

Anaesthesia for off pump coronary artery bypass- Recent updates

India is considered as a hub for cardiac patient. There is exponential increase in number of patients across the globe as well as in India. As diagnostic modalities (facilitates for invasive cardiac imaging) are increasing day by day, more and more patients are being subjected for percutaneous coronary angioplasties and bypass surgeries. The basic difference between western scenario and Indian scenario is Indian surgeons are more favouring technically more challenging off pump coronary artery bypass technique vs western surgeon who are more inclined towards less challenging on pump surgeries¹. So Indian anesthesiologists are more experienced in managing OPCAB more effectively where 90% of cardiac surgery is off pump in contrast to western world where ratio is reverse.

Preoperative evaluation:

Preoperative evaluation includes patient's general and medical history, previous surgical history, recent chest pain, comorbid conditions like diabetes mellitus, hypertension, stroke, kidney disease. Detailed general and systemic examination is performed to assess functional status of the patient. Allen's test is not performed at our institute while dorsalis pedis pulsations are checked routinely to assess peripheral vascular disease, and generally femoral arterial cannulation is avoided on the side of absent dorsalis pedis pulsation. Routine investigations include complete blood count, urine examination, liver function tests, kidney function test, coagulation profile, fasting and post prandial blood sugar levels, glycosylated haemoglobin, 12 lead electrocardiogram, 2 D echocardiogram². Angiogram is assessed by anesthesiologist to know possibility of intraoperative crash and need to go on emergency bypass. Critical left main disease, and diffuse small caliber vessels with persistent ischemia are predictors of need for going on emergency bypass. Color Doppler of carotid arteries are done routinely to assess concomitant carotid block and patient risk stratification. Risk stratification is generally done by well established online risk calculator programmes like EUROSCORE 2³.

Preoperative medication:

Clopidogrel should be stopped 5 days prior to surgery and ticagrelor 7 days prior to surgery. Aspirin is generally continued and does not increase risk of postoperative bleeding. At our institution, even clopidogrel is also continued 48 hours before surgery with little increased risk of bleeding. Beta blockers and statins are continued while ACE inhibitors and ARBS and diuretics are withheld 24 hours prior

to surgery. Patient receives anxiolytic in night with nil orally for 8 hours. Betadine bath and enema is given one night prior to surgery.

Intraoperative management⁴:

16 gauge cannula is placed under local anesthesia. Left sided radial cannulation is done under local anesthesia. Arterial blood gas and blood sugar readings are taken as a baseline. Invasive blood pressure monitoring is started. Electrocardiogram leads are stuck on back side with 5 lead placement along with cautery paddles. Warmer is started and air conditions are made off till patient is induced. Patient is induced with combination of midazolam, fentanyl, propofol, sevoflurane and muscle relaxant of rocuronium or vecuronium. Patient is intubated with appropriate size endotracheal tube, and left femoral cannulation along with right internal jugular cannulation is done. Whole body painting and draping is done. Magnesium sulphate 2 grams is given to prevent postoperative atrial fibrillation. 5 lead Electrocardiogram, Spo₂, end tidal carbon dioxide monitor, nasal temperature, central venous pressure and invasive arterial pressure are routinely monitored. Pulmonary artery catheter is not favoured.

Before sternotomy high dose fentanyl is again repeated. Tidal volumes are adjusted as per requirement of the surgeon to dissect left internal mammary artery and intermittently ventilation is made off keeping an eye on end tidal carbon dioxide.

Patient is heparinized with surgeon's preference (between 2mg/kg to 4mg/kg) to keep activated clotting time in range of 250 to 350 seconds. One ionotrope (Preferable adrenaline) and one dilator (preferably Nitroglycerine) is kept in hand to immediately manage haemodynamic variables.

During left anterior descending and diagonal artery anastomosis, there is no much haemodynamic variation except for little fall in blood pressure. The haemodynamic changes are severe with obtuse marginal artery grafting and right coronary artery branches grafting. The combination of Trendelenburg position, fluid loading, and bolus dosing of phenylephrine or noradrenaline can easily manage haemodynamic. Extreme cases of haemodynamic fluctuation, right pleura can be opened to accommodate the right ventricle, which can enhance blood pressure further. The target of blood pressure kept is mean arterial pressure of around 55 mm Hg, and any fall below can lead to slowing of heart or ventricular fibrillation, which is immediately treated with

repositioning of heart. If severe left ventricular dysfunction is there which is not tolerating extreme degrees of positioning, preoperative placement of intraaortic balloon pump can be sought. With the combination of above things, expert anesthetist can manage the haemodynamics very well even with low ejection fractions of 25-30% with off pump technique including at authors institute where 99% of coronary artery bypass are off pump.

After completion of distal grafting, for proximal grafting, blood pressure is reduced to 90 mm Hg systolic so as to apply partial cross clamp to aorta. Once proximal grafting is over, heparin is neutralized with protamine in 1:1 ratio. After heparin neutralization, arterial blood gases are repeated and compared with baseline values to check potassium levels, acidosis, and hematocrit. The blood is started according to report in ABG if Hb is less than 10 grams%.

Once procedure is over, patient is shifted to intensive care unit on ventilator with invasive monitoring. Patient is actively warmed, haemodynamic assessed and extubated at the end of 4 hours.

Various regimens are available for postoperative pain control with equal efficacy. Opioid and NSAID based analgesic regimens are popular, currently alpha 2 agonist, dexmedetomidine is getting popular as postoperative analgesic. Paracetamol and tramadol combination is used at authors institute with good result.

The combination of proper preoperative evaluation, strict management of haemodynamics and vigilance are keys for successful anesthetic management of off pump coronary artery bypass.

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