

**SCA 118**  
**USE OF TRANSCRANIAL DOPPLER AND TRANS-ESOPHAGEAL ECHOCARDIOGRAPHY FOR INTRA-OPERATIVE MONITORING IN A PATIENT WITH TAKAYASU'S ARTERITIS.**

Barron ME, Sologub T

*Department of Anesthesiology, University of Miami/JMH, Miami, FL*

**Summary:** Transcranial Doppler (TCD) and Transesophageal Echocardiography (TEE) were used to monitor intra-operative cerebral hemodynamics and cardiovascular performance in a patient with Takayasu's arteritis (TA) who required major abdominal aortic surgery. These techniques were found to be of clinical value for the continuous evaluation and maintenance of adequate cerebral and systemic perfusion, as well as assessment of the effects of surgical and therapeutic interventions.

**Case Report:** The patient was a 26-year old white Latin female with a greater than 3-year history of TA who was admitted to our institution for revascularization of the celiac, superior mesenteric and right renal arteries, because of worsening symptomatology related to ischemic colitis and progressively deteriorating renal function. Past medical history was significant for mitral valve repair and an aortic valve replacement, three years prior to this admission, with a porcine bioprosthesis, because of severe mitral and aortic regurgitation. Other related history included bilateral renal arteries stenting, aorta to left internal carotid artery bypass, chronic ulcerative/ischemic colitis and chronic hemolytic anemia. Current aortography demonstrated occlusion of both common carotid arteries at their origin, occlusion of the right subclavian artery after take-off of the vertebral artery and occlusion of the left subclavian artery at its origin, with the only native vessel supplying the cerebral vasculature was a large vertebral artery with a poststenotic dilatation on the right side. In addition, moderate suprarenal aortic occlusion and severe strictures at the origin of the celiac, superior mesenteric and bilateral renal arteries were demonstrated. Preoperative physical examination was significant for bilateral carotid bruits, a grade III/VI aortic outflow murmur, absent upper extremity pulses, palpable bilateral femoral and popliteal pulses; NIBP measured 250/94 mmHg in the left leg and 166/92 mmHg in the right leg, heart rate was 70 bpm and regular, respirations were 16 bpm, and room air O<sub>2</sub> saturation was 100%. Pertinent laboratory findings included hemoglobin 14.3, hematocrit 47, platelets 272, serum creatinin 1.2, BUN 24. ECG demonstrated normal sinus rhythm, left atrial enlargement, left ventricular hypertrophy, anterolateral ST-segment and T-wave changes. CXR was without evidence of cardiomegaly or acute pulmonary changes. Current medications included Prednisolone, methotrexate, Norvasc, Coreg, Procrit, and Plavix. Because of concerns related to the maintenance of adequate cerebral blood flow, coupled with the lack of brachiocephalic vascular access,

assessment of cerebral hemodynamics was performed using TCD, and cardiac performance was assessed using TEE. Utilizing a Pioneer TC 4040, (Nicolet Biomedical), TCD software 2.50 PV 68, baseline blood flow velocities (BFV) in both middle cerebral arteries (MCA) were measured in an awake preoperative state, using a 2 MHz TCD transducer probe over a described "middle cerebral artery window" (1). Following optimal TCD signal location the probe was fixed in place utilizing adjustable headset. Because baseline readings revealed a marked Doppler amplitude differential, it was elected to monitor the more normal pulsatile waveforms containing lower velocity signals on the right side. The corresponding baseline NIBP was obtained from the right leg and measured 162/64 mmHg. Following an uneventful etomidate, fentanyl and pancuronium induction, TCD and corresponding NIBP recordings were made every 5 min. until the period of aortic cross clamping. Right MCA TCD monitoring was performed continuously throughout the entire perioperative period. Normocarbica was deliberately maintained, and maintenance anesthesia consisted of an isoflurane (max.ETconc.1.5%, air/O<sub>2</sub>) supplemented with fentanyl as necessary. Following induction, a 5 MHz Omniplane II TEE probe was passed and imaging was performed using a Phillips Sonos 5500 ultrasound platform. A patient specific correlation of TCD velocity profiles and NIBP measurements was performed during the pre-clamp period, as well as comparisons to the awake baseline level. It was observed that the cerebral BFV paralleled acute changes in blood pressure (BP), including minor responses observed during aortic clamping and unclamping. A deliberate attempt was made to at least maintain the MCA BFV at or near the baseline level with TEE guided hemodynamic manipulations. An uncomplicated 8-hour right renal, celiac, superior mesenteric arterial revascularization, as well as a bilateral iliac arterial exploration were performed. At the conclusion of the procedure the patient was awakened, extubated, completely neurologically intact.

**Discussion:** The focus of the anesthetic management of this patient with severe manifestations of TA was the maintenance of adequate cerebral blood flow, as well as the provision of adequate systemic perfusion, especially during the vulnerable period of aortic clamping and renal/visceral revascularization. In this patient with no peripheral access for direct arterial BP measurement, TCD proved to be a reliable surrogate. While there are multiple determinants of cerebral blood flow (CBF) and there is uncertainty about the relationship between CBF and BFV, we found clinically useful parallel changes in systemic BP and TCD profiles, when the other variables were held practically constant.

**References:** 1. Kawaguchi M, Obsumi T, Nakajima T, Kuro M. Intraoperative monitoring of cerebral hemodynamics in patients with Takayasu's arteritis. *Anaesthesia* 1993;48:496-8.