

treatment was delayed by uncertainty regarding the source. In all three, initial aneurysm dilatation was followed by shrinkage. The failed treatment of a type I endoleak in a case of aortic dissection resulted in the only rupture in the entire series. Type II endoleaks were not treated.

Conclusions: Persistent aneurysm dilatation was a rare event after endovascular repair using a multibranched endovascular stent graft, probably because most direct endoleaks (types I and III) were treated, whereas untreated type II endoleaks appear to have had little effect on aneurysm size.

Outcomes of Lower Extremity Revascularization (LER) in Patients on Dialysis

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Objectives: Dialysis patients with peripheral vascular disease (PVD) are at high risk for complications after surgical bypass, and it is not clear if endovascular interventions have affected survival and limb salvage in this patient population. We sought to characterize the outcomes of endovascular (endo) and open revascularization in dialysis patients treated for claudication or critical limb ischemia (CLI).

Methods: The United States Renal Data System (USRDS) was used to review all patients undergoing lower extremity revascularization (LER) in dialysis patients in the United States between 2005 and 2008. Diagnoses and procedures were identified by International Classification of Diseases-9th Revision and Current Procedural Terminology codes, respectively. Primary outcomes were mortality and limb salvage. Bivariate associations were tested using the χ^2 test, and predictors were identified using Cox regression models.

Results: A total of 12,029 incident dialysis patients underwent LER (24% endo, 76% open). CLI was the indication in 79.9% of endo LER, and 72.8% of open LER. The major amputation rate ≤ 30 days for CLI patients was 15.1% (15.7% endo, 13.1% open; $P = .002$) and for claudicant patients was 5.2% (5.2% endo, 4.9% open; $P = .771$). At 1 year, 32.0% of CLI patients (33.0% endo, 29.1% open; $P < .001$) and 14.4% of claudicant patients (14.0% endo, 16.4% open; $P = .254$) had undergone a major amputation. The mortality rate at 30 days for CLI patients was 7.8% (7.2% endo, 9.8% open; $P = .001$) and for claudicant patients was 5.2% (4.7% endo, 7.9% open; $P = .018$). At 1 year, the mortality rate was 38.4% for CLI patients (37.6% endo, 40.9% open; $P = .005$) and 25.7% for claudicant patients (25.7% endo, 25.2% open; $P = .820$). There were no significant differences between estimated survival for endo and open procedures at 1 year when stratified by clinical indication. Estimated limb salvage differed significantly between open and endo LER only among CLI patients, with open LER associated with improved limb salvage ($P = .001$; Fig). Significant predictors of post-LER mortality were older age ($P < .001$) and congestive heart failure ($P < .001$).

Conclusions: Mortality and amputation rates after LER for dialysis patients are significant, particularly for patients with CLI. Although open LER is associated with improved limb salvage compared with endo LER, mortality is greater at 30 days and 1 year. Given the high overall mortality rates, the presence of dialysis-dependence questions the indication for LER, especially for claudication.

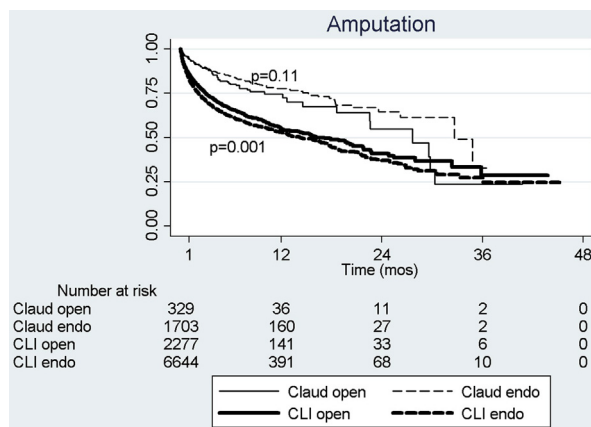


Fig. Amputation survival rates by indication and type of intervention.

Long-Term Results for Primary Bypass Versus Primary Angioplasty/Stent for Lower Extremity Critical Limb Ischemia

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Objectives: Long-term results comparing percutaneous transluminal angioplasty \pm stent (PTA/S) and surgical bypass grafting (BPG) for critical limb ischemia (CLI) in patients who have had no prior intervention have not been extensively reported. We detail our results with 3-year follow-up.

Methods: We reviewed all lower extremity revascularization procedures at our institution from January 2005 to December 2010, where 927 patients presented for CLI and underwent a first-time intervention. Outcomes included complications, restenosis, symptom recurrence, reinterventions, minor and major amputations, and mortality. Predictors for reintervention and amputation were identified using a Cox regression model.

