

CASE SERIES

Awake Coronary Artery Bypass Grafting: Initial Experience in a Rural Cardiac Centre

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ABSTRACT

Two patients with significant co-morbidities in the form of bronchial asthma and hypothyroidism underwent "awake coronary artery bypass grafting" under high thoracic epidural anaesthesia. Our experience indicates that high thoracic epidural anaesthesia is beneficial in patients with co-morbid conditions undergoing coronary artery bypass grafting. JMS 2010;13(2):64-66

Key words: High thoracic epidural anaesthesia, awake coronary artery bypass grafting, rural cardiac centre

High thoracic epidural anaesthesia facilitates off-pump coronary artery grafting by coronary vasodilation, dilatation of internal thoracic artery, reduction of heart rate and decreased incidence of arrhythmia during manipulation of heart.^{1,2} In addition, high thoracic epidural anaesthesia provides excellent postoperative pain relief.

We are reporting initial cases that underwent coronary bypass surgery under "Awake anaesthesia".

The first patient was 65 yr old male with history of severe bronchial asthma and grossly deranged lung function test. Echocardiography was normal and angiography showed severe triple vessel disease. He had diabetes and systemic hypertension as an associated co-morbid diseases.

The other patient was a 60 yr old female, with history of frequent unstable angina and was a known case of hypertension and noninsulin dependent diabetes mellitus. She had undergone thyroidectomy 20 yrs back and was not on any thyroid replacement therapy. She was found to be hypothyroid and thyroid replacement therapy was initiated.

Her liver enzymes were also significantly deranged. Echocardiography was normal and angiography showed double vessel disease. Due to recurrent episode of unstable angina it was not possible to delay the surgery further. In view of her hypothyroidism there was some risk of ventilator dependence after the surgery.

Both the patients were selected for awake coronary artery bypass grafting, off-pump so as to avoid cardiopulmonary bypass related complications also, which could have hampered the recovery of the patient after surgery. In both these cases general anaesthesia was avoided because cardiac anaesthesia consists of high dose opioid analgesia supplemented by an inhalational agent or intravenous anaesthetic agents to achieve intraoperative hemodynamic stability and to minimize sympathetic responses to surgical stimuli. However because of their unpredictable pharmacokinetic characteristics, these anaesthetic drugs may accumulate in the body, causing delayed recovery, respiratory depression and the need for prolonged ventilatory support.

Anti-platelets drugs were stopped 5 days prior to surgery. All pros and cons of anaesthetic and surgical procedures were explained to the patients and written informed consent was taken.

Procedure: High epidural catheter insertion is performed in Intensive Care Unit or high dependency set up. On the evening

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before surgery epidural catheter under local anaesthesia was inserted through TUOHY needle (16G) in the C7-T1 space via median approach in patient sitting up with back upright and neck flexed. Loss of resistance technique and confirmed by hanging drop method is used. 2-3 cms of the catheter is kept indwelling. A test dose of 1-2 ml of 2% xylocaine with 1 in 2 lac adrenaline is injected through catheter to confirm the proper position of catheter. A sterile dressing is placed taking care that the catheter is not kinked.

On the day of surgery patient was shifted to the operation theatre. All vital parameters including electrocardiogram, respiratory rate, oxygen saturation, direct arterial blood pressure (radial & femoral arteries), urine output were monitored. Ryle's tube and thermodilution pulmonary catheter were inserted. 0.05 ml per cm height of patient of 0.5% of Bupivacaine is given as infusion through epidural catheter over 10-15 mts. Following detection of adequate analgesia, an infusion of 5ml per hour of 0.5% of Bupivacaine is set up through syringe pump and infused via catheter. Patient breathes spontaneously with oxygen 8-10 litres through venturi mask to maintain a end-tidal CO₂ of less than or equal to 45 mmHg. All vitals parameters were monitored including cardiac output, cardiac index, pulmonary artery pressure, systemic vascular resistance, pulmonary wedge pressure, pulmonary vascular resistance and systemic vascular resistance. Serial arterial blood gases were checked and normothermia was maintained during the procedure. Patients were being communicated with, throughout to assess their wakefulness. If patient is apprehensive, bolus of Fentanyl 25 mcg are given IV. The off-pump grafting procedure went smoothly and they did not require any ventilatory support either during or after the surgery. Post-operative analgesia through epidural catheter was maintained with Fentanyl which was repeated every 4-6 hrs. This measure has enabled both our patients to tolerate breathing exercises and physiotherapy more effectively, despite the fact that one of them was suffering from bronchial asthma. Both these patients had good recovery after the operation and were discharged from the hospital on 5th postoperative day.

