

devices placed by interventional radiology (OR, 2.577; 95% CI, 1.41-4.68) were associated with PICC-bloodstream infection. Catheter lumens were strongly associated with this event (double lumen, OR 5.21; 95% CI, 2.46-11.04, and triple lumen, OR, 10.84; 95% CI, 4.38-26.82). With multivariable analysis only hospital length of stay, ICU status, and number of PICC lumens remained significantly associated with PICC-bloodstream infection. In fact, the HR for PICC lumens increases substantially over time suggesting earlier time to infection among patients with multi-lumen PICCs (HR, 4.08; 95% CI, 1.51-11.02, and HR, 8.52; 95% CI, 2.55-28.49 for double- and triple-lumen devices, respectively).

Comment: Assuming patients are in the hospital and in the intensive care unit only because they need to be, the only modifiable risk factor for PICC-associated bloodstream infection appears to be the number of lumens in the catheter placed. The data suggests the number of lumens should be kept as low as possible and multilumen catheters should only be used when absolutely necessary.

Pressure Control During Preparation of Saphenous Veins

Li FD, Eagle S, Brophy C, et al. *JAMA Surg* 2014;149:655-62.

Conclusions: During preparation of vein grafts, limiting vein graft distension with a pressure release valve preserves endothelial integrity, and reduces intimal hyperplasia.

Summary: Long-term patency of vein conduits in the arterial system is limited because of vein graft failure largely secondary to loss of endothelial coverage and intimal hyperplasia. LoGerfo in the early 1980's identified that integrity of vein grafts is at least partially a function of initial intimal and neointima preservation in preparation of the vein graft (LoGerfo FW et al, *Surgery* 1981;90:1015-24). Flushing vein grafts during preparation with uncontrolled pressure can result in high intraluminal pressure which can exceed 600 mm Hg, and result in denudation of the endothelium and a subsequent inflammatory response that may lead to intimal hyperplasia (Khaleel MS et al, *Ann Thorac Surg* 2012;93:552-8). In this study the authors sought to investigate if pressure distension during vein graft preparation leads to endothelial injury and intimal thickening. The hypothesis was that by limiting pressure during distension, neointimal thickening would be reduced and would result in preservation of vascular function of the grafts. A pressure limiting device that potentially can be integrated into current distension techniques was utilized in this study. The authors collected segments of human saphenous veins (HSVs) in a university hospital from 13 patients undergoing CABG procedures immediately after harvest (unmanipulated [UM]), after pressure distension (after distension [AD]), and after typical intraoperative surgical graft preparation (after manipulation [AM]). Porcine saphenous veins (PSVs) from 7 healthy research animals were subjected to manual pressure distension with or without an in-line PRV that prevented pressures of 140 mm Hg or greater. Endothelial function of the HSVs and PSVs was determined in a muscle bath and endothelial integrity was assessed and intimal thickening in PSVs evaluated after 14 days in organ culture. The primary outcome measures were endothelial function measured in force, converted to stress, and defined as the percentage relaxation of maximal phenylephrine-induced contraction. Endothelial integrity was assessed by immunohistologic examination. Neointimal thickness was measured by histomorphometric analysis. Pressure distension of HSVs led to decreased mean (SEM) endothelial-dependent relaxation (5.3% [2.3%] for AD patients vs 13.7% [2.5%] for UM patients; $P < .05$) and denudation. In the AM group, the function of the conduits was further decreased (-3.2% [3.2%]; $P < .05$). Distension of the PSVs led to reduced endothelial-dependent relaxation (7.6% [4.4%] vs 61.9% [10.2%] in the control group; $P < .05$), denudation, and enhanced intimal thickening (15.0 [1.4] μm vs 2.2 [0.8] μm in the control group; $P < .05$). Distension with the PRV preserved endothelial-dependent relaxation (50.3% [9.6%]; $P = .32$ vs control, prevented denudation, and reduced intimal thickening (3.4 [0.8] μm ; $P = .56$ vs controls) in PSVs.

Comment: In its entirety the data appears to demonstrate a causal relationship between manual distension, endothelial, and medial injury, and intimal hyperplasia. Assuming endothelial injury and intimal hyperplasia have adverse effects on vein graft patency, it is possible the use of this simple pressure regulating valve employed in this study may help contribute to long-term vein graft patency in both coronary and peripheral vascular procedures.

Hemodynamic-Guided Fluid Administration for the Prevention of Contrast-Induced Acute Kidney Injury: The POSEIDON Randomized Controlled Trial

Brar SS, Aharonian V, Mansukhani P, et al. *Lancet* 2014;383:1814-23.

