

A proposed algorithm for combining transcranial Doppler ultrasound monitoring with cerebral and somatic oximetry: a case report.

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Purpose

Transcranial Doppler (TCD) ultrasound is a non-invasive monitor of cerebral blood velocity that can be used intraoperatively. The purpose of this report is to describe how different patterns seen on TCD can help identify the cause of cerebral desaturation when near-infrared spectroscopy (NIRS) oximetry is used concomitantly.

Clinical features

A 69-yr-old male patient undergoing coronary revascularisation and aortic valve replacement developed perioperative complications that were detected using a combination of transtemporal TCD of the middle cerebral artery along with cerebral and somatic NIRS. Initial brain desaturation was secondary to hypocapnia during which TCD-derived blood velocity and somatic NIRS values remained unchanged. After the procedure, a second episode of brain desaturation occurred secondary to a technical issue with the aortic valve prosthesis requiring a return to cardiopulmonary bypass (CPB); there were no high-intensity transient signals (HITS) on TCD. Brain desaturation occurred a third time following the second attempt to separate from CPB at which time TCD detected a significant amount of HITS suggesting air emboli that were associated with acute right ventricular dysfunction; there was also a reduction in somatic NIRS.

Conclusions

Combining TCD with cerebral NIRS allows for the rapid identification of three different mechanisms of brain desaturation. An algorithm is proposed to help identify the origin of NIRS cerebral desaturation. Prospective clinical trials are needed to investigate potential benefits of multimodal brain monitoring and its impact on short and/or long-term clinical outcomes.