Introduction

Fast track cardiac anesthesia (FTCA) has gained popularity in the last decade because it facilitates early tracheal extubation and may decrease length of hospitalization in the intensive care unit (ICU) and postoperative ward. FTCA is based on the administration of relatively small amounts of short acting opioids, supplemented with either propofol or volatile anesthetics. It has been reported that the risk of cardiovascular complications after FTCA is comparable to conventional cardiac anesthesia (CCA), which is based on the administration of high doses of opioids (i.e. fentanyl 10 - 20 µg/kg, or sufentanil 2.5 - 5 µg/kg) en benzodiazepines. High dose opioid anesthesia was introduced into cardiac surgery almost 40 years ago, in an attempt to provide safe anesthesia without myocardial depression in patients with compromised cardiac function.

Many cardiac surgical centers have now embraced fast track anesthesia protocols in order to reduce ICU bed utilization and to reduce hospital costs associated with postoperative care. It has been argued, however, that FTCA should not be adopted until further evidence of its safety is available, in particular because the prolonged intensive analgesia resulting from CCA is thought to reduce postoperative myocardial ischemia.
Safety of fast track cardiac anesthesia

A number of randomized trials have indicated that FTCA is not associated with a higher risk for myocardial ischemia or other perioperative complications compared with conventional anesthetic methods.\textsuperscript{3,4,9} However, the safety of FTCA has not been thoroughly evaluated, because the studies carried out so far enrolled too few patients to adequately assess the relative risk for low frequency complications such as mortality. The two largest randomized studies comparing FTCA with CCA in fact comprised only 1012 and 404 patients\textsuperscript{9,12} yielding results with limited statistical power.

A meta-analysis of randomized trials evaluating FTCA included 10 trials with a total of 1800 patients.\textsuperscript{13} No differences were observed in 30-day mortality, myocardial infarction and renal failure, but the authors recognized that even this meta-analysis was underpowered.\textsuperscript{13} A later meta-analysis included 27 studies with a total of 2821 patients.\textsuperscript{14} Both meta-analyses predominantly included low-risk patients and were not designed to evaluate the safety of FTCA.

A recent cohort study by Svircevic \textit{et al}\textsuperscript{15} compared the safety of fast-track cardiac anesthesia (FTCA) and conventional cardiac anesthesia (CCA) in 7998 patients undergoing cardiac surgery. The data from this study showed no evidence of an increased risk of adverse outcomes in patients undergoing fast track cardiac anesthesia.\textsuperscript{15} The CCA group comprised 4020 patients and the FTCA group 3969 patients. The incidence of in-hospital mortality was 1.9\% in the CCA group and 2.3\% in the FTCA group ($p = 0.66$). The incidence of myocardial infarction was 5.2\% in the CCA group and 5.5\% in the FTCA group ($p = 0.61$) and the incidence of stroke was 0.9\% and 1.3\%, respectively ($p = 0.06$). The FTCA patients had a shorter duration of mechanical ventilation (6 \textit{versus} 12 hours, $p \leq 0.001$) than the CCA patients. Surprisingly, this did not result in a shorter ICU stay or hospital stay. This might be
explained by a higher rate of co-morbidity in the FTCA group necessitating more postoperative care. However, it also illustrates that FTCA is perhaps only more cost-effective than CCA, when patients can be transferred from the ICU to a medium care unit shortly after extubation, so that an ICU bed can be re-used the same day for another patient.

**Thoracic epidural anesthesia**

The addition of high thoracic epidural anesthesia (TEA) to general anesthesia during cardiac surgery offers an attractive strategy to improve intra- and postoperative analgesia and facilitate early extubation.\(^{16-18}\) Moreover, TEA may also have a beneficial effect on clinical outcomes. TEA promotes sympathicolysis, attenuates the stress response to surgery,\(^{19-20}\) and may enhance coronary perfusion.\(^{21}\) TEA may therefore improve myocardial oxygen balance and reduce the incidence of tachyarrhythmias.\(^{19}\) Through the same mechanism, the incidence of perioperative myocardial infarction could be reduced.\(^{22}\)

TEA in cardiac surgery, however, is controversial because the insertion of an epidural catheter in patients requiring full heparinization for cardiopulmonary bypass may lead to an epidural hematoma.\(^{23}\) An epidural hematoma may compress the spinal cord and lead to permanent neurological injury including paraplegia if not detected and evacuated promptly.

Most randomized controlled studies on TEA in cardiac surgery have compared TEA to traditional opioid-based general anesthesia.\(^{24}\) However, as mentioned above, fast track cardiac anesthesia has gained widespread popularity over the last two decades. Despite the apparent advantages of both TEA and FTCA separately, few studies have directly compared the two techniques.
Svircevic et al recently conducted a randomized controlled trial in 654 elective cardiac surgical patients who were randomized to combined FTCA and TEA versus FTCA alone. Follow-up was at 30 days and 1 year after surgery. Thirty day survival free from myocardial infarction, pulmonary complications, renal failure, and stroke was 85.2% in the TEA group and 89.7% in the FTCA-alone group (p=0.23). At 1 year follow-up, survival free from myocardial infarction, pulmonary complications, renal failure, and stroke was 84.6% in the TEA group and 87.2% in the FTCA-alone group (p= 0.42). Postoperative pain scores were low in both groups.

In this study, the authors were unable to demonstrate a clinically relevant benefit of TEA on the frequency of major complications after elective cardiac surgery, when compared to FTCA without epidural anesthesia. Given the potentially devastating complications of an epidural hematoma following insertion of an epidural catheter, it is questionable whether this procedure should be applied routinely in cardiac surgical patients who require full heparinization.

**Conclusion**

In conclusion, fast track cardiac anesthesia may reduce ICU bed utilization and hospital costs associated with postoperative care. Studies carried out so far suggest that the risk of adverse outcomes in patients undergoing fast track cardiac anesthesia is not increased in comparison to conventional cardiac anesthesia, but a sufficiently powered randomized trial is still lacking. The insertion of a thoracic epidural catheter offers no additional benefit, when compared to a modern fast track anesthetic technique without epidural anesthesia.
References


