal neck length of 16 ± 12 mm, infrarenal neck diameter of 28 ± 6 mm, and infrarenal angulation of 37° ± 17°. Aortic necks were <10 mm in length in 42.7% and <5 mm in 17.5% of patients. An average of 6 ± 2 and 7 ± 3 EndoAnchors was implanted in the primary and revision cases, respectively ($P = .003$), with successful deployment and absence of type Ia endoleak on completion angiography in 190 of 201 patients (94.5%). Over mean follow-up of 15 ± 6 months, all-cause mortality was two of 200 (1.0%), with aneurysm-related reinterventions in 21 patients (10.4%). There were 12 patients (6.0%) with endograft-related reinterventions and 11 patients (5.5%) with EndoAnchor-related reinterventions, all for type Ia endoleaks. There were no ruptures or open surgical conversions. Core laboratory analysis identified endoleaks in 14 of 108 patients (13.0%) with postoperative contrast CT studies; four of 60 in primary cases (6.7%), and 10 of 48 in revisions (20.8%; $P = .043$). The endoleak was evident on the first postoperative CT scan in all but one of these cases. Short neck predicted EndoAnchor failure; 18 ± 13 mm vs 8 ± 5 mm in those with and without postoperative type Ia endoleaks, respectively ($P < .001$). Neck length of 5 mm was evident in 39.1% of patients with 12-month CT scans; sac enlargement (>5 mm) developed in 3.7% of patients.

Conclusions: EndoAnchors are successful in remediating type Ia endoleaks in 87.0% of cases. Success was more frequent in patients treated for endoleaks that were detected and treated at the time of the initial EVAR compared with those identified and treated in follow-up. EndoAnchors should be considered as a potentially effective treatment option when type Ia endoleak is encountered during or after EVAR.

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Active Smoking Is Associated With Increased Odds of Limb Loss Among Claudicants Undergoing Infrainguinal Bypass

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Introduction: Smoking cessation is one of the primary methods of treating claudication. However, many patients receive revascularization for claudication while still smoking. We examined regional data from the Vascular Quality Initiative (VQI) database to evaluate the impact of smoking on outcomes of revascularization in claudicants in the VQI.

Methods: With consent of the members of the Carolinas Vascular Quality Group (CVQG) of the VQI, all cases entered in the infrainguinal (INF) bypass, suprainguinal bypass, and peripheral vascular intervention modules were reviewed from 2010 to 2012. Univariate analysis was used to identify demographic and comorbid differences between active and nonactive smokers. Multivariable regression modeling was used to assess primary outcomes of major adverse limb event (MALE), amputation-free survival (AFS), limb loss (LL), and death.

Results: We identified 730 active smokers and 636 nonactive smokers undergoing revascularization for claudication. Mean follow-up was 247 (214) days. Active smokers were younger and had more chronic obstructive pulmonary disease, but less diabetes, congestive heart failure, hypertension, and statin use. Multivariable regression modeling showed no differences in overall outcomes of MALE, AFS, and death between active and nonactive smokers when all procedure modules were combined; active smokers were more likely, however, to suffer limb loss (3% vs 11%; odds ratio [OR], 2.3; 95% confidence interval [CI], 1.0-5.4; $P = .05$). When we examined the modules separately, there were no differences in outcomes between active and nonactive smokers in peripheral vascular intervention (n = 1252 limbs) or suprainguinal bypass (n = 122). Compared with nonactive smokers, active smokers with claudication who received INF bypass had a much higher odds of MALE (21% vs 11%; OR, 2.8; 95% CI, 1.1-7.4; $P = .03$) and limb loss (10% vs 1%; OR, 21.0; 95% CI, 1.5-292; $P = .02$), but had no difference in death or AFS (Table).

Conclusions: Claudicants who undergo INF bypass while actively smoking have increased odds of MALE and limb loss compared with nonactive smokers in the CVQG. ORs for limb loss and MALE are significantly higher than that of previously reported patients with claudication treated with medical management. Before performing INF bypass on claudicants, aggressive smoking cessation methods should be implemented.

Table. Primary outcomes of claudicant patients undergoing infrainguinal bypass by smoking status

Outcomes	*Smokers (n = 119), %*	*Nonsmokers (n = 91), %*	χ^2 P	*Adjusted OR (95% CI)*	P
MALE	21	11	.04	2.8 (1.1-7.4)	.03
AFS	12	12	.91	1.2 (0.4-3.2)	.8
Death	3	11	.03	0.3 (0.08-1.23)	.09
Limb loss	10	1	.008	21.0 (1.5-292)	.02

AFS, Amputation-free survival; *CI,* confidence interval; *MALE,* major adverse limb event; *OR,* odds ratio.

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Multivariate Analysis of 319 Iliac Stents Reveals the Strong Impact of Demographic Factors and Lesion Severity on Stent Patency

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Introduction: The aim of our study was to perform a large-scale multivariate analysis to identify the demographic, anatomic, or procedural factors that impact primary iliac stent patency.

