

Challenges of managing a post-arrest resuscitated patient for urgent CABG and concomitant non-cardiac surgery under same anaesthesia

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Abstract

Background: Coronary artery disease is a leading cause of morbidity and mortality. 2016 Heart disease and Stroke Statistics of AHA reported 15.5 million people more than 20 years in USA have CAD, number increasing with age. Men in New Delhi have 4 times higher (2.5vs 9.7%) prevalence of CAD than Framingham. 1. CAD is higher in Asians including Asian Indian women. CAD is characterised by atherosclerosis in coronary arteries which can be asymptomatic. Any activity which increases oxygen demand of heart in atherosclerosed arteries with limited ability to fulfil the demand will result in angina, MI or ACS. Treatment modalities include medical management or PCI or CABG. CABG is a major surgery rarely combined with non-cardiac surgery under same anaesthesia. Rare cases of gastric and oesophageal cancer surgeries have been combined with CABG. We report a case of CABG combined with ORIF right supracondylar fracture done successfully under same anaesthesia. **Case Report:** We report a case of a 60 years old Asian male who developed angina while driving a motorbike leading to fall causing fracture right supracondylar closed comminuted with intra-articular extension with closed fracture 3rd metacarpal right hand. The patient was taken to nearby trauma centre, where he arrested, was revived according to ACLS guidelines and shifted to our centre. The patient was successfully managed for MI, CHB, ARF, DM and Type 1 respiratory failure. The patient underwent CABG and ORIF right supracondylar fracture under same anaesthesia setting. The anaesthetic management of a patient for concomitant cardiac and long bone fracture surgery is a challenge to the anaesthesiologist and requires intensive preoperative stabilization and meticulous intraoperative and postoperative management. There are very few such cases reported. The possibilities of combining cardiac and noncardiac surgeries under same anaesthesia need to be further investigated.

Key Word: Concomitant, CAD(Coronary artery disease), Angina, ACS(Acute coronary syndrome), PCI(Per cutaneous coronary intervention), CABG(Coronary artery bypass grafting), ORIF(Open reduction internal fixation), CHB(Complete heart block), ARF(Acute renal failure).

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INTRODUCTION

CAD is the result of repetitive vascular injury and the subsequent response to injury. Risk factors (table 1) increase an individual's likelihood of developing CAD by potentiating the magnitude of vascular injury or altering the response to it. Coronary artery consists of three layers- adventesia, media, intima. The endothelial injury initiates a sequence of events; elaboration of procoagulants, vasoactive molecules, growth factors and cytokines that attract platelets, inflammatory cells and smooth muscle cells. Repetitive injury and repair may result in progressive atherosclerosis and resultant luminal narrowing. Atherosclerotic plaques in stable ischaemic heart disease consist of fibrotic, calcific, necrotic and lipid components.

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Plaques containing a large lipid core and a relatively thin fibrous cap are prone to rupture leading to acute coronary syndrome. This is due to myocardial supply and demand imbalance (Diagram¹. Treatment options include medical management or revascularisation in the form of PCI or CABG. CABG is a major surgery done selectively for indicated patients. It is generally done alone or in combination with other cardiac procedures such as valve replacement or VSD/ASD closure. There are few case reports where CABG has been combined with peripheral vascular surgery such as femoro-popliteal, aorto-iliac or aorto-subclavian bypass. PVD frequently co-exists with coronary vascular disease. There are few reported cases of patients who have undergone CABG with sub-total gastrectomy³ and oesophagectomy⁴ primarily for cancer⁵ due to risk of spread. We report a case of CABG combined with ORIF fracture femur.

Case Presentation: A 60 years old Asian gentleman fell down while driving a motorbike due to acute chest pain and sustained injuries. He was taken to nearby Trauma Centre for treatment where he was diagnosed as having right supracondylar closed communitated fracture with intra-articular extension and closed fracture 3rd metacarpal right hand. Patient was advised surgery but while his preoperative investigations were being planned, he arrested. Cardiopulmonary resuscitation was done according to AHA guidelines. The patient was shifted to our tertiary care centre for further management.

Pre-operative management: We received the patient in ICU on ventilator with inotropic support. He was diagnosed as Acute Coronary Syndrome with acute renal failure with respiratory failure type 1 with fracture right supracondylar closed communitated with intra-articular extension and closed fracture 3rd metacarpal right hand. ECG was suggestive of IWMI. Figure 1. ECHO showed severe hypokinesia of inferior and lateral wall with mild hypokinesia of anterior wall. There was moderate mitral regurgitation and severe pulmonary hypertension with PA pressures of 60mmhg. LVEF was 25-30%. As the patient developed Complete heart block, temporary pacing was initiated. Patient was managed in ICU with inotropes, diuretics, antibiotics and elective ventilation. Patient was a known case of Hypertension and type 2 Diabetes Mellitus. Coronary angiography was done which showed critical lesion in left anterior descending artery just before first diagonal branch, proximal lesion in circumflex artery and total occlusion of right coronary artery. CABG was planned. Patient was weaned off ventilator and extubated on 3rd day having improved haemodynamics, renal function and respiratory mechanics. In view of right supracondylar fracture which would compromise post-operative mobilisation and hence speed of recovery, the option of concomittently doing the cardiac and orthopaedic

procedure under same anaesthesia was explored. The relatives consent was taken. Pre-operative blood investigations, ECG, Echo, Carotid Doppler, Pulmonary function tests were done. The patient was classified as ASA V E as per American Society of Anaesthesiologist.

