Comment: Stent thrombosis may relate to impaired or delayed re-endothelialization secondary to the drug-eluting properties of the stent. Regardless of cause, sudden thrombosis of coronary artery stents is now recognized as having a high mortality rate, likely because of abrupt occlusion of an otherwise widely patent coronary artery. Of the potential variables influencing stent thrombosis, it appears that cessation of clopidogrel therapy is the risk factor that both the patient and physician can modify. More work will be needed to determine whether lifelong clopidogrel therapy is required in patients with drug-eluting coronary artery stents.

Effect of hypobaric hypoxia, simulating conditions during long-haul air travel, on coagulation, fibrinolysis, platelet function, and endothelial activation

Toff WD, Jones CI, Ford I, et al. JAMA 2006;295:2251-61.

Conclusion: Hypobaric hypoxia at the levels encountered during long-haul air travel does not result in prothrombotic conditions in healthy individuals at low risk of venous thromboembolism.

Summary: There is a proposed link between long-haul air travel and venous thromboembolism (VTE). The mechanism by which long-haul air travel may result in VTE is unknown. It is postulated reduced cabin pressure and reduced oxygen tension may result in an increase risk of VTE compared with seated immobility. The authors sought to determine whether levels of hypobaric hypoxia encountered during air travel could activate hemostasis. This was a single, blind, crossover study performed in a hyperbaric chamber. The authors assessed the effect of 8 hours of seated exposure to hypobaric hypoxia in 73 healthy volunteers. The study was conducted in the United Kingdom from September 2003 to November 2005. The patients were screened before study enrollment for factor V Leiden mutation and the prothrombin gene 20210A mutation. If such a mutation was present, they were excluded. Activation of hemostasis was tested by blood draws before and after induction of hypobaric hypoxia. Study subjects were exposed alternatively (>1 week apart) to hypobaric hypoxia at conditions similar to those of commercial air travel and to normal baric, normal hypoxia conditions equivalent to atmospheric conditions at approximately 70 meters above sea level. Changes in coagulation activity, fibrinolysis, platelet activation, and endothelial cell activation were then compared under the two testing conditions. Changes were observed in some hemostatic markers during normal baric exposure. This was attributed to prolonged sitting and circadian variation. Including analysis for thrombin-antithrombin complex, prothrombin fragment, D-dimer, and tests of endogenous thrombin potential, there were no significant differences between changes in the hypobaric and normal baric exposures.

Comment: It is important to recognize who was studied and who was not studied in this investigation. Patients taking oral contraceptive pills were included, as were patients >50 years of age. However, individuals with factor V Leiden and prothrombin gene mutation were excluded, as were those with a history of VTE. Thus, the patients at highest risk for VTE associated with long-haul air travel were not studied. The study addresses potential changes in coagulation induced by hypobaric hypoxic. It does not address the clinical question of potential coagulation changes in individuals at most risk for long-haul air travel associated VTE.

Midterm results of extensive primary repair of the thoracic aorta by means of total arch replacement with open stent graft placement for acute type A aortic dissection

Uchida N, Ishihara H, Shibamura H, et al. Journal of Thoracic and Cardiovascular Surgery 2006;131:862-7.

Conclusion: In patients with acute type A dissection primary repair of the aorta that includes the aortic arch and the descending thoracic aorta can be performed in a single stage with a combination of standard synthetic grafts and self expanding stent grafts.

Summary: Acute type A dissection of the aorta frequently necessitates emergent surgical treatment. This treatment is often limited to the region of the ascending aorta and aortic arch leaving a false lumen distally that can expand and/or rupture. In this paper the authors describe 35 subjects who received aortic arch replacement and treatment of the descending thoracic aorta using a combination of a synthetic graft for replacement of the aortic arch and a stent graft for treatment of the descending thoracic aorta. The patients were treated between December 1997, and April 2002. There was a mean followup of 55 months (range, 30-83 months). CT scans were performed at 1, 3, 12, and 36 months postoperatively in an effort to document obliteration of the false lumen and exclusion by the stent graft.

Two patients died at the initial procedure secondary to bleeding and/or low cardiac output. The mean cardio pulmonary bypass time was 175 ± 41 minutes and mean operative time was 338 ± 86 minutes. There were 13 men and 22 women with a mean age of 67.8 years (range 47-80 years). The aortic arch was reconstructed under conditions of hypothermic circulatory arrest with re-implantation of the innominate artery, the left common carotid artery and left subclavian artery using synthetic grafts. Distally, a stent graft was placed in a 30 French introducer and inserted into the true lumen of the decending thoracic aortia via the median sternotomy incision. The graft was fixed in the true lumen of the descending aorta by expansion of the Z stent and aortic blood pressure. Proximally, the stent graft was sewn to the dital end of the aortic arch replacement.

The mean diameter of the stent grafts was 26.2mm. The mean length of the stent grafts was 8.9cm. The technique resulted in obliteration of the false lumen at the distal edge of the graft in all patients. False lumen obliteration was also achieved in 65% of the patients at the diaphragmatic level and in 48% of the patients at the SMA level. Mean enlargement of the whole aorta at the level of the SMA from 1-36 months postoperatively was 0.375mm (range, 0-2mm). Mean enlargement of the entire aorta at the level of the diaphram from 1-36 months postoperatively was only (0.5mm range, 0-2mm). Paraplegia and intestinal ischemia did not occur. No patients required additional surgical treatment of the thoracoabdominal aorta after discharge from the hospital.

