

Case Report

HIGH THORACIC EPIDURAL ANAESTHESIA FOR OFF-PUMP CABG IN A SPONTANEOUSLY BREATHING (CONSCIOUS) PATIENT (ACAB)

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ABSTRACT

A 68 yr old man with ischemic heart disease (IHD) affecting triple vessels was admitted in National Institute of Cardiovascular Diseases & Hospital (NICVD), Dhaka for Coronary artery bypass grafting (CABG). He had been suffering from angina with minimal exercise with mild left ventricular systolic dysfunction. He was also suffering from hypertension and mild obstructive airway disease for the last ten years. He underwent off-pump CABG on beating heart using high thoracic epidural anaesthesia (TEA) without intubation. The patient was awake and breathing spontaneously, tolerated each phase of the operation without having any harmful effect. The effect of movement of the chest wall and the heart during spontaneous respiration did not influence the conduction of the operation. Epidural catheter was placed at T1-2 interspace, in lateral decubitus position. After a test dose of 2% lignocaine 5ml, 0.5% Bupivacaine 14 ml + Fentanyl 2 µg/ml was injected epidurally. Central venous catheter was placed under local anaesthesia and inj Morphine 7.5 mg was given intramuscularly. After mid sternotomy left internal mammary artery (LIMA) and venous grafts were anastomosed to coronary arteries on beating heart. Haemodynamically patient was stable throughout the procedure and oxygenation was maintained by assisted facemask ventilation. At the end of operation laryngeal mask airway (LMA) was used for better oxygenation, which was withdrawn one hour later in the postoperative period. After transferring to the ICU, the patient was fully conscious, oriented, responds to commands, capable of coughing and clearing of secretions and

pain free. He didn't require any inotropic support or any systemic analgesic. Postoperative analgesia was maintained by continuous epidural infusion of local anaesthetic mixture (0.5% Bupivacaine 20 ml + 2% Lignocaine 20 ml + Fentanyl (50µg/ml) 1 ml + NS 9 ml = 50 ml) via syringe pump at 1ml /hour. Liquid diet was allowed to the patient from the first POD and epidural analgesia was provided upto the third POD. Patient was shifted to HDU from ICU on the third POD. The patient was highly satisfied about the anaesthetic and operative procedure.

Key words: coronary artery bypass graft, awake coronary artery bypass graft, thoracic epidural anaesthesia, high thoracic epidural anaesthesia.

INTRODUCTION

Complete sternotomy is the standard approach in cardiac surgery, and CABG is the most common revascularization procedure using this approach¹. This standard approach is associated with surgical, anaesthetic, or cardiopulmonary bypass trauma during cardiac operation, which is responsible for increased perioperative morbidity and mortality. Procedures are in continuous development in an effort to minimize the perioperative morbidity and mortality. The current technique of beating heart CABG is intended to decrease the adverse side effects typically associated with cardiopulmonary bypass, resulting in reduction of morbidity and length of hospital stay². High TEA further reduces intraoperative stress and postoperative pain and allows awake coronary artery bypass grafting (ACAB), avoiding the drawbacks of endotracheal general intubation and mechanical ventilation.

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This new technique is referred to as awake coronary artery bypass grafting (ACAB), was first performed in October 1998 with high thoracic epidural block³.

This report describes our first experience in performing CABG in an awake patient using high thoracic epidural anaesthesia without intubation.

CASE REPORT

A 68 yr old man with hypertension and triple vessel coronary artery disease (critical stenosis of proximal left anterior descending (LAD) before first diagonal (D₁), right coronary artery (RCA) 70% & circumflex is diffusively diseased & narrow), having angina with minimal exercise (NYHA class III) and mild left ventricular systolic dysfunction (LVEF-45%) with mild obstructive airway disease underwent off-pump CABG using high TEA without intubation. The associated mild obstructive pulmonary disease increased the operative risk..

