GA group vs 73% in the CBA group ($P = .0085$). Thirty percent of all patients required both vasopressors and antihypertensives during surgery; 23% (CBA) vs 34% (GA; $P = .0457$). There were no postoperative complications or mortality in the CBA cohort. The GA cohort developed postoperative complications (myocardial infarctions, 4; stroke, 6; hematoma, 9); however, these complications were not statistically significant compared with the CBA group.

Conclusions: For patients undergoing CEA, CBA resulted in less hemodynamic fluctuations and fewer vasvasoactive medication requirements as compared with GA.

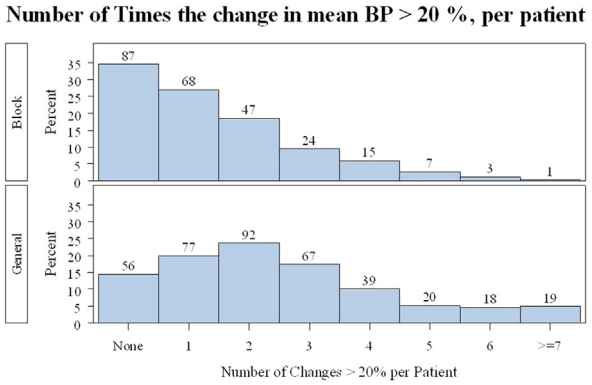


Fig. *BP,* Blood pressure

Endovascular Repair of Popliteal Artery Aneurysm: A Comparison of Outcomes with Contemporary Open Surgical Repair

Ying Huang, Peter Gloviczki, Gustavo S. Oderich, Audra A. Duncan, Manju Kalra, Mark D. Fleming, Thomas C. Bower. Mayo Clinic, Rochester, Minn

Objectives: To compare outcomes after endovascular repair (ER) and open surgical repair (OR) of popliteal artery aneurysms (PAAs).

Methods: Clinical data of PAA patients treated between 2005 and 2012 were reviewed. Primary endpoints were major adverse events (MAE) including mortality, thrombosis, amputation, complications, and reinterventions.

Results: A total of 46 limbs of 38 patients (37 males; mean age, 81 ± 6.4 years) were treated with ER, electively (n = 34) or emergently (n = 12). A mean of 2.0 Viabahn stent grafts were used. Thirty-day mortality and amputation was 0 after elective ER and 17% (2/12) after emergencies. Thirty-day patency was 100% after elective ER and 75% (3/12) after emergencies. MAE was 8.8% after elective and 58% after emergency ER ($P = .0007$). Mean follow-up was 2.3 years (range, 1 month to 6.0 years). Three-year primary and secondary patencies were 72% and 82% for electives and 60% and 83% for emergencies ($P > .05$), freedoms from reintervention were equivalent (69% vs 55%), and limb salvage and freedom from MAE rates were higher for electives than for emergencies (100% vs 83% and 63% vs 30%; $P < .05$). One hundred ten limbs of 91 patients (90 males; mean age, 71 ± 9.8 years) were treated with OR, electively (n = 98) or emergently (n = 12). Autogenous veins (n = 89) or PTFE (n = 21) were used as bypass grafts. Thirty-day amputation rate was 0, one patient died (1%), and one graft (1%) thrombosed after elective OR. Thirty-day MAE was 7.1% after elective and 33% after emergency OR ($P = .02$). Mean follow-up was 3.4 years (range, 1 month to 8.0 years). Three-year primary and secondary patencies were 82% and 90% for electives, 83% and 92% for emergencies ($P > .05$), limb salvage rates were similar (99% vs 100%), and freedoms from reintervention and freedom from MAE rates were higher for electives than for emergencies (85% vs 67% and 77% vs 58%; $P < .05$). ER and OR in elective interventions had similar patencies and MAE; hospitalization was longer after OR. Emergency repair prolonged intensive care unit stay after ER but hospital days, patencies, and MAE were similar. Factors affecting MAE included ER and emergency repair.