Results: Of the 927 patients, 519 underwent BPG and 408 underwent PTA/S. BPG were above the knee in 58% (40% vein) and below the knee in 42% (100% vein). Mean age was 70.5 years (BPG) vs 72.4 years (PTA/S; $P = .03$), with more males undergoing BPG (64% vs 52%; $P < .01$). Mean length of stay was 10 days for BPG vs 7.4 days for PTA/S ($P = .02$), with 3-year reintervention rates significantly lower in patients undergoing BPG (42% vs 54%; $P < .01$). There were no differences in perioperative mortality (3% vs 2%; not significant). Wound infection was 11% in BPG patients; however, BPG showed improved freedom from restenosis of 78% vs 67% at 3 years (odds ratio [OR], 1.6; 95% confidence interval [CI], 1.2-2.1). A Cox regression model of all patients showed that a reintervention ≤ 3 years was predicted by PTA/S (OR, 1.6; 95% CI, 1.1-2.3; Fig) and a history of smoking (OR, 1.3; 95% CI, 1.0-1.6). Major amputations were predicted by gangrenous indications (OR, 1.9; 95% CI, 1.1-3.5) and were not predicted by procedure type.

Conclusions: BPG for the primary treatment of CLI showed improved freedom from restenosis and significantly fewer reinterventions than PTA/S ≤ 3 years but was associated with increased length of stay and wound infection. Perioperative mortality and 3-year amputation rates were similar between procedure types.

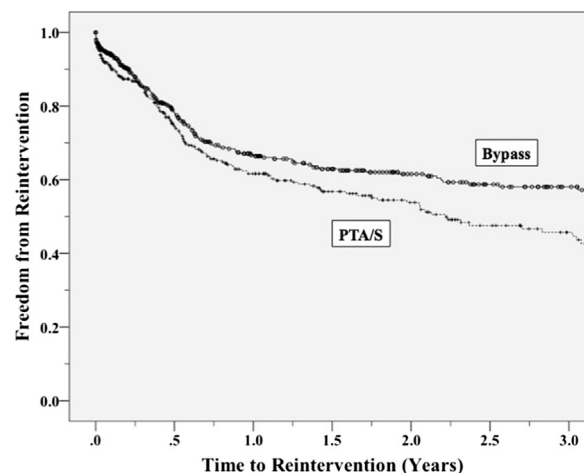


Fig. Freedom from reintervention.

Morbidity and Mortality After Acute Lower Extremity Embolization: A Ten-Year Experience

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Objectives: Acute lower extremity ischemia secondary to thromboembolism is a common problem treated by vascular surgeons. Contemporary data regarding this problem are sparse. This report examines a 10-year single-center experience with acute lower extremity thromboembolism and describes the surgical management and outcomes observed.

Methods: Consecutive patients treated surgically for acute lower extremity embolization from January 2002 to September 2012 were identified using International Classification of Diseases-9th Revision and Current Procedural Terminology codes. Iatrogenic cases and cases secondary to trauma were excluded. Demographic, comorbidity, presentation, operative management, postoperative morbidity, and mortality data were abstracted from the electronic medical record. Data were examined using count (%), median, or mean \pm standard deviation, and product-limit survival analysis.

Results: The identified study sample included 170 patients (47% female). Mean age was 69 years, and 80% were white. Eighty-two patients (49%) had a known history of atrial fibrillation, and four (2%) had a warfarin-associated international normalized ratio ≥ 2.0 . Eighty-three percent presented >6 hours after symptom onset. Nine percent presented with a concurrent stroke. Femoral artery exposure for embolectomy was the preferred initial mode of treatment. Additional popliteal exposure for inadequate clearance of tibial occlusion was required in 4% of cases, 10% of cases used a popliteal-only approach for isolated distal occlusions, and local instillation of thrombolytic agents was used in 16% of cases. Fasciotomies were performed in 39% of cases. An unexpected return to the operating room occurred in 24% of cases. Eleven patients (6%) required bypass for limb salvage during the initial hospitalization. Amputation was required during the index hospitalization in 26 patients (15%) and after initial discharge in an additional six patients (4%). In-hospital or 30-day mortality was 18%. Median length of stay was 8 days, and 34% of patients required discharge to a skilled facility. Recurrent embolization occurred during follow-up in 23 patients (14%) at a median interval of 1.6 months. Amputation-free and overall survival estimates for the study sample at 5 years were 75% and 49%, respectively.

Conclusions: Despite advances in contemporary medical care, lower extremity arterial embolization remains a condition that is associated with significant morbidity and mortality. Furthermore, the condition is resource intensive to treat and could be prevented (either initially or in recurrence) in a substantial subset of patients.

Trends in the Utilization and Cost of Ambulatory Endovascular Procedures

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Objectives: Endovascular therapy is used increasingly for the treatment of claudication and limb threat from peripheral arterial disease (PAD). These procedures may be performed in inpatient hospital-associated ambulatory or freestanding ambulatory settings, although utilization and costs in the ambulatory setting have not been studied. We aim to evaluate trends in the utilization and cost of endovascular procedures across health care settings.

Methods: The State Ambulatory Surgery Databases (SASD) and State Inpatient Databases (SID) of Florida, New Jersey, California, and Maryland from 2005 to 2009 were queried for patients undergoing elective endovascular procedures for PAD. Utilization trends for these procedures were stratified by indication (claudication vs critical limb ischemia [CLI]) and service location (freestanding ambulatory, hospital-associated ambulatory, inpatient). Because freestanding data were available for Florida only, comparison of health care charges across locations was restricted to this state. Inpatient charges for cases with length of stay >1 day were excluded from cost analysis.