Conclusions: Left ventricular end-diastolic pressure-guided fluid administration is a safe and effective method to prevent contrast-induced kidney injury in patients undergoing angiography.

Summary: A common cause of acute kidney injury is contrast-induced. This is associated with both increased morbidity, mortality and health-care costs. There are no known treatments available after acute kidney injury has occurred. Primary focus is therefore to identify preventative therapies. Currently, although many interventions have been assessed to prevent contrast-induced acute kidney injury, none are universally embraced with the exception of intravascular volume expansion. However, the rate and duration of fluid administration around the time of contrast exposure that could optimally prevent acute kidney injury is unclear. In this study, the Prevention of Contrast Renal Injury with Different Hydration Strategies (POSEIDON) trial the authors investigated different rates of fluid administration guided by left ventricular end-diastolic pressure in patients undergoing cardiac catheterization. This was a randomized, parallel-group, comparator-controlled, single-blind phase 3 trial. The trial investigated the efficacy of a new fluid protocol based on left ventricular end-diastolic pressure for the prevention of contrast-induced acute kidney injury in patients undergoing cardiac catheterization. The primary outcome was the occurrence of contrast-induced acute kidney injury, which was defined as an increase in serum creatinine concentration of greater than 25% of baseline or greater than 0.5 mg/dL. Between October 10, 2010 and July 17, 2012, 396 patients aged 18 years or older undergoing cardiac catheterization with an estimated glomerular filtration rate of 60 mL/min per 1.73 m² or less and one or more of several risk factors (diabetes, history of congestive heart failure, hypertension, or age older than 75 years) were randomly allocated in a 1:1 ratio to left ventricular end-diastolic pressure-guided volume expansion (n = 196) or the control group (n = 200) who received a standard fluid administration protocol. Four computer-generated concealed randomization schedules, each with permuted block sizes of 4, were used for randomization and participants were allocated to the next sequential randomization number by sealed opaque envelopes. Patients and laboratory personnel were masked to treatment assignment, but the physicians who did the procedures were not masked. Both groups received intravenous 0.9% sodium chloride at 3 mL/kg for 1 hour before catheterization. Analyses were by intention to treat. Adverse events were assessed at 30 days and 6 months and all such events were classified by staff who were masked to treatment assignment. Findings concluded that contrast-induced acute kidney injury occurred less frequently in patients with left ventricular end-diastolic pressure-guided fluid administration (6.7% [12/178]) than in the control group (16.3% [28/172]; relative risk, 0.41, 95% CI, 0.22-0.79; $P = .005$). Hydration treatment was terminated prematurely because of shortness of breath in three patients in each group. The total mean (SD) volume of normal saline administered was 1727 (583) mL in the left ventricular end-diastolic pressure-guided group vs 812 (142) mL in the control group ($P < .001$).

Comment: The study is possible because left ventricular end-diastolic pressure is a haemodynamic parameter routinely obtained during cardiac catheterization. Obviously that is not the case in angiographic procedures performed for other reasons. Nevertheless, the fact patients who had end-diastolic monitoring to guide their fluid administration received larger volumes of fluid and had decreased levels of acute kidney injury compared to the control group, implies that more aggressive hydration of patients at the time of administration of contrast than is routinely performed could be an effective strategy to reduce contrast-induced acute kidney injury.

Sex Differences in the Association Between Smoking and Abdominal Aortic Aneurysm

Stackelberg O, Björck M, Larsson SC, et al. *Br J Surg* 2014;101:1230-7.

Conclusions: There are sex differences in the association between smoking status and abdominal aortic aneurysm (AAA) risks. Further investigation of targeted AAA screening among women who smoke is indicated.

Summary: Ultrasound screening for AAA among men has been demonstrated by randomized trials to be an effective strategy to prevent rupture and aneurysm associated death. AAA is considered more dangerous in women than men, but thus far there's no randomized data supporting ultrasound screening among women for AAA. However, the Society for Vascular Surgery and the European Society for Vascular Surgery have both suggested that ultrasound screening in women as an effective strategy to prevent aneurysm related death in women. It is known that smoking and the risk of AAA is widely correlated and that smoking cessation is one of the few medical strategies that can decrease the expansion and rupture rate of small screen detected AAA (Sweeting MJ et al, *Br J Surg* 2012;99:655-65). In this study the authors sought to investigate sex specific, dose response associations between smoking (smoking status, pack-years smoked, and smoking cessation) and risk of developing AAA in two large, comparable, population-based prospective cohorts of women and men from central Sweden. Women in the Swedish Mammography Cohort and men in the Cohort of Swedish Men were followed up from 1998 to 2011. AAA was identified through linkage of the cohorts to the Swedish