Conclusions: PAAs with ER and emergency repair continue to have elevated MAEs. Both elective ER and OR have excellent early results and similar late outcome. Selective use of ER in patients who need emergency repair is clearly warranted.

The Effect of Extremity Vascular Complications on the Outcomes of Cardiac Support Device Recipients

J. Westley Ohman, Chandu Vemuri, Sunil Prasad, Scott Silvestry, Jeffrey Jim, Patrick Geraghty. Washington University St. Louis, St. Louis, Mo

Objectives: To assess the effect of extremity vascular complications (EVC; including ischemia and vessel trauma) on the outcomes of patients receiving cardiac support devices (CSD; including ventricular assist device [VAD] and extracorporeal membrane oxygenation [ECMO]).

Methods: Institutional review board-approved, retrospective review of a prospectively maintained database of all temporary and permanent CSD recipients from 7/1/10 to 6/30/12. Patient demographics, procedural data, and outcomes were analyzed. The primary endpoint was all-cause mortality at 30 days post-CSD initiation.

Results: Of 208 patients who received CSDs, 31 (14.9%) experienced EVC: 13 (8.9%) of the 146 permanent VADs, 10 (26.3%) of the 38 temporary VADs, and eight (33.3%) of the 24 ECMO patients. The 30-day mortality was significantly higher for temporary VAD patients who experienced EVC versus those that did not (80.0% vs 35.7%; $P = .03$). However, 30-day mortality was not significantly impacted by EVC in the permanent VAD (15.4% EVC vs 4.5% without EVC; $P = .15$) and ECMO patients (50.0% vs 68.75%; $P = 1.00$). Preinitiation peripheral arterial disease and cardiogenic shock did not significantly differ between the CSD groups. Outcomes for CSD subgroups following the occurrence of EVC are shown in Table.

Table. Outcomes for 31 cardiac support device (*CSD*) recipients who experienced extremity vascular complications (*EVC*)

	Permanent VAD	*Temporary VAD*	*ECMO*
CSD recipients experiencing EVC	13	10	8
Outcomes			
Any vascular procedure, n (%)	7 (53.9%)	9 (90.0%)	6 (75.0%)
Revascularization, n (%)	5 (38.5%)	4 (40.0%)	2 (25.0%)
Amputation, n (%)	0 (0.0%)	1 (10.0%)	1 (12.5%)
Withdrawal of care, n (%)	3 (23.1%)	8 (80.0%)	4 (50.0%)
Time to death after EVC, days (± SEM)	60.14 ± 21.48	15.38 ± 2.34	15.20 ± 7.21
30-day mortality after EVC, n (%)	2 (15.4%)	8 (80.0%)	4 (50.0%)

ECMO, Extracorporeal membrane oxygenation; *SEM,* standard error of the mean; VAD, ventricular assist device.

Conclusions: In temporary VAD recipients, the development of extremity vascular complications results in higher 30-day mortality and more frequent withdrawal of care. In contrast, extremity vascular complications in the permanent VAD and ECMO groups did not significantly impact mortality or withdrawal of care. This prognostic data may be useful in the management of these challenging patients.

Altered Sca-1+ Progenitor Cell Populations in Diabetic Mice Are Associated with Increased Neointimal Hyperplasia After Vascular Injury

Jill R. Streams, Janet Martinez, Megan Flynn, Melina R. Kibbe. Department of Vascular Surgery, Northwestern University, Chicago, Ill

Objectives: Diabetic patients exhibit poor outcomes after vascular interventions, predominantly due to development of neointimal hyperplasia. While diabetic mice have been shown to have diminished Sca-1+ stem cells in their bone marrow, the role of Sca-1+ cells in the vasculature is unknown. We hypothesize that diabetic mice have diminished Sca-1+ stem cell populations in the arterial wall compared with wild type (WT) mice. We also hypothesize that vascular injury will alter the presence and distribution of Sca-1+ cells in the arterial wall.

