

**Conclusions:** This study demonstrates that CAS fractures are not associated with an increased risk of restenosis. The true incidence of stent fracture may be underestimated by x-ray analysis due to limited resolution and frequent artifacts. Additional methods to evaluate for subtle CAS fractures may assist in defining a more precise incidence and might lead to insight into the potential etiologies. Further evaluation with a larger study population and a longer follow-up both for stent integrity and its association with restenosis or adverse clinical outcomes is needed.

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#### Inferior Vena Cava Stenting: Technical Considerations, Early Outcomes, and Long-Term Durability

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**Objectives:** Inferior vena cava (IVC) thrombosis is an uncommon condition but can cause devastating complications to those affected. Historically, this has been treated with an open surgical approach, with high morbidity, and with angioplasty in more recent years. We describe technical aspects of IVC stenting in patients with recalcitrant chronic occlusive disease and evaluate its outcomes.

**Methods:** We reviewed all of the patients treated in an endovascular fashion for venous pathology at our institution from 2005 to 2014 to identify and include those with IVC stent placement. Clinical characteristics, treatment details, and outcomes data were collected using medical records. Primary end points were technical success, symptom resolution, freedom from reintervention, and patency rate at follow-up.

**Results:** Twenty-eight patients (15 males), with mean age of  $48 \pm 14$  years, underwent IVC stent placement for 16 occlusions (four congenital) and 12 high-grade stenoses. Hypercoagulable state was noted in 14 patients, seven of whom had malignancy. A previously placed IVC filter was present in 13 patients. Median time from onset of symptoms to presentation was 81 months (range, 3-480 months). Lytic therapy with alteplase was performed in 12 patients for a mean of  $2 \pm 1$  days. Self-expanding stents (Wallstent) were used in the IVC in 22 patients, with adjunctive use of balloon-expandable (Palmaz) stents in seven patients. Technical success was 100%. At a median follow-up of 10 months (range, 0-56 months), thrombotic complications requiring reintervention occurred in four patients at 1, 4, 8, and 37 months. One patient died at 2 weeks secondary to underlying malignancy. Freedom from reintervention, patency rate, and symptom-free survival rate at 2 years were 84%, 90%, and 80%.

**Conclusions:** Endovascular stenting for chronic occlusive disease of the IVC is safe, effective, and durable, with minimal morbidity. The reintervention rate is low, with excellent outcomes.

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#### Optimal Management of Renal Artery Aneurysms: Observation Versus Intervention

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**Objectives:** This study evaluated outcomes of treated renal artery aneurysms (RAAs) and the natural history of observed RAAs.

**Methods:** A total of 114 patients with RAA managed from 1994 to 2014 were retrospectively reviewed. Primary outcomes included morbidity and mortality of RAAs treated operatively (OP) with open and endovascular procedures and aneurysm growth rate and risk of rupture in patients managed nonoperatively (NOP). Secondary outcomes included renal artery patency and need for reintervention in the OP group and kidney function in the OP and NOP groups.

**Results:** There were 49 OP patients (34 females) and 66 NOP (31 females). Three RAAs ruptured (sizes: 34, 36, and 41 mm). Mean aneurysm size was  $26.8 \pm 8.9$  mm (OP) and  $13.6 \pm 5.2$  mm (NOP;  $P < .001$ ). A total of 57% of patients in OP were symptomatic, with flank pain (24%), hematuria (18%), and severe hypertension (18%). Nine (19%) and 29 (60%) of OP patients had a RAA  $<20$  and  $<30$  mm, respectively. RAA location in the OP included the primary bifurcation in 28, main renal artery in 8, upper and lower segmental pole branches in 5 each, and middle segmental pole branch in 2. Operative management included RAA resection and saphenous vein graft (SVG) in 15, vein patch in 11, primary repair in 7, ex vivo reconstruction in 7, Dacron graft in 2, internal iliac artery patch in 1, and endovascular