Methods: A retrospective record review of iliac stenting from 2011 to 2013 was conducted. Index iliac stenting patients were identified by Current Procedural Terminology codes 37220, 37221, 37222, and 37223. Differences in demographic, anatomic, and procedural characteristics were analyzed by univariate analysis between groups based on primary patency. Variables that were considered significant ($P < .05$) were brought forward in the Cox regression multivariate analysis.

Results: A total of 224 patients (53% male) underwent primary iliac artery stenting, and 319 limbs were analyzed. Average age was 66 years (range, 38-93 years) and 57% were Caucasian. Indication for procedure was 64% claudication, 23% rest pain, and 13% ulcer/gangrene. The cohort included all TransAtlantic Inter-Society Consensus (TASC) classifications: 50% TASC A, 25% TASC B, 12% TASC C, and 13% TASC D. The treated anatomic location was isolated external iliac artery (EIA) in 27%, isolated common iliac artery (CIA) in 55%, and combined CIA/EIA in 18%. Intervention distal to the iliac arteries was performed in 37% of the cohort. There were no procedural-related mortalities. Kaplan-Meier analysis at 1 and 3 years revealed a primary patency of 86% and 51%, primary assisted patency of 98% and 89%, and secondary patency of 99% and 90%. For those patients with critical limb ischemia preprocedurally, limb salvage was 88% at 1 year. By Kaplan-Meier analysis, primary patency at 1 year was 93% for Caucasian patients vs 79% for non-Caucasian ($P = .001$). One-year Kaplan-Meier primary patency was 76% in patients aged <60 years, 86% in patients aged 60-70 years, and 97% in patients aged >70 years, with a significant difference among all groups ($P < .001$). Primary patency was significantly different for those with and without EIA occlusion ($P < .001$), with 1-year primary patency by Kaplan-Meier analysis of 71% and 86%, respectively. Primary patency was also significantly different for those with and without aortic occlusion ($P = .008$), with 1-year patency of 84% and 87%, respectively. The reentry device differed significantly among groups ($P = .028$), with 1-year patency rates of 79% for reentry device use and 87% for those who did not have reentry device. We evaluated five factors on multivariate analysis, and three factors were identified to impact primary patency: Caucasian race (HR, 0.517; 95% confidence interval [CI], 0.313-0.852; $P = .01$) and older age at the time of procedure (HR, 0.945; 95% CI, 0.920-0.971; $P < .001$) positively affected patency. EIA occlusion (HR, 2.352; 95% CI, 1.294-4.275; $P = .005$) negatively affected primary patency. Aortic occlusion and reentry device were no longer significant in our multivariate model.

Conclusions: In our institution's experience with a large number of iliac interventions (CIA and EIA), race, age, and EIA occlusion all impacted primary patency. This study emphasizes the underappreciated effect of patient demographics and lesion severity on stenting outcomes.

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Redefining the Operative Threshold in Women With Abdominal Aortic Aneurysms

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Introduction: Rupture of an abdominal aortic aneurysm (AAA) is a usually fatal event best prevented by timely diagnosis and surgical intervention. Evidence is accumulating that women tend to rupture AAAs at smaller sizes than men, are often at higher risk because of age and comorbidities, and have poorer outcomes. In the past, women were often excluded from lower-risk endovascular aortic aneurysm repair (EVAR) because of inadequate iliac vascular access. Furthermore, current elective operative recommendations for asymptomatic AAA repair of >5.5 cm do not distinguish possible differences between men and women regarding the advantages of earlier treatment with respect to the risk of rupture relative to AAA size.

Methods: All patients evaluated with International Classification of Diseases-9th Revision diagnosis codes for AAAs at a single institution between 2000 and 2012 were identified for retrospective analysis under Investigational Review Board approval.

Results: A total of 3800 patients were identified with a diagnosis of AAA. Of these, there were 3686 patients (97%) with nonruptured AAAs and 114 patients (3%) with ruptured AAAs. The male-to-female ratios for nonruptured and ruptured AAAs were similar (2.9:1 and 2.5:1, respectively) as were the percentages of ruptured AAAs for men and women (2.9% and 3.4%, respectively). Also similar were jospital mortality rates for ruptured AAAs in men (42.0%) and women (42.4%). AAA diameter at the time of rupture was determined in 75 patients (54 men and 21 women). The mean ruptured AAA diameter was 7.9 ± 1.6 cm (range, 4.5-12.0 cm) for men and 6.5 ± 1.5 cm (range, 3.6-9.0 cm) for women. Of the ruptured AAA patients, 97.3% were treated with emergency open AAA repair and 2.7% by emergency EVAR. The percentage of patients with a ruptured AAA <5.5 cm in diameter was 28.6% for women and only 3.7% for men (Fig).

Conclusions: Although this single-institution experience is small, these results strongly indicate that AAAs in women tend to rupture at smaller diameters than men. Mortality for elective EVAR has dramatically decreased AAA operative risk, and the newer low-profile delivery systems have made this technology routinely available for women. Current recommendations for elective operative intervention for AAAs should be reconsidered and stratified by gender.

