

Coronary Artery Bypass Grafting (CABG) Without General Anaesthesia- An Initial Experience in NICVD, Dhaka, Bangladesh

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Summary:

Objective: our initial experience with 15 patients operated on without general anesthesia is reviewed to explore the validity of our surgical strategy. **Material and Methods:** 15 males between 45-65 years underwent off-pump coronary artery bypass grafting (OPCAB) with high thoracic epidural anesthesia (HTEA) between April to September 2006. Target vessels involved were the single vessel in 5, double vessel in 7 and triple vessel disease in 3 patients. CABG was performed through a median sternotomy in 13 patients and through limited access in 2 patients. **Results:** Among 15 patients, patients remain awake or were lightly sedated breathing spontaneously in 9 cases. In 3 patients pneumothorax was observed during surgical intervention. Average length of ICU stay was 1 day (range 1 to 2 days). In all cases, patients showed lack of treatable cardiac dysrhythmias and stable haemodynamic response to surgical procedures including cardiac positioning and direct handling.

Introduction:

General anaesthesia is the usual practice in cardiac surgery. But high thoracic epidural anaesthesia (HTEA) is also an important tool in off pump coronary artery bypass (OPCAB) surgery. HTEA

Conclusion: CABG under epidural anesthesia appeared to be safe for and satisfying to the patients. Stable haemodynamics, low incidence of cardiac dysrhythmias and early recovery and discharge from ICU and low cost involvement are among the benefits that can be derived from this technique at least in selected patients. High thoracic epidural anaesthesia was proved to be very efficient in achieving, somatosensory & motor block in the chest, which in turn facilitating CABG without endotracheal general anaesthesia in selected patients. CABG in an awake patient without endotracheal general anaesthesia was first performed in October 1998 with high thoracic epidural block. Since then, similar cases had been reported in the literature to decrease the invasiveness of the CABG procedure. This report presents our initial experience in 15 patients which was performed during a time period of 6 months.

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yielding cardiac sympathectomy resulting in vasodilation of coronary is interal thoracic artery and bradycardia without haemodynamic compromise. Thoracic epidural anaesthesia may also decrease the incidence of supraventricular and ventricular arrhythmia undergoing cardio thoracic surgery. It also attenuates the stress response, a favorable oxygen demand supply ratio for the myocardium, balancing the pro coagulant activity after off pump surgery and effective control of pain. So epidural anaesthesia also shortens ICU stay and contributes patients satisfaction significantly after CABG. The goal of this study was to express our initial experience with coronary artery bypass grafting (CABG) without general anaesthesia and to facilitate the learning process towards performing cardiac surgery in a less invasive manner.

Materials and Methods:

Between April to September 2006, 15 patients underwent off pump CABG with high thoracic epidural anesthesia. Patient selection criteria included the absence of recent antithrombotic (<1 week) or fibrinolytic therapy (<2 days), and patient co-operation. Severe left ventricular dysfunction, severe pulmonary disease, or any other variable that could present

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potential comorbidity did not affect patient selection. Written informed consent was obtained from every patient. All of them were male patients ranging in age from 35 to 65 years. No patients had contraindications for general anaesthesia. In all cases this procedure was used electively. A 0.07 mg/kg dose of Midazolam was used for premedication. At least 60 minutes elapsed between epidural catheter insertion and heparinization.

High thoracic epidural anaesthesia was used for these operations. The objective of this approach was to achieve somatosensory and motor block at the T₁₋₈ level, and motor block of the intercostal muscles while preserving diaphragmatic respiration. The upper permissible level of block was C₆ which was monitored by the development of Horner syndrome. The patient was placed in a lateral position and a 16 gauge flexible tip catheter (B.Braun) was inserted through a tuohy needle at the T₁₋₂ or T₂₋₃ inter space by using the median approach and the loss of resistance or hanging drop technique. The catheter was directed cephalad and advanced 3 to 4 cm into the epidural space. The block level was tested after epidural administration of a test dose of 5 ml of lignocaine (2%). An epidural anaesthesia solution was used for epidural anaesthesia, consisting of bupivacaine (0.5%, 20 ml), lignocaine (2%, 20 ml), Fentanyl 50 mgm (1 ml), and normal saline 9 ml. In the operating room 10 ml of epidural anaesthesia solution was administered epidurally as a bolus, and the level of the block was tested by assessing both temperature and pinprick discrimination.

Additional doses of epidural anaesthetic solution were administered as a bolus or by continuous infusion as needed to achieve motor block of the intercostal muscles. Motor block of the intercostal muscles was assessed visually by monitoring the loss of intercostal movement. Sensory block level was maintained at the C6-T8 level. Throughout operation, patients spontaneously breathed room air or nasal oxygen.