Comment: This is a clever use of the combination of endovascular and open surgery. It is essentially a 1-step elephant trunk procedure. The technique appears to represent a significant advance over 2-stage open repair of type A aortic dissection. Hopefully this approach can significantly reduce the number of patients requiring late descending thoracic aortic repair following repair of type A dissection.

The prevalence of thrombophilia in patients with symptomatic peripheral vascular disease

Big S, Chitolie A, Bevan D, et al. Br J Surg 2006;93:577-81.

Conclusion: One third of patients with peripheral vascular disease have hyperhomocysteinemia and one quarter have evidence of thrombophilia.

Summary: This was a screening study of patients with peripheral arterial disease (PAD) that was designed to establish the prevalence of thrombophilia and hyperhomocysteinemia in PAD patients. Between November 1998 and January 2000, 150 consecutive patients with chronic leg ischemia were recruited for the study. All had an ankle-brachial index (ABI) <0.8. Also recruited were 25 age-matched controls without PAD (ABI >0.9). Patients and controls underwent thrombophilia screening that included protein C and protein S, antithrombin, activated protein C resistance, factor V Leiden, prothrombin gene mutation, and lupus anticoagulant. Fasting homocysteine levels were also determined. A thrombophilia defect was found in 27.3% of patients (n = 41). The most common defect was protein S deficiency found in 11.3% (n = 17). Other detected thrombophilias included factor V Leiden mutation in 6.7% (n = 10), protein C deficiency in 4.0% (n = 6), and lupus anticoagulant and prothrombin gene mutation, both found in 4.0%. One patient had antithrombin deficiency. With single variable analysis, only the presence of critical limb ischemia was associated with positive thrombophilia ($P < .03$). Hyperhomocysteinemia was present in 37.3% of the population. The prevalence of thrombophilia exceeded that of the control group. The prevalence of hyperhomocysteinemia in the patients was double that of the control group.

Comment: The prevalence of various thrombophilias in PAD patients found in this report is similar to that of previous reports. The exception is the extraordinarily high prevalence of protein S deficiency in the current study. The authors suggest this may be result of an acquired protein S deficiency perhaps influenced by age, sex, and smoking. However, the same risk factors are prevalent in previous articles on thrombophilia in patients with PAD that did not find nearly the same level of protein S deficiency. One must question the author's assay or standards for abnormality with respect to this particular thrombophilia. It was noted once again that there is a high prevalence of hyperhomocysteinemia in patients with PAD. Unfortunately, there still exists no evidence that treatment of hyperhomocysteinemia in patients with PAD lowers the end points of cardiovascular events or cardiovascular mortality.

Endovenous treatment of the greater saphenous vein using a 1,320 nm Nd:YAG laser causes fewer side effects than using a 940 nm diode laser

Proebstle TM, Moehler T, Gul D. Dermatologic Surg 2005;31:1678-84.

Conclusion: Endoluminal laser therapy (ELT) of the greater saphenous vein (GSV) with a 1320-nm neodymium:yttrium-aluminum-garnet (Nd:YAG) laser results in fewer side effects compared with 940-nm diode laser ELT.

Summary: ELT of the GSV generally results in some perforation of the GSV and therefore direct impact to perivenous tissues. Energy absorption varies with laser wavelength. The authors tested the theory that a 1320-nm Nd:YAG laser device would result in fewer perioperative side effects. Lasers with wavelengths strongly absorbed by hemoglobin can result in areas of sharply increased temperature within the GSV during ELT, resulting in vein perforations and damage to perivenous tissue. More uniform heating may occur using wavelengths such as 1320 nm that primarily target water in the vein wall and therefore, theoretically, do not result in focal areas of sharply increased temperature leading to perforation and damage to perivenous tissues. The authors tested this concept by comparing three patient cohorts receiving ELT of the GSV. In group A, a 940-nm diode laser at 15 W was

used. In group B, a 940-nm diode laser at 30 W was used. In group C, a 1320-nm laser at 8 W was used. Laser energy was administered continuously with constant pullback under tumescent local anesthesia. There were 113 GSVs treated in group A, 136 in group B, and 33 in group C. Average linear endovenous energy densities of 24, 64, and 62 J/cm and an average endovenous fluence equivalent of 12, 30, and 33 J/cm^2 were administered to the GSVs respectively. At day 1, occlusion rates were 95% in group A, 100% in group B, and 100% in group C. At 3 months, occlusion rates were 90.3% in group A, 100% in group B, and 97% in group C. Treatment-related pain (50%) and need for analgesics (36%) were lower in group C compared with treatment-related pain (81%) and need for analgesics (67%) in the patients in group B ($P < .005$. There was also less ecchymosis in group C compared with group B ($P < .05$).

Comment: Use of 810-nm ELT devices can result in temperatures up to 1200°C in animal models (Dermatologic Surgery 2002; 28:56-61). The goal of ELT of the GSV is closure of the GSV with a minimal amount of energy so as to result in minimization of damaged perivenous tissues. It may be that the <8 W of energy utilized in this study is also effective in achieving GSV ablation with further reduction in postoperative pain (please see comment by Dr. Robert Weiss accompanying this article.)