Case Report

AWAKE CABG ON BEATING HEART UNDER HIGH THORACIC EPIDURAL ANAESTHESIA : FIRST TIME IN BSMMU

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ABSTRACT

Minimally invasive Coronary Artery Bypass Surgery (CABG) using Thoracic Epidural' Anesthesia (TEA) is nowadays considered to be a safe surgical strategy. The objective of TEA is to achieve somatosensory and motor block at TI to T8 level so that CABG can be done in - awake patient. In June 2006 when a 40 year old patient came to us in University Cardiac Centre (UCC) at BSMMU with double-vessel disease for CABG surgery, we considered it an opportunity to try this operation under only high thoracic epidural anesthesia without incubation. After taking the patient's consent, we proceeded to perform the awake CABG on beating heart (ACAS) - an operation attempted for the first time in BSMMU. The patient received TEA via an epidural catheter placed at the level of T1 -T2. Total arterial myocardial revascularization on was performed after sternotomy. The patient well tolerated all phases of the operation. Additional analgesics and sedatives required only during the sternotomy and sternal retraction. The patient's Blood Pressure (BP), SPO_2, ABG, $ETCO_2$, ECG, and all other parameters were within normal range throughout the whole procedure. The effect of movement of the chest wall and heart during spontaneous respiration did not affect the conduction of the surgery. The postoperative course was uneventful, and we were able to release the patient from the ICU on the second POD.

CASE REPORT

A 40 year-old 61 kg male patient was admitted into the cardiac surgery unit of BSMMU for Coronary Artery Bypass Grafting surgery (CABG). He was diagnosed with double-vessel disease with ejection fraction of 62%. Our traditional technique of anesthesia was general anesthesia with intubation. However, in this case we decided to perform the operation under Thoracic Epidural .Anesthesia TEA. We discussed the procedure with the patient, who was enthusiastic and well-motivated to accept the technique.

On the day prior to the elective surgery, a thoracic epidural catheter was inserted at the T1 and T2 level under local anesthesia using an 18-gauge. Tuohy needle with the patient in sitting position. The epidural space was identified by hanging-drop technique. The catheter was directed cephaled and advanced 3cm into the epidural space. The block level was tested by a test dose of 3ml Lignocaine (2%).

On the day of surgery, early in the morning the patient was pre-medicated with 7.5 mg Midazolam orally. At 8:30am in the operating room, 10 ml of 0.25% Bupivacaine + 5 ml of 1% Lignocaine was administered through the epidural catheter as a bolus and the level of block was tested by pin-prick discrimination. The upper level of block was C6 and the lower level was T10. After skin incision we-infused a solution of 25ml 0.5% Bupivacaine + 25ml distilled water + 50μg Fentanyl by syringe pump at the rate of 5ml per hour. The patient breathed 5 litres of oxygen per minute using a face mask.

The patient was continuously monitored by Intra Arterial Blood Pressure (IABP), CVP, ECG, pulse oxymetry, $ETCO_2$, and ABCT. The maximum

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permissible block level was. C6 which was monitored by development of Horner's syndrome. Though the intercostal muscles were paralyzed, the patient maintained good diaphragmatic respiration.

The chest was opened with complete median sternotomy with an oscillating saw and a careful LIMA (Left Internal Mammary Artery) dissection was done to avoid pneurnothorax in the spontaneously breathing patient. During the sternotomy, the patient was complaining of difficulty in breathing, and so he was given, 50 μg Fentanyl and 5 mg Midazolam i/v. The saphanous vein was dissected with Femoral block supplemented by local block of the leg. The vessels involved were LAD (left anterior descending) and RCA (right coronary artery). The blood pressure was maintained with in the normal range by infusion of noradrenaline, adequate volume and low dose of GTN . The full dose of heparin was used for anticoagulation which was reversed with protamin at the end of the operation.

The patient well-tolerated each phase of the operation and remained haemodynamically stable throughout. We finished the operation in 6 hours, and the patient was transferred to the ICU. He was awake, pain-free and clinically stable with blood pressure and all other parameters within normal limits. Because of the need for continuous analgesic drug administration, we kept the epidural catheter for two days. We maintained the analgesia by 0.125% Bupivacaine and 50μg Fentanyl by syringe pump at the rate of 5 ml per hour. No Oral or IM NSAID or Opioid was needed. The effective pain management enabled faster postoperative mobilization and allowed the patient to be discharged from the ICU on the second day.

BLOOD GAS ANALYSIS REPORT

ABG after induction:

pH - 7.42	Het -34.0
$pC0_2$ - 35rnm Hg	Na* - 137.2
pO_2 - 332.0	K^+ - 3.45
HCO_3 - 22mEq/L	Cl^{-2} - 113.0
BF-0.8	Ca^{2+} - 0.82

ABG after sternotomy:

pH – 7.409	Hct – 34.0
PCO2 – 36 mm Hg	Na+ - 136.7
pO2 -= 319.6	K – 3.43
HCO3 – 23mEq/L	Cl- - 111.1
BE – 0.9	Ca2+ - 0.870

ABG at the end of operation:

pH – 7.38	Hct – 37.0
PCO2 – 40mm Hg	Na= 134.2
pO2 – 306.6	K+ - 3.57
HCO3 – 24mEq/L	Cl- - 109.1
BE – 1.0	Ca2= - 0.98

DISCUSSION

CABG in awake patient without endotracheal anesthesia was first performed in October 1998 with high TEA block[1]. Since then, similar cases have been reported in the literature in an attempt to decrease the invasiveness of the CABG procedure.

TEA provides excellent conditions for off pump coronary artery bypass surgery by dilating the coronary arteries and the internal thoracic artery and by reducing heart rate and arrhythmias during manipulation of the heart[2,3,4]. In addition to these intraoperative advantages, postoperative pain management is facilitated by continuous epidural application of analgesia. Such effective pain management improves postoperative mobilization and recovery after beating-heart surgery[5,6,7]. A recent meta-analysis calculated the risk for epidural hematoma formation in cardiac surgical patients with a 95% confidence to be less than 1:150,000 for epidural anaesthesia[8] compared with an incidence of 1:143,000 in the overall population receiving epidural anaesthesia[9].

Revascularizнation o the circumflex territory is in most cases difficult because of haemodynamic impairment- associated with exposing the vessel. In this early time we initially selected a patient with two-vessel disease (LAD, RCA) to avoid possible complications.. After gaining further experience with the technique, we expect to be able to perform circumflex revascularization.

On completion of the learning curve, randomized controlled trials are mandatory to elucidate the relative importance of sole TEA in cardiac surgery. A limitation of this study is that it was an observational study dealing with technical issues and not a randomized study comparing different subgroups of patients. In this context, the ethical question remains as to extent an awake patient can endure the psychological stress of such an operation. Our experience in this one case, as well as those in other centres, suggest that ACAB should only be used in highly selected, compliant, and mentally stable patients.

ACAB achieved excellent patient acceptance by avoiding general anesthesia and allowing effective pain management. The combination of the benefits of beating-heart CABG without cardiopulmonary bypass, avoidance of general anesthesia, positive-pressure ventilation, and effective pain management may allow ACAB to compete with interventional catheter-based techniques.

CONCLUSION

During our first experience in BSMMU, the use of TEA for awake CABG was feasible and the patient was comfortable, pain-free, and remained haemodynamically stable. However, further randomized multi-centred study is required to fully evaluate the extent and limitation of this procedure.

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