Methods: The femoral artery wire injury model was performed in 8- to 12-week-old male Lepr *db/db* diabetic and C57BL/6 WT mice. Treatment groups included control and injury. Femoral arteries were harvested at 24 hours and 3 days and assessed for Sca-1+ cells with immunofluorescence (n = 5). Sca-1+ staining was graded on a scale of 0 to 4 in four

high-power fields per section. Femoral arteries were harvested at 2 weeks for morphometric analysis (n = 6).

Results: Lumen area and artery circumference did not differ between diabetic and WT mice at baseline. However, Sca-1+ staining was significantly diminished in the adventitia of uninjured diabetic vs WT arteries (2.2 ± 0.1 vs 2.9 ± 0.1; $P < .001$). Both diabetic and WT mice showed progressive depletion of Sca-1+ staining in the adventitia at 24 hours (1.2 ± 0.2 and 1.9 ± 0.1; $P < .001$, respectively) and 3 days (0.9 ± 0.1 and 2.2 ± 0.2; $P < .001$, respectively) after injury. While Sca-1+ staining in the media transiently increased 24 hours postinjury in both strains before returning to baseline, the magnitude of increase was much greater for WT than diabetic mice (96% vs 39%). Two weeks after arterial injury, diabetic mice developed significantly more neointimal hyperplasia compared with WT mice (56% increase vs WT; $P = .04$).

Conclusions: Baseline morphology of mouse femoral arteries did not differ between diabetic and WT strains. However, the diabetic mice were found to have diminished adventitial Sca-1+ cells at baseline and a blunted increase in medial Sca-1+ cells following injury compared with WT mice. Given that diabetic mice exhibit more neointimal hyperplasia after vascular injury, these data suggest that changes in the distribution of Sca-1+ progenitor cells within the arterial wall may be involved in regulating the response to vascular injury in diabetic patients.

Repair of the Isolated Nontraumatic Aortic Arch Aneurysm

Himanshu J. Patel, Vikram Sood, David M. Williams, Narasimham L. Dasika, G. Michael Deeb. Department of Cardiac Surgery, University of Michigan Hospitals, Ann Arbor, Mich

Objectives: Repair of isolated aortic arch aneurysms (nontraumatic) by either open (OAR) or endovascular (TEVAR) methods is associated with need for either hypothermic circulatory arrest, complex debranching procedures, or use of marginal proximal landing zones. This study evaluates outcomes for treatment of this cohort.

Methods: Of 2039 patients undergoing arch repair (1993 to 2013), 121 (mean age, 58.9 years) were treated with isolated arch resection for nontraumatic pathology. Treatment was by OAR (93), hybrid (9), or TEVAR (19) methods, with the latter two approaches reserved for poor OAR candidates. Treatment was predominantly for saccular (44), fusiform (29) aneurysms, or dissection (13). Rupture was present in 16%. Prior aortic repair was performed in ascending (31), arch (39), descending (22), or abdominal (9) aorta.

Results: Early mortality was seen in nine (7%). Morbidity included stroke (8), paraplegia (1), and need for dialysis (5) or tracheostomy (10). A composite outcome of these morbidities was independently predicted by presentation with rupture ($P = .01$) or increasing creatinine ($P = .06$). Ten-year survival was 71.7%, with mortality predicted by increasing age, perioperative stroke, or peripheral vascular disease (all $P < .05$). Ten-year freedom from aortic rupture/reintervention was 75.7% and was higher after OAR (2-year OAR 94.2% vs TEVAR or hybrid 72.5%; $P = .004$).

Conclusions: Isolated arch repair remains a high risk procedure occurring frequently in the reoperative setting. Despite being performed in a higher risk group, endovascular strategies yielded similar outcomes, but with an increased risk for aortic related complications. These data support ongoing efforts to develop branched endografts specifically tailored for arch pathology to potentially reduce morbidity related to currently available approaches.