Target vessels involved were the LAD in 5 patients and LAD plus circumflex in 7 and LAD plus circumflex plus RCA in 3 patients. CABG was performed through minimal access in 2 patients (MIDCAB) and rest by median sternotomy.

In all operations 5000 IU of heparin was used for anticoagulation, which was reversed with protamine at the termination of operation. Cardiopulmonary bypass was used in 1 patient. Femoral block were given (by 2% lignocaine (10 ml) for taking venous graft. For sedation propofol was used intermittently.

Results:

In all patients objectives of epidural anaesthesia were achieved. All patients' hemodynamic status were stable. Diaphragmatic respiration was adequate in maintaining sufficient level of oxygenation in 9 patients. 6 patients electively converted to general anesthesia with insertion of either Laryngeal Mask Airway (LMA) for assisted spontaneous ventilation in 3 cases or endotracheal tube for control ventilation in 3 cases due to dyspnoea and desaturation resulting from opening of pleura. There were no complications related to epidural anaesthesia. Nine of 15 patients completed the procedure awake.

Average length of ICU stay was 1 day (range 1-2). One of the converted cases was expired due to hypotension on 2nd post operative day. Perioperative variables are depicted in Table 1.

Table-I

<i>Perioperative variables</i>	
SVo2 (%)	98±1.38
Pco2 (mm Hg)	45±2
MAP (mm Hg)	115±25.2
Heart rate (beats/ min)	60±10
Epidural Solution(ml)	46±8
Operative Time (min)	300±30
VAS	2.6±0.3

Values are expressed as means±SD. Blood samples were taken at every 15 minutes during the operation.

SVo2, Arterial oxygen saturation; MAP, mean arterial pressure; VAS, visual analog score (0=no pain, 10=worst possible pain).

Discussion:

Endotracheal general anaesthesia is the usual practice in cardiac surgery. High thoracic epidural anaesthesia might have beneficial effects in beating heart surgery, with or without general anaesthesia⁸. Thoracic epidural block yields cardiac sympathectomy resulting in vasodilatation of coronary and internal thoracic arteries, and bradycardia without hemodynamic compromise⁸. Other advantages include, attenuation of stress response, a favorable oxygen demand/supply ratio for the myocardium, preservation of the fibrinolytic system that might counter balance the procoagulant state observed after the beating heart surgery^{9,10}, and the prevention of postoperative sustained atrial fibrillation are still matter of debate^{10,11}.

Moreover epidural anaesthesia results in sensory block which gives advantages of effective pain control and facilitate earlier extubation. Contrary to our previous experiences aspirin is no longer discontinued before off pump CABG, irrespective of whether epidural anesthesia is used. The major drawback of thoracic epidural anesthesia is the risk of epidural hemotoma formation, which is estimated to be 1 in 150,000¹². This complication can be avoided by a minimum time delay of 60 minutes between epidural puncture and heparinization and willingness to postpone surgical intervention for at least 24 hours if a bloody tap occurs³.

The epidural anaesthesia itself exerts a sedative effect on the patients. As the epidural block paralyzes the intercostal muscles, maintenance of diaphragmatic respiration is mandatory. Diaphragmatic paralysis which occurs at the C4 level, can be avoided by monitoring the development of Horner syndrome, indicating a block at the C6 level. Diaphragmatic respiration was adequate in maintaining sufficient levels of oxygenation. A moderate accumulation of CO₂ was noted without clinical significance.

Avoidance of a rebreathing mask and decreasing the dose of epidural anesthetic solution is sufficient to deal with hypercarbia. Pneumothorax was a dreaded complication. This problem will be overcome by quick repair of pleura if open within a stable period of about 5 to 6 minutes before respiratory distress and vigorous cardiac motion started. If this is not sufficient the pleura should be opened wide.

Avoidance of general anaesthesia enables mobilization of patients immediately after surgical intervention⁶ and eliminate intubation and extubation related risk to ischemic heart disease patient.

Epidural anaesthesia also shortens ICU stay or avoid ICU experience which is not only beneficial for effective use of hospital resources but also contributes patients satisfaction significantly after CABG⁶.

Conclusion:

CABG without general anaesthesia appeared to be safe for and satisfying to the patients. Moreover Thoracic Epidural offers many benefits over GA. It is not our intention to advocate the elimination of endotracheal general anaesthesia in routine off pump CABG. Our purpose is to facilitate the learning process towards performing cardiac surgery in a less invasive manner. Minimally invasive cardiac surgery

should go hand in hand with minimally invasive cardiac anaesthesia. Further study is required to define the possible extent and limitations of this strategy.

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