Discussion

Ours is a cardiovascular centre situated in a remote panchayat of Perumala, Kerala where two patients with significant co-morbid states namely, bronchial asthma and hypothyroidism, underwent "awake coronary artery bypass grafting".

Well conducted general anaesthesia is an important aspect of cardiac surgery with advantages of good control of gases, haemodynamics, and relief of anxiety.³ The advent of minimal invasive surgical techniques for cardiac surgery aims at better analgesia, earlier extubation, improved respiratory function, earlier ambulation and reduced narcotic requirements⁴. Although, general anaesthesia with endotracheal intubation is frequently used without complications, documented haemodynamic responses to tracheal intubation, tube suctioning and tracheal extubation may lead to myocardial ischemia which

represents a potential disadvantage for patients with coronary artery disease.^{5,6} Besides these the other known complications of tracheal intubation include trauma to teeth, vocal cords, or peri-intubational hypoxia.⁷

Initially high thoracic epidural anaesthesia was used as an adjunct to general anaesthesia in cardiac surgeries to facilitate surgery. Thoracic epidural block yields cardiac sympathectomy which has distinct advantages in patients with ischemic heart disease.^{8,9}

Bradycardia and coronary vasodilatation facilitates beating heart surgery technically.¹⁰ Sympathetic block of the heart results in coronary artery dilation and improves subendocardial blood flow which is beneficial in these patients.^{11,12}

Internal thoracic artery dilatation can be achieved if the block rises to the C6 level which provides excellent graft flow. Moreover, the epidural anaesthesia provokes a fibrinolytic state that may counter balance procoagulant state after beating heart surgery.^{13,14} Besides superb pain control which is extended into the postoperative period, epidural itself exerts a sedative effect on patients and no additional sedative is required during the operation.¹⁰ The major drawback of epidural anaesthesia is risk of epidural haematoma. This is estimated to occur 1 in 1,50,000 case.¹⁵ This complication can be avoided by implementation of proper technique and delay of at least 60 min between epidural puncture and heparinization.¹⁶

In our 2 cases this complication was not observed as the epidural was placed night before the planned surgery and after normal coagulation profile was confirmed. Diaphragmatic paralysis which occurs at level of C4 was not noted in our series, it can be avoided by monitoring the development of Horner's syndrome.

Pneumothorax during awake coronary artery bypass grafting, results in respiratory distress and vigorous cardiac motion.¹⁰ The effects are thought to be due to the development of tension pneumothorax through the small rent, so aspiration of air followed by repair or opening the pleura wide has been recommended.¹⁰

In our two patients no arrhythmia was noted. This could be explained by the anti-arrhythmic effect of high thoracic epidural anaesthesia.^{17,18} Scott *et al*¹⁹ reported that high thoracic epidural anaesthesia decreases the incidence of atrial fibrillation in patients undergoing off-pump coronary artery bypass grafting, whereas other authors have shown no benefit.²⁰

Another concern of high thoracic epidural anaesthesia is the possibility of bronchospasm due to sympathetic blockade especially in patients with chronic obstructive pulmonary disease or hyperactive airway²¹ was not seen in our patient who was a known asthmatic with deranged respiratory functions.

It has been suggested that sympathetic nerve supply exerts little influence in bronchomotor tone in this subset of patients. Similar experience was seen by Karogoz in his 5 patients where the postoperative respiratory course was noted to be uneventful in all and did not differ in patients with or without chronic

obstructive pulmonary disease.⁵

Patients with certain risk profiles, including chronic lung disease, coagulation disorders and neurological conditions appear to benefit most from coronary artery bypass grafting without cardiopulmonary bypass. However major complications after coronary artery bypass grafting are usually associated with pre-existing pulmonary disease or reduced general status. These patients require prolonged post operative ventilation and post operative intensive care stay. With awake coronary artery bypass grafting risk of post operative pulmonary failure and long term intensive care unit stay may be reduced. Our initial experience with high thoracic epidural anaesthesia awake coronary artery bypass grafting in two patients shows that the technique is promising with benefits, few risks and is totally safe and beneficial even in a rural cardiac centre.

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