Thoracic epidural anaesthesia without intubation:

High thoracic epidural anaesthesia was used to achieve somatosensory and motor block between T₁₋₈. The upper permissible level of block C₆ which was monitored by ensuring that the patient didn't present with any symptom compatible with Homer's Syndrome.

One hour before cardiac surgery in the operating room, the patient was placed in left lateral position. Epidural space was identified using 18G(B Braun) Touhy needle at the interspace between T₁₋₂ employing the Median approach & the loss of resistance technique using air under local anesthesia (LA). The catheter was directed cranially and advanced 3-4 cm within the epidural space. After confirmation about the correct position of the catheter, 2% Lignocaine-2.5 ml was given as a test dose. After 3-5 minutes of test dose Inj. Bupivacaine 0.5% 14 ml and Fentanyl 2 µg/ml was injected within the epidural space. After 15 minutes the level of the block was assessed by pinprick and temperature discrimination. The somatosensory and motor block of the intercostal muscles was maintained by continuous infusion of epidural anesthetic solution (Lignocaine 2%-20 ml, + Bupivacaine 0.5%-20 ml + Fentanyl (50 µgm) 1 ml+ NS-9 ml = 50 ml) using syringe pump at 1 ml/hour, whilst preserving diaphragmatic respiration. Motor block of intercostal muscles was assessed

visually by monitoring the loss of intercostal movement. Sensory block was maintained at the CE, Ts level.

Through out the operation, the patient spontaneously breathed O₂ delivered through a Hudson mask. He was draped in such a way that we had free access to the patient's head and neck which would enable us to proceed for immediate tracheal intubation in case of any emergency. No muscle relaxants were used. Continuous monitoring of the patient's condition was done by means of electrocardiography (L-II) with two lead ST analysis and the direct determination of arterial pressure, central venous pressure, and pulse oxymetry & urine output measurement and periodical arterial blood gas analysis.

Off-pump CABG

After a median longitudinal sternotomy incision, the in situ LIMA was anastomozed to LAD using pleural sparing technique. A pericardial traction suture was used to visualize the target coronary artery. The visualization of the anastomotic site was enhanced using a surgical blower. 3 grafts were given- -

LIMA to LAD

RSVG to a diagonal (DI)

RSVG to Posterior descending artery (PDA).

Right Saphenous vein was harvested by infiltrating 2% lignocaine locally from right lower extremity.

After placement of two chest drainage tubes into the mediastinum, the sternotomy was closed. At the beginning of the operation 5000 IU of heparin were administered for anticoagulation and 7.5 mg of morphine Fm given for analgesia. Sedation was maintained by intravenous infusion of Propofol.

RESULTS

The patient tolerated each phase of the operation very well and he was stable hemodynamically (except during manipulation of the heart when he became moderately hypotensive [BP was decreased upto 65/35 mm of Hg] for some period which was managed by intermittent ephedrine injection). Oxygenation was maintained adequately by diaphragmatic respiration. A moderate accumulation of CO₂ was noted in ABG analysis (PCO₂ was increased upto 50 mm Hg), otherwise no metabolic consequences occurred.

The effect of the movement of the chest wall and the heart during spontaneous respiration didn't influence the conduction of the operation or compromise the quality of anastomosis. At the end of the operation an LMA was introduced under propofol sedation for better oxygenation and it was withdrawn one hour later in postoperative period. The postoperative course of the patient was uneventful. The patient remained haemodynamically stable in ICU. Arterial blood gas and acid-base status remained within acceptable ranges throughout ICU stay. No ECG alterations revealed postoperative necrosis. No neurologic or infectious complications or clinical pulmonary or radiologic alterations occurred. The patient was completely pain free.

DISCUSSION

Endotracheal general anaesthesia and Cardiopulmonary bypass is the usual practice in CABG. Endotracheal general anaesthesia and mechanical ventilation offer an adequate blood gas control, stable haemodynamics and with the relief of anxiety⁴.

