

# Continuous Thoracic Paravertebral Block as Perioperative Analgesia for Off-Pump Coronary Artery Bypass Grafting

Gerald Chi<sup>1,\*</sup>, Adeel Jamil<sup>2</sup>, Miroslav Radulovic<sup>2</sup>

<sup>1</sup>Division of Cardiovascular Medicine, Department of Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, Massachusetts, USA.

<sup>2</sup>Department of Medicine, James J. Peters VA Medical Center, Icahn School of Medicine, Bronx, New York, USA.

## Correspondence

Gerald Chi,

Division of Cardiovascular Medicine, Department of Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School, 930 Commonwealth Avenue #3 Boston, Massachusetts 02215 USA.

Ph.no: +1 (617) 975-9952

E-mail: geraldchi@gmail.com

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Until the mid-1990s, coronary artery bypass grafting (CABG) was performed with cardiopulmonary bypass in conjunction with the induction of ischemic cardiac arrest (on-pump CABG).<sup>1</sup> On-pump CABG has been considered as the standard approach as it allows for precise vascular anastomoses without cardiac motion or hemodynamic compromise. To circumvent the complications associated with bypass circuit and cross-clamping of the aorta, the off-pump technique was developed as an alternative approach, particularly for patients with extensive disease of the ascending aorta.

With respect to perioperative analgesic techniques for cardiothoracic surgery, thoracic paravertebral block (PVB) has gained considerable popularity over the past two decades. In thoracic PVB, somatic and sympathetic nerve blockade is achieved by injection of local anesthetics into the paravertebral space. Continuous PVB is utilized in conditions requiring more prolonged pain relief than that conferred by single-injection PVB.<sup>2</sup>

In the current issue, a randomized study prospectively investigated the feasibility and efficacy of bilateral continuous PVB in conjunction with general anesthesia among 60 patients scheduled for elective off-pump CABG. Patients with infection at the puncture site, failed paravertebral catheterization, anomaly of vertebral column, left main coronary artery lesion, ejection fraction of <40%, associated vascular heart disease, or pre-existing neurological, respiratory, renal, or liver disease were excluded from the analysis. Bilateral PVB was performed in 30 patients at the level of third or fourth thoracic vertebra with bupivacaine 0.125% injection at 0.15 ml/kg/h intraoperatively and postoperatively. The other 30 patients in the control group received intravenous infusion of fentanyl at 1 µg/kg/h intraoperatively and tramadol at 1mg/kg tid postoperatively. The authors demonstrated that continuous PVB with bupivacaine 0.125% injection was associated with a less severe early pain (measured at 8 h postoperatively), but the intensity for late pain (measured at 24 h postoperatively) was not statistically different from the control group. Additionally, continuous PVB reduced the requirement for postoperative rescue analgesia within 24 h of surgery. Patients who underwent continuous PVB were also hemodynamically more stable and had numerically shorter time to extubation and length of ICU or hospital stay. No major complications such as pleural puncture or epidural spread of local

anesthetic agents were observed. Consistent with previous studies,<sup>3-6</sup> these findings generally support the feasibility of continuous PVB technique for perioperative analgesia in patients undergoing CABG. Conversely, in a pilot observational study by Ho *et al.*<sup>7</sup> bilateral thoracic paravertebral block with ropivacaine (initial bolus dose of 3 mg/kg, followed by infusion of ropivacaine 0.25% at 0.1 ml/kg/h on each side) failed to eliminate the need for supplemental opioids after CABG. Furthermore, all seven patients who received continuous ropivacaine infusion experienced postoperative neurologic impairment presumably due to ropivacaine toxicity, raising the concern of appropriate regimen and dosage for continuous PVB.

The authors should be congratulated for conducting a prospective randomized study in an attempt to supplement current evidence concerning the continuous PVB in off-pump CABG. A systematic review and meta-analysis from Scarfe *et al.* revealed that continuous PVB for post-cardiothoracic surgery analgesia is associated with a lower risk of nausea and vomiting, hypotension, and urinary retention than epidural analgesia.<sup>8</sup> Mixed results as well as heterogeneous measures of outcome (e.g., scoring of pain intensity, time frame of pain assessment, and rescue analgesia requirement) were noted. Therefore, a fully conclusive verdict on the analgesic effect of continuous PVB could not be reached. There remains an unmet need for more high-quality evidence and consistency in outcome assessment. Future data from pooled analysis of controlled trials, observational studies, and registries will be required to inform physicians regarding the risk-benefit of continuous thoracic PVB with a greater certainty.

## REFERENCES

1. Grover FL. Current status of off-pump coronary-artery bypass. *N Engl J Med.* 2012;366(16):1541-3.
2. King K, Chelly J. Paravertebral blocks: The evolution of a standard of care. *Anesth News.* 2012;38:33-9.
3. Dhole S, Mehta Y, Saxena H, Juneja R, Trehan N. Comparison of continuous thoracic epidural and paravertebral blocks for postoperative analgesia after minimally invasive direct coronary artery bypass surgery. *J Cardiothorac Vasc Anesth.* 2001;15(3):288-92.
4. Canto M, Sanchez MJ, Casas MA, Bataller ML. Bilateral paravertebral blockade for conventional cardiac surgery. *Anaesthesia.* 2003;58(4):365-70.

5. Mehta Y, Arora D, Sharma KK, Mishra Y, Wasir H, Trehan N. Comparison of continuous thoracic epidural and paravertebral block for postoperative analgesia after robotic-assisted coronary artery bypass surgery. *Ann Card Anaesth.* 2008;11(2):91-6.
6. Ganapathy S, Murkin JM, Boyd DW, Dobkowski W, Morgan J. Continuous percutaneous paravertebral block for minimally invasive cardiac surgery. *J Cardiothorac Vasc Anesth.* 1999;13(5):594-6.
7. Ho AM, Karmakar MK, Ng SK, *et al.* Local anaesthetic toxicity after bilateral thoracic paravertebral block in patients undergoing coronary artery bypass surgery. *Anaesth Intensive Care.* 2016;44(5):615-9.
8. Scarfe AJ, Schuhmann-Hingel S, Duncan JK, Ma N, Atukorale YN, Cameron AL. Continuous paravertebral block for post-cardiothoracic surgery analgesia: A systematic review and meta-analysis. *Eur J Cardiothorac Surg.* 2016;50(6):1010-8.

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