

Intraoperative hypotension and perioperative outcomes

Intraoperative hypotension is associated with adverse outcomes. Although a causal relationship is yet to be fully established, proactive management of vulnerable patients and use of bispectral index monitoring is recommended to avoid deep anaesthesia.

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Introduction

Hypotension during anaesthesia is common, multifactorial and may signify reduced oxygen delivery to tissues. The vasodilating and cardiodepressant effects of most anaesthetic agents are well-known, and may cause hypotension even in young healthy patients. Pre-existing issues with circulating volume, vasomotor tone or cardiac contractility will compound matters, and surgical factors such as haemorrhage, retraction or pressure, and patient positioning may also contribute.

Adverse outcomes

With no clear definition of intraoperative hypotension, some studies use absolute values for mean arterial pressure and systolic blood pressure, or a decrease relative to a baseline, or any combination of the above (Sessler et al, 2019). Nonetheless, there is a consensus that intraoperative low blood pressure and adverse outcomes are linked, and strong associations have been established between hypotension during surgery and myocardial ischaemia, renal injury and 30-day mortality (Walsh et al, 2013; Sessler et al, 2019).

The renal injury threshold appears to be higher than that for the myocardium, with respective mean arterial pressures of 75 mmHg and 65 mmHg (Sessler et al, 2019). The duration and magnitude of hypotension is also significant, with even short periods of hypotension related to myocardial injury (Abbott et al, 2016). Associations with cognitive dysfunction and stroke in non-cardiac surgery are less well-established, although all clinicians will recognise that very low arterial pressures eventually result in neurological damage.

Association or cause?

There is less evidence as to whether hypotension is an association with or a cause of morbidity and mortality. Patients with poor physiological reserve may be more sensitive to the cardiovascular effects of anaesthetics, and also more likely to suffer complications. Does intervening reduce harm? Futier et al (2017) conducted a multicentre, randomised controlled trial looking at targeted blood pressure management intraoperatively, and found less organ injury when blood pressure was maintained within 10% of baseline. However, Perioperative Quality Improvement Programme consensus statements regarding intraoperative hypotension have held back from attributing causality (Sessler et al, 2019).

Management

For many patients, intraoperative management of hypotension may involve simply ensuring euvolaemia, administering vasopressors and optimising cardiac contractility with a balanced anaesthetic technique. Present clinical practice varies widely in how tightly arterial pressure is managed. However, evidence links even short periods of hypotension with morbidity, so a more proactive approach may be called for, which anticipates vulnerable patients, uses invasive monitoring as appropriate and defines an individualised blood pressure threshold to actively maintain.

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A role for depth of anaesthesia monitoring?

Sessler et al (2012) proposed a ‘triple low’ of low bispectral index reading, low anaesthetic requirement and low mean arterial pressure as a predictor of mortality. These three measures combined could represent an increased sensitivity to anaesthetics. National Institute for Health and Care Excellence (2012) guidance currently recommends depth of anaesthesia monitoring in patients at greater risk of excessively deep anaesthesia, including older patients, and those who are obese or who have poor cardiovascular function or liver disease. Depth of anaesthesia monitoring may allow a dial-back of excessively deep anaesthetic, and better preserve organ perfusion.

Conclusions

The Perioperative Quality Improvement Programme consensus statement is clear on the association between intraoperative hypotension and organ injury, and the work of Futier et al (2017) suggests that targeted management preventing this hypoperfusion may be beneficial. Future areas of research could clarify exact thresholds for intervention and the most useful anaesthetic measures (systolic blood pressure, mean arterial pressure or divergence from baseline).

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