Abstracts

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Enhanced Detection of Thromboemboli With the Use of Targeted Microbubbles

Martin MJ, Chung EML, Goodall AH, et al. Stroke 2007;38:2726-2732.

Conclusion: Transcranial Doppler (TCD) detection of circulating microemboli can be improved by injection of appropriately targeted microbubbles.

Summary: Some ultrasound contrast agents adhere selectively to specific pathologic materials, such as plaque or thrombus. Targeting specific pathologic materials for adherence by microbubbles may allow TCD to distinguish different types of microembolic material. In this study, the authors sought to determine whether TCD detection of circulating thrombus emboli could be enhanced by targeted microbubbles.

A technique of binding microbubbles to the surface of thrombus was developed. Binding was confirmed by scanning electron microscopy. Using an *in vitro* pulsatile flow model, control and targeted microbubbles were introduced to thrombus. Thrombus and tissue mimicking material were then circulated under pulsatile-flow conditions using the model. TCD was used to detect embolic symbols before and after induction of the microbubbles.

TCD signal intensities were enhanced by the targeted microbubbles up to 13 dB. Microbubbles were observed to bind moving thrombus even when injected in low concentrations (approximately 36 bubbles per 100 mL). The microbubbles were retained on the thrombus under pulsatile-flow conditions. TCD signal intensity was not enhanced by similar size pieces of tissue mimicking material not enhanced by injection of targeted microbubbles.

Comment: Targeted microbubble enhancement of TCD emboli detection may allow determination of what TCD really detects during manipulation of the carotid bifurcation. It may eventually be possible to design targeted therapies to prevent embolization of specific materials.

Serious Lower Extremity Venous Injury Management With Ligation: Prospective Overview of 63 Patients

Kurtoglu M, Nrynar H, Taviloglu K, et al. American Surgeon 2007;1039-1043.

Conclusions: Venous ligation for severe venous injury results in no significant sequelae of chronic venous insufficiency and has no detrimental effect on associated arterial repair.

Summary: It is recommended that repair of major venous injury be performed when feasible. However, primary repair may be impossible if there is extensive disruption of the vein or in an unstable patient. In such cases, ligation of the venous injury is recommended. The authors investigated the effects of venous ligation of major veins in the lower extremities when the vein was extensively lacerated from a traumatic injury. Between January 2001 and April 2004, there were 63 patients with grade 3 and 4 venous injuries treated with ligation who were then observed prospectively. Patients had venous ultrasound performed on the 5th day postoperatively prior to discharge and at 3 months to assess for the presence of deep venous thrombosis (DVT) and patency of any associated arterial repair. Patients with DVT were treated with sodium warfarin for three months with a target international normalized ratio of 2.0-3.0. Patients were also treated with Class II compression stockings for 1 year. Follow-up occurred at 1, 3, 6, and 12 months and at 6 month intervals thereafter.

Fifty of the patients (79.4%) had combined arterial and venous injury. Pure venous injuries were present in 13 patients (20.6%). DVT developed in 49 patients (77.7%). The DVT was postoperative in 37 patients (58.7%) and developed late in 12 patients (19%). There were 3 arterial restenoses and one pseudoaneurysm of the superficial femoral artery observed. Five patients underwent prophylactic fasciotomy and 2 patients had late fasciotomy for compartment syndrome. Postoperative edema was present in 56 (88.8%) of the patients and wound infection occurred in 19 patients (30.1%) with 18/19 wound infections being superficial. There were 2 amputations. One patient died as a result of hemorrhagic shock. At 18 months, 25 patients were classified according to the CEAP classification. Three legs were CEAP class 0, 7 legs CEAP class 2, and 8 legs CEAP class 3. There were no instances of severe postthrombotic syndrome.

Comment: The article suggests it is not necessary to repair severe lower extremity venous injuries. The data is restricted to patients that had essentially unreconstructable venous injuries. Only about 40% of the patients were available for follow-up to assess for possible postthrombotic syndrome. Cleary the data allow one to conclude that ligation of a severe venous injury in a lower extremities is safe. There are too few patients and too limited follow-up to justify a conclusion that postthrombotic syndrome is not a problem following ligation of major lower extremity veins for trauma.