Results: We identified 101,910 procedures: 64,722 (64%) for claudication and 37,188 (36%) for CLI. Overall procedure volume increased 57% from 2005 to 2009. Utilization of ambulatory facilities (freestanding and hospital-associated) for claudication increased 84% from 2005 to 2009 (6188 to 11,547), whereas inpatient procedures declined 11% from peak utilization in 2007 to 2009 (4421 to 3947). Freestanding procedures for claudication showed the most pronounced increase, with 444% (47 to 256) during the study period. Procedures for CLI increased in all service locations (ambulatory: 2606 to 4936, 89%; inpatient: 3173 to 3619, 14%). Total charges for treatment of claudication in freestanding centers were only 53% of hospital-associated ambulatory centers (\$14,727 vs \$27,945), whereas total charges for treatment of CLI were similar in freestanding vs hospital associated ambulatory centers (\$26,704 vs \$27,072). Inpatient charges far exceeded both ambulatory locations (claudication: \$39,900; CLI: \$41,368).

Conclusions: Freestanding and hospital-associated ambulatory endovascular procedure utilization is increasing for both claudication and CLI. Treatment of claudicant patients in freestanding centers appears to be particularly cost-effective.

Endovascular Case Volume Per Year

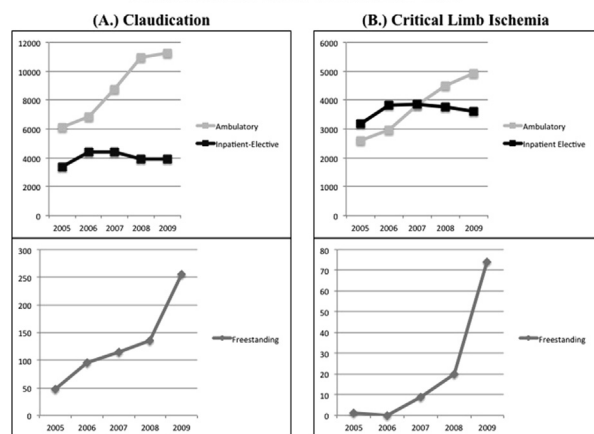


Fig. Annual endovascular case volume by indication and procedure site.

Dacron® vs Polytetrafluoroethylene Grafts for Above-Knee Lower Limb Arterial Bypass

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Objectives: Surgical revascularization for lower limb ischemia remains an important component for optimization of quality of life and symptomatology in patients with peripheral arterial disease. The objective of this meta-analysis is to establish which prosthetic graft, Dacron or polytetrafluoroethylene (PTFE), has the better long-term patency in patients undergoing an above-knee femoropopliteal arterial bypass.

Methods: This meta-analysis was performed using Cochrane and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. An electronic search of all relevant databases was performed from 1990 to 2013 using the Medical Subject Headings: "Dacron," "PTFE," "above knee," "femoropopliteal," and "bypass." The inclusion criteria were randomized controlled trials, use of Dacron vs PTFE prosthetic conduits, and completion of an above-knee femoropopliteal arterial bypass involving adult patients aged >18 years presenting with disabling claudication, rest pain, or tissue loss, occlusion of the superficial femoral artery, and reconstitution of the above-knee popliteal artery. Graft patency rates were calculated using RevMan 5.1 software. When multiple studies were evaluated, original patency rates were documented when only one study result was available.

Results: Ninety-one publications were reviewed. After exclusion of duplicate, nonrandomized, and alternative bypass surgery studies, four randomized controlled trials were identified involving 957 patients comprising 476 Dacron and 481 PTFE above-knee lower limb arterial bypasses. Mean age reported was 66 years, and all patients had generalized cardiovascular comorbidities and risk factors. Two studies evaluated 6-mm grafts, one assessed 8-mm grafts, and the other study included graft sizes between 5 mm and 8 mm. Although primary and secondary patency rates at 12 months were not significantly different (RR, 0.47; $P = .52$ and RR, 0.84; $P = .52$), 24- and 60-month primary patency rates were better with Dacron compared with PTFE grafts (RR, 0.81; $P = .03$; and 52% vs 36%; $P = .04$). Statistical analysis also supported higher secondary patency rate for Dacron at 24 months (RR, 0.75; $P = .02$) and 60 months (70% vs 51%; $P = .01$). Ten-year patency rates were similar. Antiplatelet/anticoagulation therapy was prescribed in 85% of patients in one trial. However, exact best medical therapy strategies were not described in the other studies. There was no difference in amputation, overall morbidity, or mortality rates between the two surgical graft populations.

Conclusions: Current evidence suggests that Dacron prosthetic grafts are superior to PTFE grafts in above-knee femoropopliteal arterial bypass procedures. Further randomized trials targeting standardization of confounding variables, particularly graft size and best medical therapy, are warranted.