

# Coronary Artery Bypass Grafting In the Conscious Patient without Endotracheal General Anesthesia



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Be not the first by whom the new are tried,  
Nor yet the last to lay the old aside”

- Alexander Pope

## Introduction

Over the past several years, beating heart surgery has been accepted as one of the modes of surgical treatment of ischemic heart disease. In an attempt to further simplify and decrease the “invasiveness” of this procedure, performing this operation without endotracheal general anesthesia is deemed feasible in certain subsets of patients. There are reports about an alternative anesthetic technique by performing the Conscious Off pump Coronary Artery Bypass (COPCAB) – Beating heart CABG operations under Thoracic Epidural Anesthesia (TEA) as the sole anesthetic without general anesthesia (GA). We have done a first successful beating heart CABG under Thoracic Epidural Anesthesia (TEA) as the sole anesthetic without general anesthesia (GA) in Tamilnadu.

Criteria for Patient Selection (based on literature review)

### Inclusion Criteria

1. A Cooperative and an understanding patient – most important
2. Normal airway
3. Significant coronary artery disease.
4. Presence of co morbid conditions, multiple coronary artery disease are not reasons to exclude the patients for COPCAB under TEA

### Exclusion criteria

1. Lack of consent
2. Cardiomegaly with ejection fraction below 30%
3. Infection at the local site of injection
4. Continued use of anti platelet medicines
5. Bleeding disorders
6. Past surgery of the cervical and upper thoracic spine

## Preparation for TEA

If the patients were being treated with low molecular weight heparin we switched over to infusion of heparin, which was stopped 6 hours prior to insertion of the epidural catheter and recommenced after epidural catheterization. Normalcy of the airway was considered an absolutely essential criterion in the early part of the work. Preoperative investigations include complete hemogram, liver and kidney function tests.

## Epidural Anesthesia

Epidural catheter was inserted on the evening before surgery in the intensive care unit after securing intravenous access. On the next day (day of surgery), the patient was premedicated with Fentanyl, 3 mcg/kg body weight, Midazolam 50 mcg /kg intra muscularly half an hour before surgery. In the operating room, EKG monitoring, pulse oximetry monitoring was commenced. Radial arterial line, pulmonary artery catheter (through right internal jugular vein), were inserted under local anesthesia before administering test dose of epidural analgesia (3 ml of 2% xylocaine with 1:200,000 epinephrine). After confirming the absence of untoward reaction, epidural anesthesia was accomplished with 18 ml of 0.5% Bupivacaine and the level of analgesia was noted. Level of sensory loss was maintained between C7 and T9 level. After this we set up an infusion of a mixture of 0.25% Bupivacaine and Fentanyl 5mcg/ml at the rate of 5 ml/hour via a syringe pump. A naso-pharyngeal airway was passed and a 10 French naso-gastric tube was passed through this. A stiff transparent oxygen mask with hooks for the harness was placed on the patient's face, connected to the breathing tube from the circle absorber. To the

'Y' connection of the breathing tube, connector of the end tidal carbon dioxide (ETCO<sub>2</sub>) probe was connected and the monitoring of ETCO<sub>2</sub> was commenced.

#### Surgical Technique

**Sternotomy and harvesting of conduits:** Before making the incision, complete analgesia from suprasternal notch to upper abdomen was confirmed. The sternotomy was performed in the inspiratory phase of the respiration; taking care to avert injury to the pleura. We feel that maintaining the integrity of the pleura is one of the important steps in carrying out COPCAB. The LIMA was dissected avoiding diathermy during the expiratory phase of the respiratory cycle (because the chest and therefore the LIMA move towards the operator during expiration). Saphenous vein was harvested without an addition of local anesthetic.

#### Management of pneumothorax

Pleura was opened inadvertently during sternotomy, which was repaired with appropriate suture, an intercostal pleural drainage tube was inserted and connected to intercostals drainage system to which a negative pressure of 20 cms of water is applied.

#### Off pump (beating heart) coronary artery bypass grafting

Patient was heparinized with 2mg/kg of Heparin and activated clotting time (ACT) was kept over 300 seconds. Coronary artery anastomosis was performed using the octopus stabilizer. Two bypass grafts (LIMA to LAD, SVG to DIAG.) were done. At the end of the grafting and hemostasis, protamine sulfate was administered in the dose of 2 mg/kg and return of ACT to normal values was considered as an endpoint to reversal of heparin. After the completion of the surgery, patient was transferred to the intensive care unit while monitoring the same parameters as in the operating room. Postoperative analgesia was maintained in the intensive care unit with continuous infusion of 0.125% Bupivacaine with 5 mcg/ml of Fentanyl at a rate of 5ml/hr. Epidural catheter was left in-situ for 48 hrs for the purpose of postoperative analgesia.

#### Indication for conversion to general anesthesia and or cardiopulmonary bypass

GA is indicated whenever there is inadequate analgesia, hemodynamic instability, coughing (which will not improve with restoration of the heart into the pericardial cavity and CPAP) and uncontrollable

movement of the patient. After administration of GA, cardiopulmonary bypass is indicated if the hemodynamic parameters progressively deteriorated in spite of inotropic support (up to 10mcg/kg/min of dopamine), restoration of the heart in to the pericardial cavity and if new life threatening arrhythmias develop.

#### Discussion

Thoracic epidural anesthesia provides satisfactory conditions for off pump coronary artery bypass surgery by dilating the coronary arteries, and the internal thoracic artery.

#### Advantages of TEA

1. Potential beneficial effects on the hemodynamic and pulmonary systems.
2. Reduced stress response and blood loss
3. Ready access to assessment of cerebral function in most patients
4. Performing COPCAB may enhance fast tracking and help cost containment.

#### Disadvantages of TEA

1. Risk of epidural hematoma - has not (yet) been documented in the literature.
2. Phrenic nerve paralysis can occur and is as a result of high block may render the patient hypoxic due to inadequate diaphragmatic excursions.

A spontaneously breathing patient may cough, usually during the grafting on the lateral and the inferior walls. This may be due to venous congestion due to left ventricular dysfunction causing pulmonary venous congestion, mitral regurgitation causing an increase in left atrial pressure. This problem is some thing peculiar to COPCAB and not seen during endotracheal GA. This can be treated by increasing the inotropic therapy, assisting the spontaneous respiration and restoration of the heart to the pericardial cavity. If the problem cannot be solved by the above measures, endotracheal general anesthesia may have to be instituted.

If the block is adequate there is no requirement of infiltration of local anesthetic for harvesting radial artery and the saphenous veins from the leg. It is our observation that by about an hour after the institution of the epidural block, the analgesia slowly spreads even to the legs. Although epidural anesthesia is a segmental block, a well administered one may over time spread to the sub arachnoid space also; this explanation may explain the TEA permitting us to harvest the saphenous vein graft from the legs.

## CONCLUSION

COPCAB can be performed in a select group of patients. Patient's consent and a willing surgeon are important factors that govern this mode of anesthesia.

“Just as energy is the basis of life itself, and ideas the source of innovation, so is innovation the vital spark of all human change, improvement and progress”

- Ted Levitt

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