Selected Abstracts from the December Issues of the Journal of Vascular Surgery and the Journal of Vascular Surgery: Venous and Lymphatic Disorders☆

Editors: Peter Gloviczki and Peter F. Lawrence

Juxtarenal endovascular therapy with fenestrated and branched stent grafts after previous infrarenal repair

Magnus Sveinsson, MD, Thorarinn Kristmundsson, MD, PhD, Nuno Dias, MD, PhD, Bjorn Sonesson, MD, PhD, Kevin Mani, MD, PhD, Anders Wanhainen, MD, PhD, and Timothy Resch, MD, PhD

Background: The treatment strategy for proximal aortic disease or type I endoleak after previous infrarenal repair has traditionally been open surgery. As endovascular treatment options with fenestrated and branched stent grafts increasingly rival open surgery for juxtarenal and pararenal aortic aneurysms, secondary proximal repair may similarly be performed endovascularly. Fenestrated stent grafts are individually tailored to each patient, whereas a more readily available "off-the-shelf" branched stent graft is often suitable in more urgent settings.

Methods: All patients who had been reoperated on with a proximal fenestrated or branched cuff after previous infrarenal endovascular or open repair from two tertiary referral centers between 2002 and 2015 were included in the analysis. Patients were retrospectively enrolled in a digital database. Data were collected from chart review and digital imaging.

Results: There were 43 patients, 37 (86%) male and six (14%) female, who were treated. The indications for proximal endovascular repair were type I endoleak (58%), proximal aneurysm formation (30%), and stent graft migration (12%). Median follow-up time was 33 months (range, 3-120 months); 34 patients (79%) received a fenestrated cuff, and branched stent grafts were used in 8 (19%) cases. The majority of grafts had three (47%) or four (49%) fenestrations or branches. Technical success was accomplished in 93% of cases. In two cases, the celiac trunk occluded; in one case, the hepatic artery was overstented, and a renal artery could not be cannulated in one case. Median hospital stay was 5 days (range, 2-57 days). The 30-day mortality was 0%, and 1-year mortality was 5%. One patient died of an aneurysm-related cause during the study period.

Conclusions: An endovascular approach with fenestrated or branched stent grafts for treatment of proximal endoleak, proximal aneurysm formation, or pseudoaneurysms after previous infrarenal repair seems to be a valid alternative to open surgery.

Anatomic suitability for "off-the-shelf" thoracic single side-branched endograft in patients with type B aortic dissection

Gregory A. Magee, MD, MSc, Narek Veranyan, MD, PhD, Eric C. Kuo, MD, Sung Wan Ham, MD, Kenneth R. Ziegler, MD, Fred A. Weaver, MD, MMM, Fernando Fleischman, MD, Michael E. Bowdish, MD, and Sukgu M. Han, MD, MS

Objective: Treatment of type B aortic dissections with thoracic endovascular aortic repair (TEVAR) has been adopted in many centers with the goal of covering the proximal entry tear. Coverage of the left subclavian artery (LSCA) is commonly required to achieve a dissection-free proximal seal zone. A novel thoracic single side-branched (TSSB) endograft device offers a potential off-the-shelf option to achieve total endovascular incorporation of LSCA during zone 2 TEVAR. The aim of this study was to determine what percentage of patients with type B aortic dissection who require zone 2 TEVAR meet the anatomical requirements for this device.

Methods: All consecutive patients undergoing TEVAR for type B aortic dissections at a single institution from 2006 to 2016 were evaluated. Three-dimensional centerline reconstruction of preoperative computed tomography angiography was performed to identify the diameter of the aorta, distances between branch vessels, diameter of the target branch vessel, and location of the primary entry tear. Only patients who met criteria for zone 2 TEVAR were included in the analysis. The primary outcome was percentage of patients that meet all anatomical requirements for TSSB. Individual criteria were evaluated independently, and results were stratified by dissection chronicity.

Results: Eighty-seven patients who underwent TEVAR for Stanford type B aortic dissections were reviewed. Fifty-seven (66%) would have required zone 2 TEVAR. Indications for TEVAR were malperfusion (12), aneurysm (15), persistent pain (22), rupture (3), uncontrolled hypertension (5), and other (3). Mean follow-up was 19 months (range, 1-72 months). Only 16 of the 57 patients (28%) met all the requirements for anatomic suitability. The primary contributor was that only 49% of patients had sufficient length between arch branches to prevent coverage of a proximal branch.

Conclusions: Although the new TSSB device can allow for a more proximal seal zone and eliminate the need for open aortic arch debranching, only 28% of patients with type B dissection who required zone 2 TEVAR met all the anatomic requirements for this device. Future devices will need to

☆Full articles available online at www.jvascsurg.org

1078-5884/
http://dx.doi.org/10.1016/S1078-5884(19)32596-1

account for the short distance between the left carotid and LSCA to be more broadly applicable.