Effect of a Multifactorial Intervention on Mortality in Type II Diabetes

Gaede P, Lund-Andersen H, Parving H-H, et al. N Engl J Med 2008;58:580-91.

Conclusion: Death rates from cardiovascular causes can be reduced in patients with Type II diabetes with use of behavior modification and intensive intervention with multiple drug combinations.

Summary: It is known that risk of non-fatal cardiovascular disease among patients with type II diabetes mellitus and micro-albuminuria can be reduced using multi-factorial interventions that include tight glucose control, renin-angiotensin system blockers, lipid lowering agents, and aspirin. In this study the authors evaluated whether such an approach could also reduce deaths from cardiovascular etiologies and all cause mortality. Patients in this study were derived from the Steno-T study. There were 160 caucasian Danish patients with type II diabetes and persistent micro-albuminuria. They were randomly assigned to receive either conventional multi-factorial treatment or intensified target-driven therapy involving a combination of medicines and behavior modification. In the intensive group, target guidelines included a glycosurated hemoglobin level of less than 6.5%, a fasting serum total cholesterol level of less than 175 mg/dl, a fasting serum triglyceride level of less than 150 mg/dl and systolic blood pressures $<$130 mmHg and diastolic pressures $<$80 mmHg. Patients also received daily low dose aspirin.

The trial ran through 2001. By that time 27 patients had died. Three additional patients withdrew before the end of the trial examinations in 2001. Mean treatment period for either intensive or conventional therapy was 7.8 years. Patients were subsequently followed for a mean of 5.5 years until December 31, 2006. The primary end-point at 13.3 years of follow-up was timed to death from any cause.

During the the study, 24 patients in the intensive therapy group died, and 40 in the conventional therapy group died (HR 0.54; 95%CI 0.32 to 0.89, $P = 0.02$). Patients having intensive therapy had a lower risk of death from cardiovascular causes (HR 0.43; 95% CI 0.19 to 0.94; $P = 0.04$). Intensive therapy patients also had a lower risk of cardiovascular events (HR 0.42; 95%CI, 0.25 to 0.67; $P < 0.001$). Six patients in the conventional therapy group and one patient in the intensive therapy group progressed to end stage renal disease ($P = 0.04$).

Comment: The study was not designed to identify which risk factor modification resulted in the greatest benefit in patients with type II diabetes. Based on a sub-analysis, however, the authors concluded the statins and anti-hypertensive drugs likely had the largest effect in reducing cardiovascular risk with hypoglycemic agents and aspirin the next most important medications.

Analysis of Expansion Patterns in 4 to 4.9 cm Abdominal Aortic Aneurysms

Dde Ceniga MV, Gomez R, Estallo L, et al. Annals of Vascular Surgery 2008;22:37-44.

Conclusion: Growth of 4-4.9 cm abdominal aortic aneurysms (AAA) is mostly irregular and unpredictable without modifiable risk factors to influence expansion pattern. An eccentric distribution of thrombus within the aneurysm may be associated with continuous aneurysm expansion.

Summary: Most vascular surgeons have observed AAAs grow unpredictably. The authors thought to quantify growth patterns in 4 to 4.9 cm infrarenal AAA's. This was an observational, longitudinal, prospective study. Patients with 4 to 4.9 cm abdominal aortic aneurysms were followed every six months with abdominal computed tomographic (CT) scans. The authors defined aneurysm growth as an increase in aortic diameter $>$2 mm from one surveillance period to the next. In patients with three or more CT scans the authors characterized aneurysm expansion as either continuous or discontinuous. A discontinuous growth pattern included at least one period of non-growth ($<$2 mm over six months). Cardiovascular risk factors were also correlated with AAA anatomic characteristics and growth.

There were 195 patients in the study, 94% men, mean age 71 $\pm$ 8.3 years. Age range was 50 to 90. Follow up occurred for 50 $\pm$ 36.4 months (6.5 to 193.7 months). A discontinuous growth pattern was noted in 88.5% of the AAAs and a continuous growth pattern in 11.5%. In aneurysms that had continuous expansion, mean expansion rate was greater than those aneurysms with a discontinuous growth pattern (7.92 $\pm$ 3.74 mm vs. 2.74 $\pm$ 2.94 mm per year, $P < 0.0001$). No patient co-morbidity or