Impact of Amputation Level and Comorbidities on Functional Status of Elderly Adults before and after Lower Extremity Amputation

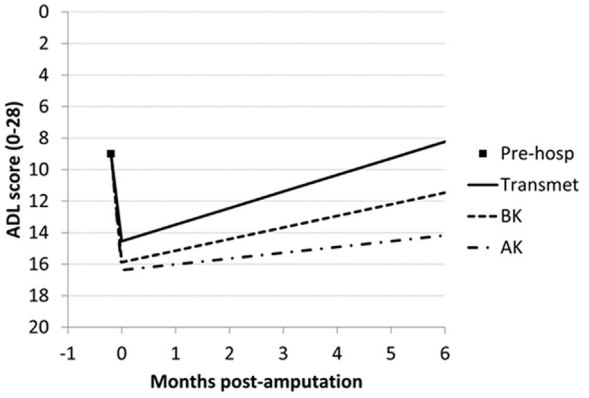
Todd R. Vogel, Gregory F. Petroski, Robin L. Kruse. University of Missouri Hospitals and Clinics, Columbia, Mo

Objectives: Nursing home residents' ability to independently function is associated with their quality of life. The impact of amputations on functional status in the elderly remains unclear, and this analysis evaluated the following amputations: transmetatarsal (TMA), below-knee (BK), and above-knee (AK).

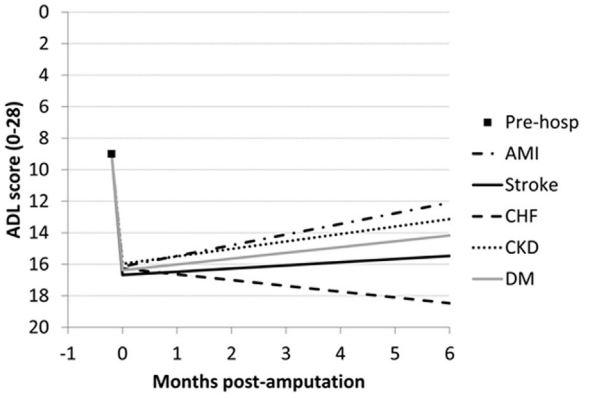
Methods: Medicare inpatient claims were linked with nursing home assessment data to identify admissions for amputations. Residents with a previous AK and residents sustaining a stroke in the previous 6 months were excluded. A functional score (0-28; higher indicating greater impairment) based on activities of daily living (ADL), walking, and locomotion was calculated before and after amputation. Hierarchical modeling determined the effect of the surgery on residents' postamputation function. Controlling for comorbidity, cognition, and prehospital function allowed for evaluation of ADL trajectories over time.

Results: A total of 4965 patients underwent amputation: 490 TMA, 1596 BK, and 2879 AK. Mean age was 81 years, and 54% of the patients were women. Most were white (67%) or African-American (26.5%). Comorbidities prior to amputation included: diabetes 70.7%; coronary heart disease 57.1%; chronic kidney disease 53.6%; and/or congestive heart failure (CHF) 52.1%. Mortality within 30 days of hospital discharge was 9.0% and hospital readmission was 27.7%. CHF was associated with the poorest functional outcome after AK. Compared with patients who received TMA, those who had BK or AK recovered more slowly and did not return to their baseline function by 6 months. BK was found to have a superior functional trajectory.

Conclusions: Elderly patients undergoing BK or AK amputation failed to return to their functional baseline within 6 months. Thirty-day mortality and readmission were high. BK amputation had a better functional trajectory compared with AK amputation. CHF, stroke, and diabetes were the most predictive for poor functional outcomes after an AK amputation. Among frail elderly nursing home residents, amputation level remains an important predictor of future overall functional status and should be strongly assessed to maintain ADL and quality of life in this ailing population.



Post-amputation ADL trajectories for a 80-year old male nursing home resident with pre-hospital ADL function=9, CPS=1, diabetes, and median hospital length of stay (8 days)



Post-amputation ADL trajectories for an 80-year old male nursing home resident with pre-hospital ADL function=9, CPS=1, above knee procedure, and median hospital length of stay (8 days)

Fig. *ADL,* Activities of daily living; *AK,* above-knee amputation; *BK,* below-knee amputation; *CHF,* congestive heart failure; *CKD,* chronic kidney disease; *DM,* diabetes mellitus; *Transmet,* transmetatarsal.