Long-term survival after endovascular and open repair in patients with anatomy outside instructions for use criteria for endovascular aneurysm repair

Philippe Charbonneau, MD, Kiattisak Hongku, MD, Christine R. Herman, MD, MSc, Mohammed Habib, MD, Elie Girsowicz, MD, MSc, Robert J. Doonan, MD, PhD, Luc Dubois, MD, MSc, Sajjid Hossain, MD, Heather L. Gill, MD, MPH, Kent S. Mackenzie, MD, Jason P. Bayne, MD, Daniel Obrand, MD, and Oren K. Steinmetz, MD

Background: Randomized controlled trials of long-term survival for infrarenal abdominal aortic aneurysms have compared open surgical repair (OSR) with endovascular aneurysm repair (EVAR) in patients with suitable aortic anatomy for EVAR. However, in clinical practice, patients who do not meet instructions for use (IFU) criteria are often still treated by EVAR despite that some studies show higher graft-related adverse events. The goal of this study was to compare the long-term survival of EVAR and OSR in patients with anatomy outside IFU criteria for EVAR.

Methods: This multicenter retrospective cohort study included patients with at least one anatomic IFU violation for EVAR undergoing either elective EVAR or elective OSR for abdominal aortic aneurysm. Demographics, anatomic data, and follow-up data of patients were collected from three academic centers from 2003 to 2016. Device-specific IFU were used for EVAR patients, whereas generic IFU for EVAR were applied to the OSR patients. The primary outcomes were 30-day mortality and long-term all-cause mortality. Secondary outcomes were aneurysm-related mortality and perioperative complications at 30 days. Kaplan-Meier survival and Cox proportional hazards modeling were performed. Inverse propensity score weights were used to adjust for differences in treatment selection.

Results: The study population included 202 EVAR patients and 224 OSR patients with at least one anatomic IFU violation for EVAR. EVAR patients were older (78.1 $\pm$ 7.3 vs 70.9 $\pm$ 7.0 years; $P < .001$) and less likely to be hypertensive (69.3% vs 79.0%; $P = .02$) compared with OSR patients. OSR patients were more likely to have proximal aortic neck IFU violations (75.0% vs 47.1%; $P < .001$) and were less likely to have iliac IFU violations (65.2% vs 79.2%; $P < .001$). All-cause mortality was 37.6% in the EVAR group and 24.1% in the OSR group with a median follow-up time of 5.2 (3.5-7.2) and 5.4 (2.8-9.3) years, respectively ($P < .002$). Kaplan-Meier survival analysis revealed a significant association between patients undergoing OSR and increased long-term survival (log-rank $P < .0001$). When adjusted for possible confounders and weighted for propensity for treatment through Cox hazard modeling, the association remained significant (hazard ratio, 0.6; 95% confidence interval, 0.4-0.9). Aneurysm-related mortality was 3.5% in the EVAR group and 2.2% in the OSR group during long-term follow-up ($P < .001$).

Conclusions: Our study identified that patients with IFU violations have higher overall long-term survival with open surgery compared with EVAR. Caution should be applied in considering standard EVAR for patients with anatomy outside of IFU.

Natural history and management outcomes of segmental arterial mediolysis

Kate X. Peng, MD, Victor J. Davila, MD, William M. Stone, MD, Fadi E. Shamoun, MD, Sailendra G. Naidu, MD, Robert D. McBane, MD, and Samuel R. Money, MD

Background: Segmental arterial mediolysis (SAM) is a poorly understood, nonatherosclerotic, noninflammatory disease resulting from arterial medial degeneration. Patients may present with aneurysm, dissection, stenosis, or bleeding from visceral or renal arteries. Treatment algorithms are poorly characterized.

Methods: A retrospective review of all patients diagnosed with SAM was performed at our institution. Patients were identified by established criteria that include clinical presentation in combination with radiographic and serologic findings. Demographics, presenting symptoms, diagnostic evaluation, management, and outcomes were reviewed.

Results: There were 117 patients diagnosed with SAM between 2000 and 2016; 67.5% (n = 79) were male. Mean age was 52.7 years (range, 23.4-90 years); 69.2% (n = 81) presented with acute abdominal pain, 22.2% (n = 26) with flank pain, and 19.7% (n = 23) with back pain; 15.4% (n = 18) had abdominal pain longer than 30 days; 13.7% (n = 16) had acute hypertension, and 5.1% (n = 6) were hypotensive; 10.3% (n = 12) were asymptomatic. There were 93 (79.5%) dissections and 61 (52.1%) aneurysms. Hemorrhage was seen in 10 (8.5%). The celiac axis was affected in 54.7% (n = 64), renal arteries in 49.6% (n = 5 8), superior mesenteric artery in 43.6% (n = 51), and inferior mesenteric artery in 2.6% (n = 3). After diagnosis of SAM, aspirin was prescribed in 60.7% (n = 71). Statins were prescribed in 29.9% (n = 35). Antihypertensive medications were prescribed in 65% (n = 76), including beta blockers in 42.7% (n = 50); 40.2% (n = 47) of patients were prescribed anticoagulation. Interventions were performed in 26 (22%) patients; 13 had endovascular intervention only, 9 open surgery only, and 4 open and endovascular interventions. Of the 17 patients undergoing endovascular intervention, 19 procedures were performed, most commonly embolization (78.9% [n = 15]), followed by stenting (10.5% [n = 2]). Of the 13 patients undergoing open surgery, 14 procedures were performed, including arterial bypass (50% [n = 7]) and splenectomy with aneurysm ligation (15.4% [n = 2]). Other surgery involved thrombectomy (21.4% [n = 3]) and angioplasty (14.3% [n = 2]). Only 11.5% (n = 3) experienced a perioperative complication, including one hematoma, one abscess, and one death secondary to ongoing hemorrhage. Follow-up imaging was performed in 96.6% (n = 112). Mean follow-up was 1258 days (range, 2-5017 days). Of these, 27.7% (n = 31) had regression, 43.8% (n = 49) stability, and 28.6% (n = 32) progression. Average