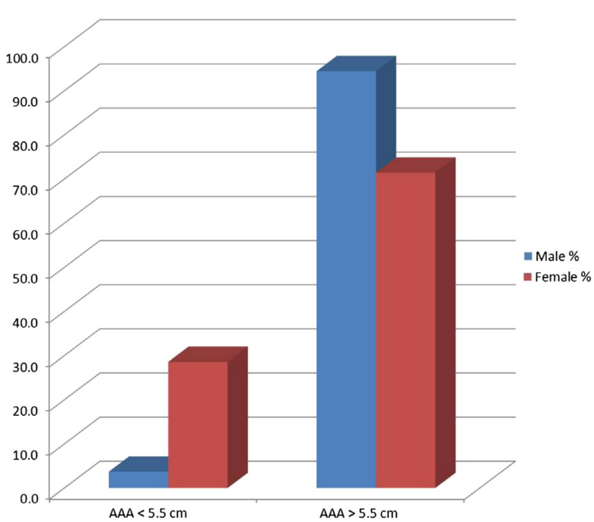

Fig. Percentage rupture with 5.5-cm threshold.

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The Correlation Between Computed Tomography (CT) and Duplex Evaluation of Vein Bypass Grafts and Their Relationship to Graft Failure

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Background: Infrainguinal vein graft bypass has 5-year patency rates between 45 and 80%, and the optimal post-operative approach to graft surveillance is not clear. The current study was designed to evaluate the relationship between physiologic (duplex scanning) and anatomic (CT scan) methodologies for assessment of vein graft stenosis and evaluate the relationship of these observed abnormalities to vein graft failure.

Methods: Fifty-four patients who underwent infrainguinal autogenous vein graft bypass for disabling claudication or tissue loss at the Malcolm Randall Veterans Affairs Medical Center in Gainesville, Florida were included in our study. These patients were followed with concurrent duplex U/S and CT imaging at intervals of 1 week, 1 month, 6 months, and 12 months postoperation. For each of the "zones" within the bypass graft (we divide the leg into six zones), and U/S peak-systolic velocity and mean CT cross-sectional area were calculated. Thus, our initial data set consisted of both an U/S velocity measurement and a CT cross-sectional area measurement for each zone per patient, at each of the four time points for a total of 656 patient*zone*time points (Fig 1, *A*). We also transformed these 656 sets of CT and U/S data into CT percent stenosis and U/S velocity ratios.

Results: A CT stenosis less than 50% was extremely highly correlated with success (0% failure), while a velocity ratio > 3.5 was correlated with a 67% failure rate (Fig 1, *B*; Table). Interestingly, even high degrees of CT demonstrated stenosis were still more likely to succeed than not, with those in the >80% group having only a 25% failure rate (Table). Those zones with moderate graft stenosis, identified as a duplex-derived velocity ratio in the 2.0 to 3.5 range, tended to improve with time as 78% showed a reduction in the velocity ratio at the next time interval (Fig 2). Importantly, within this group only a 12% failure rate was seen, thus demonstrating the relatively benign nature of this degree of stenosis (Table).

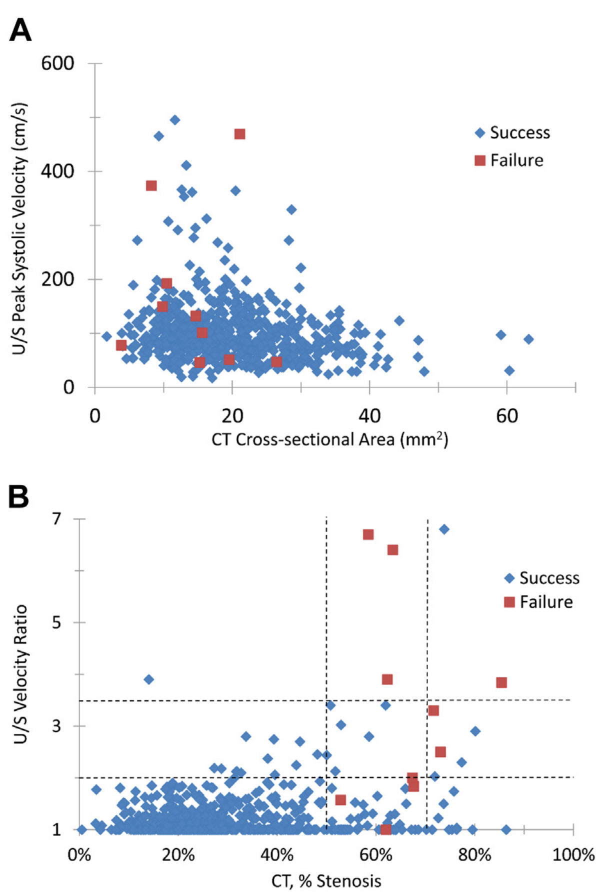

Fig 1. A, Vein graft computed tomography (*CT*) cross-sectional area vs ultrasound (*U/S*) velocity. **B,** Vein graft CT stenosis ratio vs U/S velocity ratio.