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[Intervention Review]

Pulse oximetry for perioperative monitoring

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ABSTRACT

Background

Pulse oximetry is extensively used in the perioperative period and might improve patient outcomes by enabling an early diagnosis and, consequently, correction of perioperative events that might cause postoperative complications or even death. Only a few randomized clinical trials of pulse oximetry during anaesthesia and in the recovery room have been performed that describe perioperative hypoxaemic events, postoperative cardiopulmonary complications, and cognitive dysfunction.

Objectives

The objective of this review was to assess the effects of perioperative monitoring with pulse oximetry and to clearly identify the adverse outcomes that might be prevented or improved by the use of pulse oximetry.

Search methods

We searched the Cochrane Central Register of Controlled Trials (CENTRAL) (*The Cochrane Library* 2009, Issue 2), MEDLINE (1966 to May 2009), EMBASE (1980 to May 2009), CINAHL (1982 to May 2009), ISI Web of Science (1956 to May 2009), LILACS (1982 to May 2009), and databases of ongoing trials; and checked the reference lists of trials and review articles.

Selection criteria

We included all controlled trials that randomized patients to either pulse oximetry or no pulse oximetry during the perioperative period.

Data collection and analysis

Two authors independently assessed data in relation to events detectable by pulse oximetry, any serious complications that occurred during anaesthesia or in the postoperative period, and intra- or postoperative mortality.

Main results

Searching identified five reports. We considered the studies with data from a total of 22,992 patients that were eligible for analysis. Results indicated that hypoxaemia was reduced in the pulse oximetry group, both in the operating theatre and in the recovery room. During observation in the recovery room, the incidence of hypoxaemia in the pulse oximetry group was 1.5 to three times less. Postoperative cognitive function was independent of perioperative monitoring with pulse oximetry. The one study in general surgery showed that postoperative complications occurred in 10% of the patients in the oximetry group and in 9.4% in the control group. No statistically significant differences were detected in cardiovascular, respiratory, neurologic, or infectious complications in the two groups. The duration of hospital stay was a median of five days in both groups, and an equal number of in-hospital deaths was registered in the two groups.

Continuous pulse oximetry has the potential to increase vigilance and decrease pulmonary complications after cardiothoracic surgery, however routine continuous monitoring did not reduce transfer to an intensive care unit (ICU) or overall mortality.

Authors' conclusions

The studies confirmed that pulse oximetry can detect hypoxaemia and related events. However, we have found no evidence that pulse oximetry affects the outcome of anaesthesia for patients. The conflicting subjective and objective results of the studies, despite an intense methodical collection of data from a relatively large general surgery population, indicate that the value of perioperative monitoring with pulse oximetry is questionable in relation to improved reliable outcomes, effectiveness, and efficiency. Routine continuous pulse oximetry monitoring did not reduce either transfer to ICU or mortality, and it is unclear if there is any real benefit from the application of this technology in patients who are recovering from cardiothoracic surgery in a general care area.

PLAIN LANGUAGE SUMMARY

Perioperative monitoring with pulse oximetry does not appear to affect the outcomes of anaesthesia

The pulse oximeter is a non-invasive clinical monitor that measures the oxygen saturation of blood. The greatest value of pulse oximetry is its ability to provide an early warning of low oxygen levels (hypoxaemia). Although pulse oximetry can detect a deficiency of oxygen in the blood, its use does not appear to influence a person's cognitive function, length of hospital stay, or incidence of complications after anaesthesia. The conflicting subjective and objective results of the studies, despite an intense methodical collection of data from a relatively large population, indicate that perioperative monitoring with pulse oximetry can reduce pulmonary events. In general however, monitoring does not lead to improvements in patient outcomes, or in the effectiveness and efficiency of care. The results of perioperative pulse oximetry studies indicate that pulse oximetry was not a breakthrough which could reduce the number of postoperative complications. The question does remain whether pulse oximetry improves outcomes in other situations. Future work in this area would benefit from greater attention to methods of randomization as we found only a few appropriately randomized studies.