fractures will need to be weighed against the ability of the drug to prevent cardiovascular events.

Ischemic Preconditioning for Prevention of Contrast Medium-Induced Nephropathy: Randomized Pilot RenPro Trial (Renal Protection Trial)

Er F, Nia AM, Dopp H, et al. Circulation 2012;126:296-303.

Conclusion: In patients at high risk for contrast-induced nephropathy, remote ischemic preconditioning (rIPC) before contrast medium use prevents acute kidney injury (AKI).

Summary: The main predictor of contrast-induced AKI (CI-AKI) is a decreased estimated glomerular filtration rate (eGFR) of <60 mL/min/1.73 m^2. The magnitude of decrease in eGFR correlates directly with CI-AKI (Best PJ et al, J Am Coll Cardiol 2002;39:1113-9; and Rihal CS, Circulation 2002;105:2259-64). There is currently no renal protective medicine that reliably protects high-risk patients from CI-AKI. The authors sought to test whether a novel prevention strategy of rIPC might help preserve kidney function in patients undergoing contrast administration for coronary angiography. Their study is based on extrapolation from data suggesting rIPC can prevent renal injury during surgery for abdominal aortic aneurysm (Ali ZA et al, Circulation 2007;116(suppl):I-98-105). In this study, patients with impaired renal function, as defined by a serum creatinine >1.4 mg/dL or an estimated glomerular filtration rate <60 mL/min/1.73 m^2, who were undergoing elective coronary angiography were randomized in a 1:1 ratio to standard care with or without ischemic preconditioning (n = 50 in each group). The rIPC was performed with intermittent upper-arm ischemia through four cycles of 5-minute inflation and 5-minute deflation of a blood pressure cuff. According to the Mehran Risk Score, both study groups were at high risk for developing CI-AKI. An increase in serum creatinine ≥25% or ≥0.5 mg/dL above baseline at 48 hours after contrast medium exposure was the primary end point of the study. In the study, CI-AKI occurred in 26 patients (26%), 20 (40%) in the control group, and in six (12%) in the rIPC group (odds ratio, 0.21; 95% confidence interval, 0.07-0.57; $P = .002$). This apparent protective effect was independent of all other factors such as amount of contrast medium and patient comorbidities. rIPC also significantly decreased the incidence of the composite cardiovascular end point of death, hospitalization, or hemodialysis. The number needed to treat with rIPC to prevent one case of CI-AKI was 3.6 (95% confidence interval, 2-9).

Comment: The possible beneficial effects of rIPC in patients with vascular disease have been a bit of a fringe area of research for a number of years now. This study seems reasonably well preformed, and no major adverse events occurred related to rIPC. However, this is a single-center trial, and despite the dramatic *P* values, the sample size was rather limited. The design of the trial is relatively simple, the number of patients potentially available for further study is large, and the need for improved renal protection in high-risk patients undergoing contrast studies is obvious. One certainly cannot find fault with the authors' conclusion that "Our findings merit a larger trial to establish the effect of remote ischemic preconditioning on clinical outcomes."

Prospective Study of Restless Legs Syndrome and Coronary Heart Disease Among Women

Li Y, Walters AS, Chiuve SE, et al. Circulation 2012;126:1689-94.

Conclusion: Women with restless leg syndrome (RLS) for at least 3 years have an elevated risk of coronary heart disease (CHD).

Summary: Patients with RLS (Willis-Ekbom disease) report periodic leg movements during sleep that may occur up 200 to 300 times per night. Such leg movements are associated with sympathetically induced heart rate increases and elevations in blood pressure (Montplaisir J et al, Move Disord 1997;12:61-5; and Ali NJ et al, Sleep 1991;14:163-5). In addition, patients with RLS frequently have hypertension, depression, and obesity, all of which may put them at increased risk of heart disease. RLS patients also report disturbed or insufficient sleep, which can also increase the risk of heart disease (Cappuccio FP et al, Eur Heart J 2011;32:1484-92). Patients with RLS have indeed been associated with an increased risk of CHD. The first report of an association of RLS with CHD was in 2001 in Swedish men (Ulfberg J et al, Mov Disord 2001;16:1159-63). However, this observation, although confirmed by other cross-sectional studies, was not confirmed by prospective evaluation in two additional studies. The prospective studies, however, did not take into account duration of RLS symptoms. In the current study, the authors examined whether RLS was associated with an increased risk of CHD in women who participated in the Nurses' Health Study and took into account duration of RLS symptoms. There were 70,977 women (mean age, 67 years) free of CHD and stroke at baseline (2002) who were monitored until 2008. Physician-diagnosed RLS was determined by questionnaire. CHD was defined as myocardial infarction or fatal CHD. Women who had RLS at the time of entry into the study (baseline) had a higher risk of developing CHD (multivariable-adjusted hazard ratio [HR], 1.46; 95% confidence interval [CI], 0.97-2.18). Risk (HR [95% CI]) was dependent on duration of symptoms, 0.98 (0.44-2.19) for women with RLS for <3 years and 1.72 (1.09-2.73) for women with RLS >3 years ($P = .03$ for trend). Multivariable-adjusted HRs (95% CI) of women with RLS for >3 years were 1.08 (1.07-3.01) for nonfatal myocardial infarction and 1.49 (0.55-4.04) for fatal CHD compared with women without RLS.

