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Continuous gastrointestinal mucosal oximetry during endovascular procedures carrying risk of ischemia

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Purpose:

To explore a potential role for gastrointestinal mucosal oximetry during mesenteric embolization and/or endovascular aneurysm repair carrying risk of mesenteric ischemia.

Materials and Methods:

Microvascular tissue oxygen saturation of gastric or colonic mucosa was measured using a visible light spectroscopy (VLS) oximetry probe. 10 controls, 5 patients undergoing endovascular AAA repair including one who had a prior partial colectomy and SMA and internal iliac artery ligations, and 1 patient undergoing celiac aneurysm repair were studied. For the sigmoid colon, the probe was inserted 10 cm past the anal sphincter to monitor saturation during balloon test occlusions of the infrarenal aorta and iliac arteries. For the stomach, the probe was passed transnasally to monitor saturation during celiac test occlusion in a patient with a celiac/hepatic aneurysm who had undergone prior splenic artery embolization, partial aneurysmectomy, and sacrifice of the right gastric and both gastroepiploic arteries.

Results:

Baseline saturation was similar in controls and AAA patients (69% vs. 66%). During aortic test occlusion, saturation dropped 0.6%/sec until balloon deflation. During iliac test occlusion, oxygenation dropped only in some patients and only on some sides. Occlusion of the hypogastric artery in the colectomy patient resulted in immediate desaturation, reversible only by deflation of the balloon. A precipitous and prolonged desaturation in another patient in whom an aorto-uniiliac stent-graft had been deployed was treated successfully with a fem-fem bypass and stent-graft placement from contralateral external to internal iliac artery. In the celiac aneurysm patient, collateral supply to the stomach was not identifiable by angiography but was physiologically confirmed by test occlusion of the left gastric and celiac arteries, which were then coil embolized uneventfully.

Conclusion:

VLS mucosal oximetry provides a continuous monitor of tissue oxygenation during endovascular procedures that put mucosa at risk of ischemia. Prediction or detection of ischemia enables the practitioner to plan accordingly and to intervene early in the event of desaturation.