

Intraoperative Colon Mucosal Oxygen Saturation Can Predict and Possibly Prevent Colon Ischemia During Aortic Aneurysm Repair

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Purpose: Colon ischemia after aortic reconstruction is a devastating complication with high mortality rates. This study evaluates whether CMOS can predict colon ischemia during aortic aneurysm (AAA) repair.

Methods: Colon Ischemia and Survival to Discharge after AAA repair were monitored in 562 subjects. Aneurysm repair was performed in 38 patients using a T-Stat® Ischemia Detection system (T-Stat® 303) using a catheter probe inserted in each patient’s rectum prior to the surgical procedure. 524 control patients were studied without probes. Continuous CMOS, buccal mucosal saturation, systemic MAP, HR, pulse oximetry, and pivotal intraoperative events were recorded. Colon ischemia was defined as CMOS below 15% with no improvement after 5 minutes.

Results: Patients with colon ischemia detected by T-Stat® had significantly different outcomes than patients detected clinically in the post-operative period (Table 1). EVAR or open repair was performed in patients with a mean age of 75±10 years. CMOS reliably decreased in EVAR from a baseline of 56 ± 8% to 29 ± 16% (p<0.0001) during infra-renal aortic balloon occlusion and femoral arterial sheath placement. CMOS similarly decreased during open repair from 56 ± 8% to 15 ± 19% (p<0.0001) when the infra-renal aorta and iliac arteries were clamped. When aortic circulation was restored in both EVAR and open, CMOS returned to baseline values 56 ± 10% (p=0.81). Mean recovery time in CMOS after an aortic intervention was 6 ± 3 minutes. In one monitored patient, CMOS remained depressed (<10%) for 60 minutes. Revascularization of the hypogastric artery brought CMOS to baseline values 15 minutes later. This patient had no clinical sequelae. In another 2 monitored patients, CMOS was significantly depressed (<10%) with catheter manipulation and slow recovery, implying embolization. Subsequently, buttock ischemia and cholesterol emboli were discovered on physical examination and angiography. Simultaneous buccal mucosal oxygen saturation was stable (82±6%) during aortic manipulation but would fall significantly during active bleeding. CMOS measurement had no complications.

Table 1.

Patients with colon ischemia detected by T-Stat® had significantly different outcomes than patients detected clinically in the post-operative period. Ischemia Group T-Stat® (mean ± SD)

Ischemia Group	T-Stat® (mean ± SD)	No. of Subjects	Days in ICU
No Ischemia			
– With T-Stat®	56% ± 7%	(35)	4 ± 9
Ischemia			
– With T-Stat®	6% ± 9%	(3)	3 ± 8
– No T-Stat®	n/a	(9)	29 ± 23

} p<0.0001

Significance: Intra-operative CMOS is a sensitive measure of colon ischemia where transient changes demonstrate no problem. However, persistently low CMOS can imply colon ischemia thus providing an opportunity to revascularize the IMA or hypogastric arteries thereby avoiding colon infarction.