Comment: RLS is common and bothersome. Anecdotally, it is frequently seen in patients with peripheral arterial disease (PAD). Given the unquestioned association between CHD and PAD, one wonders if RLS, if carefully studied in patients with PAD, would be found to also be statistically associated with PAD, perhaps independent of CHD?

Shorter Duration of Femoral-Popliteal Bypass Is Associated With Decreased Surgical Site Infection and Shorter Hospital Length of Stay

Tze-Woei T, Kalish JA, Hamburg NM, et al. J Am Coll Surg 2012;215:512-8.

Conclusion: In femoral-popliteal bypass performed with autogenous vein, longer operations are associated with a higher risk of perioperative surgical site infections and longer hospital stays.

Summary: Multiple factors influence the duration of a surgical procedure. Some are patient-specific, whereas others are surgeon-specific and system-specific. Surgeon-specific factors may include the choice of surgical technique, surgical judgment, technical skill, and experience. Patient-specific factors include presence of scar tissue or inflammation, patient body habitus and physiologic status, and the physical quality of relevant tissues or organs used in the reconstruction. The efficiency of the operating room support staff and participation of surgical trainees in procedures are also system-specific factors that may influence the duration of surgery. The authors' hypothesized shorter operative durations would be associated with improved outcomes of femoral-popliteal bypass. They used the American College of Surgeon's NSQIP Dataset from 2005 to 2009 to identify patients who underwent a femoral-popliteal bypass as a primary operation with autogenous vein. Operative duration quartiles (Q) were defined as Q1, ≤149 minutes; Q2, 150 to 192 minutes; Q3, 193 to 248 minutes; and Q4, ≥249 minutes. Perioperative outcomes analyzed included hospital length of stay, mortality, cardiopulmonary complications, and surgical site infection. Patient-specific and system-specific variables analyzed included age, body mass index, smoking, diabetes, end-stage renal disease, indication for surgery, American Society of Anesthesiologist's class, type of anesthesia, intraoperative transfusion, nonoperative time in the operating room, and participation of a trainee during the procedure. Multivariable regression was used to adjust for variables. There were 2,644 femoral-popliteal bypass procedures in this study. Patient mean age was 65.9 years, and 62% were men. Longer operations were associated with increased perioperative surgical site infection (Q1, 6.3%; Q2, 9.0%; Q3, 10.1%; Q4, 13.9%; $P < .001$). Longer surgical durations were also associated with longer lengths of stay (5.4 ± 6.8, 6.1 ± 6.7, 7.0 ± 11.3, and 8.1 ± 8.0 days, respectively; $P < .001$). With multivariable analysis, longer operative duration remained independently associated with a higher rate of surgical site infection and longer hospital stays. Risk of surgical site infection increased by 50% with operative durations of ≥260 minutes compared with operative times of 150 minutes.

Comment: The relevance of procedure length on patient outcomes is controversial. Authors have found both positive correlations with complications with increased procedure length (Cruse PJE et al, Arch Surg 1973;107:206-10). Others have found no association between procedure length and patient outcomes (Scheer A et al, Dis Colon Rectum 2009;52:1746-52). Most analyses have been of general or laparoscopic surgical procedures. The authors here present a relatively unique analysis of surgical duration on outcomes of vascular surgical procedures that attempted to control for patient-specific and system-specific factors. Their conclusion is that because they controlled for patient-specific and system-specific factors, the length of time required for femoral-popliteal bypass is at least partly influenced by surgeon-specific factors such as specific surgical techniques, surgical judgment, technical skill, and the overall pace of the operation. There was no denying that the duration of surgery of femoral-popliteal bypass in the authors' data was associated with increased surgical site infection and hospital length of stay. Therefore, it would appear that system-specific and surgeon-specific factors that lower the duration of femoral-popliteal bypass are reasonable targets to facilitate quality improvement.