time between initial diagnosis and progression was 666 days.

Conclusions: SAM is an uncommon disease that may require intervention; it is therefore important that the vascular surgery community be aware of this disease. Follow-up imaging is required to monitor for disease progression.

Endovascular treatment of spontaneous renal artery dissection

Jianjun Jiang, MD, Lecong Li, MD, Yang Liu, MD, Juchao Ren, MD, Qingbo Su, MD, Sanyuan Hu, MD, and Xiangjiu Ding, MD

Objective: This study aimed to assess the outcomes of patients with spontaneous renal artery dissection (SRAD) after endovascular repair.

Methods: We performed a retrospective review of SRAD patients after endovascular treatment between January 2007 and August 2018. Demographic, clinical, ancillary testing, treatment, and outcome data were collected and analyzed.

Results: Fourteen patients (12 men and 2 women) with a mean age of 47 years were included in this study. All the patients had hypertension, either new onset (78.6%) or preexistent (21.4%). Sudden flank pain was the most common symptom. Fourteen patients had 15 affected renal arteries. Endovascular repair was successfully performed in 14 arteries. The technical success rate of endovascular repair was 93.3% (14/15), with no postoperative death. Endovascular repair significantly improved hypertension and renal function, and these improvements persisted during the follow-up period. The effective rate of endovascular repair for improving or curing hypertension was 85.7%. Follow-up imaging showed no sign of stent stenosis or occlusion in those patients who received endovascular repair.

Conclusions: Endovascular repair is safe, feasible, and effective for SRAD treatment and should be a promising alternative to open revascularization.

Clinical outcome of drug-coated balloon angioplasty in patients with femoropopliteal disease: A real-world single-center experience

Ali F. AbuRahma, MD, Zachary T. AbuRahma, DO, Grant Scott, MD, Elliot Adams, MD, Matthew Beasley, MD, Meghan Davis, MD, L. Scott Dean, PhD, MBA, and Elaine Davis, RN, EdD

Background: Several multicenter industry-sponsored clinical trials reported satisfactory results in the use of drug-coated balloons (DCBs) for treatment of femoropopliteal occlusive disease. However, few single-center studies have been published to verify the outcome from real-world experience.

Methods: In this study, 228 patients treated with DCB angioplasty (Lutonix 0.35; Bard, Tempe, Arizona) were analyzed. Perioperative major adverse events (death, amputation, target lesion thrombosis or reintervention) were calculated. Kaplan-Meier analysis was used to estimate primary patency rates (based on duplex ultrasound with or without ankle-brachial index) and limb salvage rates.

Results: Lesions treated were primarily TransAtlantic Inter-Society Consensus (TASC) type C and D lesions. Indications included claudication (Rutherford classes 2 and 3) in 40% and critical limb ischemia (CLI; Rutherford classes 4 and 5) in 60%. Lesions treated included 61% in the superficial femoral artery, 15% in the popliteal artery, and 24% in both superficial femoral artery and popliteal artery. Mean follow-up was 12.2 months (range, 1-42 months). Overall perioperative morbidity and mortality rates were 13% and 1%. The perioperative major adverse event rate was 3%. Symptom relief (improvement of one Rutherford category or more) was obtained in 64%. Primary patency rates were 56% and 39% at 1 year and 2 years, respectively. Limb salvage rates were 92% and 83% at 1 year and 2 years. Patients with claudication had a lower rate of early perioperative complications (4% vs 19%; $P = .001$). Symptom improvement was 76% for claudication vs 49% for CLI ($P < .001$). Overall, major amputation rate was 0% for claudication vs 13% for CLI ($P < .001$). The primary patency rates at 1 year and 2 years were 59% and 41% for claudication vs 54% and 37% for CLI ($P = .307$). The assisted primary patency rates at 1 year and 2 years were 72% and 52% for claudication vs 64% and 46% for CLI ($P = .223$). Primary patency rates at 1 year and 2 years were 82% and 71% for TASC A to C lesions vs 29% and 14% for TASC D lesions ($P < .001$). Limb salvage rates at 1 year and 2 years were 100% and 100% for claudication vs 85% and 74% for CLI ($P < .001$).

Conclusions: Clinical outcomes after DCB angioplasty in femoropopliteal lesions were inferior to what has been reported in previous studies, particularly for TASC D lesions. Further investigation from real-world experience with long-term follow-up is needed to confirm these results.