Intra-op management: Patients IJV and radial artery were cannulated pre-induction under local anaesthesia. Left femoral artery sheath was placed for IABP insertion if required. Right leg was kept stabilized for fracture immobilisation. Patient was induced with midazolam/fentanyl/etomidate/rocuronium, intubated and maintained with midaz/fentanyl/atracurium infusion. Adrenaline, nor-adrenaline and dobutamine infusions were started to maintain haemodynamics and cardiac output. Insulin infusion was started for glycemic control. Post-sternotomy, we had a recently infarcted inflamed heart with pericardial adhesions and scarred inferior wall. Figure 2. Patient was heparinized to maintain ACT 250-300 seconds. IABP support was taken. Off-pump CABG with 3 grafts using safenous vein to LAD, diagonal and posterior descending artery was done using Octopus 3 tissue Stabilizer, Medtronic, USA. Heparin was reversed with protamine, haemostasis achieved and thorax was covered with sterile pads and sheet. The orthopaedic surgeon then did open reduction internal fixation of supracondylar fracture. 2 units PCV and 2 units RDP were transfused. The chest was later closed and shifted to ICU with haemodynamics stabilized with inotropes and IABP.

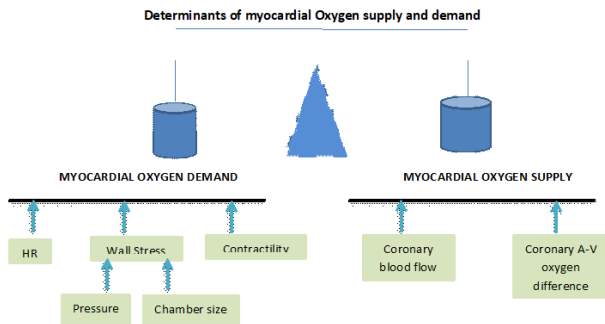
Post-operative: 2 units FFP were transfused in ICU. Patient was weaned off ventilator after 12 hours and IABP after 24 hours. 2 units PCV were transfused on day 2. Patient was started on fentanyl infusion for pain relief to maintain VAS between 1-2. Inotropes were titrated to maintain adequate cardiac output. After 36 hours patient was mobilised from bed to chair. On day 3 patient was shifted out of ICU and discharged day 10 after physiotherapy advice.

Table 1: Risk factors for coronary artery disease

1	Age	Increases with age
2	sex	Men more than women Women increases after menopause
3	Family history	Risk increases if close relatives have CAD before 55 yrs of age
4	smoking	
5	hypertension	
6	High blood cholesterol levels	High levels of low density lipoproteins. Low level of high density lipoproteins
7	Diabetes	
8	Obesity	8
9	Physical inactivity	
10	High stress	
11	Unhealthy diet	

Other Risk Factors

1. Sleep Apnoea
2. High Sensitivity C-Reactive Protein
3. High Triglycerides
4. Homocysteine
5. Pre-Eclampsia
6. Alcohol Use
7. Auto Immune Diseases.



Graph 1: showing balance between oxygen supply and demand

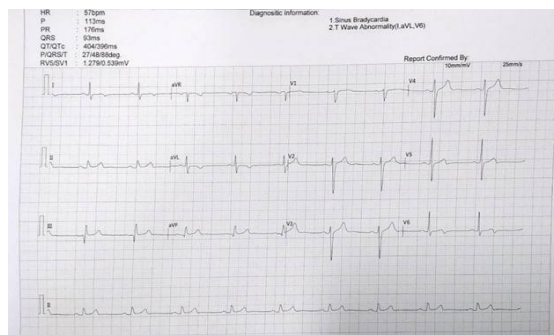


Figure 1: ECG showing inferior wall MI

DISCUSSION

Surgical strategy in patients with coronary artery disease requiring CABG and concomitant non-cardiac surgery needs great concern. There are two surgical policies in the management of such cases, first is staged and second is simultaneous approach. In staged procedure which is commonly followed, cardiac intervention takes priority. Non-cardiac surgery depending on urgency is deferred. According to 2016 guidelines, class 1 recommendation that elective non-cardiac surgery in drug-elluting stent recipients be delayed for 6 months and class IIB recommendation to consider non-cardiac after 3 months. However in our patient CABG was preferred choice over PTCA. Although there are no strict guidelines for timing of surgery after CABG, the complications such as prolonged ventilatory requirement, dialysis and cardiac complications increase if non-cardiac surgery done within 1 year of CABG. Also, since our patient had a long bone fracture, delay in surgery increases chances of venous

thromboembolism, fat embolism syndrome, pulmonary embolism, complex regional pain syndrome, non-union or malunion There is thus increased cardiac risk for patients undergoing orthopaedic surgery.⁷ This encouraged the decision to do concomitant surgery. Ability to mobilize early also decreases morbidity. Off-pump CABG was an advantage since we could prevent systemic inflammatory response syndrome associated with on-pump surgery. That would have added to hypoxemia, systemic arterial hypotension, increase in pulmonary shunt and pulmonary hypertension associated with release of microemboli intraoperatively during intra-medullary nailing. In our patient plating was done. IABP support was taken. IABP improves coronary perfusion by increasing diastolic pressure and improving left ventricular function by offloading the heart as it deflates during systole to decrease afterload. On-pump surgery also increases blood loss which would have increased the requirement of blood product transfusions and its complications like DIC since fracture long bone is associated with considerable pre-operative blood loss. So during surgery ACT was maintained at 250-300seconds. Compared to 400-600 required during on-pump surgery.

CONCLUSION

Concomitant surgery for CABG and non-cardiac surgery is a challenge to the cardiac anaesthesiologist. However it can be performed with acceptable risk and may offer physiological, psychological, social and economical advantages to avoid rehospitalization and repeated surgical interventions. We could successfully manage our patient for CABG with supracondylar fracture. However more cases need to be done to fully justify doing cardiac and noncardiac surgery under same anaesthesia.

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