coil embolization in 3. Mean renal ischemia time was  $56 \pm 48$  minutes (ex vivo:  $151 \pm 27$  minutes; not ex vivo:  $40 \pm 27$  minutes). The 30-day mortality was 0%. One patient had a nephrectomy at the time of repair due to venous injury, and a second one occurred at 3.7 months due to SVG occlusion. One patient underwent concomitant splenectomy. One patient's operation was aborted due to inflammation from a previously ruptured and coiled RAA, who subsequently underwent definitive embolization. Complications included pancreatitis ( $n = 1$ ) and reexploration for small bowel obstruction ( $n = 1$ ) and bleeding ( $n = 1$ ). RAA reintervention was 0%. NOP RAAs were followed up for  $76.8 \pm 54.4$  months and had a growth rate of  $0.3 \pm 0.9$  mm/y. There were no ruptures and no conversions to OP. Kidney function in NOP remained stable ( $\Delta$  glomerular filtration rate,  $5.4 \pm 21.1$  mL/min) but worsened in OP ( $\Delta$  glomerular filtration rate,  $5.9 \pm 23.5$  mL/min;  $P = .008$ ).

**Conclusions:** No RAA  $<34$  mm ruptured. Because the rate of growth is slow and kidney function remains stable without repair, RAA  $<30$  mm should be observed unless symptoms occur.

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#### A Comparison of Results With Eversion Versus Conventional Carotid Endarterectomy From the Vascular Quality Initiative

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**Objectives:** Carotid endarterectomy (CEA) is usually performed with eversion (ECEA) or conventional (CCEA) techniques. Previous studies report conflicting results with respect to outcomes for ECEA and CCEA. We compared patient characteristics and outcomes for ECEA and CCEA.

**Methods:** Deidentified data for CEA patients were obtained from the Society for Vascular Surgery Vascular Quality Initiative database. Patients undergoing reoperative CEA or CEA concurrent with cardiac surgery were excluded, leaving 2828 ECEA and 20,831 CCEA for comparison. Univariate analysis compared patients, procedures, and outcomes. Survival analysis was also performed for primary outcomes of mortality, cerebral ischemic events, restenosis, and reintervention.

**Results:** Groups were similar with respect to gender, comorbidities, and preoperative neurologic symptoms, except that ECEA patients tended to be older ( $71.3$  vs  $69.9$  years;  $P < .0001$ ). CCEA was more often performed with general anesthesia ( $92\%$  vs  $81\%$ ;  $P < .001$ ) and with a shunt ( $59\%$  vs  $24\%$ ;  $P < .001$ ). Perioperative ipsilateral neurologic events (ECEA,  $1.3\%$  vs CCEA,  $1.2\%$ ;  $P = .90$ ) and any stroke ( $1.0\%$  vs  $0.8\%$ ;  $P = .38$ ) were uncommon in both groups. ECEA tended to take less time ( $100$  vs  $113$  minutes;  $P < .001$ ) but more often required a return to the operating room for bleeding ( $1.4\%$  vs  $0.8\%$ ;  $P = .003$ ). Kaplan-Meier 30 day freedom from stroke or death was similar ( $97.7\%$  vs  $97.6\%$ ;  $P = .17$ ). The 1-year freedom from recurrent stenosis  $>50\%$  was lower for ECEA ( $88.9\%$  vs  $94.1\%$ ;  $P < .0001$ ). However, ECEA and CCEA both had a very high rate of freedom from reoperation at 1 year ( $99.6\%$  vs  $99.5\%$ ;  $P = .98$ ).

**Conclusions:** ECEA and CCEA appear to provide similar freedom from neurologic morbidity, death, and reintervention. ECEA was associated with significantly shorter procedure times. Furthermore, ECEA obviates the expenses of a patch, typically used in CCEA, and a shunt, more often used in CCEA in this database. However, these potential benefits may be reduced by a slightly greater requirement for early return to the operating room for bleeding.

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#### Cost Analysis of Trellis Device Versus Catheter-Directed Thrombolysis for Lower Extremity Deep Vein Thrombosis

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**Objectives:** This study assessed total costs for lower extremity deep vein thrombosis (DVT) treatment using the Trellis device or