High TEA provides excellent conditions for off-pump CABG surgery by dilating the coronary arteries and the internal thoracic artery (if the level of block extend to C6) and by reducing heart rate and arrhythmias during manipulation of the heart². Thus, TEA improves the myocardial oxygen demand/supply ratio and consequently reduces perioperative myocardial ischemia. In addition to these intraoperative advances, postoperative pain management is facilitated by continuous epidural application of analgesia. Superior analgesia leads to improved pulmonary function and early ambulation after beating heart surgery consequently in short intensive care requirement. Other potential advantages of high TEA are preservation of fibrinolytic system and the prevention of sustained atrial fibrillation postoperatively⁵.

The formation of an epidural hematoma, nerve root compression, ischemia and paralysis after epidural catheter placement in heparinized patient and the bronchospasm due to sympathetic blockade of the bronchial tree were not observed^{6,7,8}.

Off-pump beating heart surgery significantly decreases the invasiveness of coronary artery

bypass grafting. Elimination of cardiopulmonary bypass, small incisions, avoiding aortic manipulation, use of arterial graft etc., have all led to the performance of CABG more efficiently. It also modified the anaesthetic procedure as well-better analgesia, reduced narcotic requirements, wiser drug choice, earlier extubation and an improved respiratory function leading to an earlier ambulation.

Recently there is a high trend of increasing popularity in other centers abroad high TEA without intubation is used as a sole anaesthetic procedure for off-pump CABG in spontaneously breathing patient.

CONCLUSION

In selected cases, high TEA for off pump CABG in spontaneously breathing conscious (ACAB) patients is feasible & may provide many advantages over the usual practice.

We don't want to advocate the elimination either of endotracheal intubation or GA in routine off pump CABG. Our purpose is to facilitate the learning process towards performing Cardiac surgery in a less invasive way to decrease the perioperative morbidity and mortality.

REFERENCES

1. Aybek T, Dogan S, Neidhart G, Kessler P, Khan MF, Wimmer -Greincker G, et al . Coronary artery bypass grafting through complete sternotomy in conscious patients. *Heart Surg Forum.* 2002; 5: 17-21.[Medicine]
2. Aybek T, Dogan S, Neidhart G, Kessler P, Khan MF, Wimmer -Greincker G, et al . Surgery for Acquired Cardiovascular Disease- Operative techniques in awake coronary artery bypass grafting. *J. Thoracic Cardiovasc Surg* 2003; 125: 1394-1400.
3. Karagoz H, Kurtoglu M, Bakkaloglu B, Sonmez B, Cetintas T, Bayazit K. Coronary artery bypass grafting in the awake patient: Three years experience in 137 patients. *J. Thoracic Cardiovasc. Surg.* 2003 125: 1401-1404.
4. Gatti G, Piccione R, Pugliese P. Thoracic epidural anesthesia for off-pump coronary artery bypass grafting in a spontaneously breathing conscious patient. *Ital Heart J* 2003; 4(8): 565-567

5. Blomberge S, Emanuelsson H, Kvist H, et al. Effects of thoracic epidural anesthesia on coronary arteries and arterioles in patients with coronary artery disease. *Anesthesiology* 1990; 73: 840-7.
6. Karagoz H, Sonmez B, Bakkaloglu B et al. Coronary artery bypass grafting in the conscious patient without endotracheal general anesthesia. *Ann Thorac Surg* 2000; 70: 91-6.
7. Vandermeulen EP, Aken HV, Vermylen J. Anticoagulants and spinal-epidural anesthesia. *Anesth Analg* 1994; 79: 1165-77.
8. Gruber EM, Tschermko Em, Kritzinger M, et al. The effects of thoracic epidural analgesia with Bupivacaine 0.25% on ventilatory mechanics in patients with severe chronic obstructive pulmonary disease. *Anesth Analg* 2001; 92: 1015-9.
9. Metha Y, Swaminathan M, Mishra Y, Trehan N. A comparative evaluation of intrapleural and thoracic epidural analgesia for postoperative pain relief after minimally invasive direct coronary artery bypass surgery. *J Cardiothorac Vasc Anesth* 1998; 12: 162-5.