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Case Report

CARDIAC PATIENT WITH NON-CARDIAC SURGERY ANAESTHESIA MANAGEMENT: CASE REPORT WITH LITERATURE REVIEW

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ABSTRACT:

The incidence of ischemic heart disease (IHD) is increasing. The patient with IHD with or without treatments coming for non-cardiac surgeries are increasing. They have increased risk of myocardial ischemia, myocardial infarction (MI) , cardiac arrhythmia, morbidity and mortality during peri-operative period. Patient with recent MI have significant increased risk of above mentioned events. An Anesthesiologist should be aware of pathophysiology and the need to thoroughly evaluate the patient for peri-operative management.

INTRODUCTION:

It is a challenge to administer anaesthesia to people who already have cardiac problems. Ischemic heart disease (IHD) is the most frequent cause of peri-operative morbidity and mortality in cardiac patients. Patients with IHD seeking non-cardiac surgical procedures are growing, whether they have received interventions or not. During the peri-operative phase, these individuals are at higher risk for myocardial ischemia, myocardial infarction (MI), conduction disturbances, morbidity, and mortality. Identification of risk factors, pre-operative assessment and optimization, medical therapy, monitoring, and the selection of the proper anesthetic method and medications are all necessary for the care of these patients.(Fig.1) (Fig. 2)

Preoperative evaluation serves the purposes of assessing a patient's present medical condition, providing clinical risk profiling, deciding on additional testing, treating modifiable risk factors, and planning the management of cardiac illness during the peri -operative period[(1)]. Recent myocardial infarction, congestive heart failure, peripheral vascular disease, angina pectoris, diabetes mellitus, hypertension, hypercholesterolemia, dysrhythmias, age, renal dysfunction, obesity, lifestyle choices, and smoking are risk factors that affect peri-operative cardiac morbidity.

The objectives of anesthesia continue to be stable hemodynamics, preventing myocardial infarction by increasing myocardial oxygenation and decreasing oxygen demand, monitoring for ischemia, treating it if it occurs, maintaining normothermia, and avoiding substantial anemia[(2)]. The demand for myocardial oxygen is increased by anything that puts more strain on the heart, including physical exertion, mental stress, and surgical and anesthetic stress. In healthy people, this demand is offset by an increase in coronary blood flow. Patients with IHD, whose coronary flow is already impaired, do not experience this. Reduced coronary blood flow, tachycardia, hypotension, increased preload, hypoxia, coronary artery spasm, decreased oxygen content and availability, anemia, hypoxemia, etc. are conditions that reduce myocardial oxygen supply. Tachycardia, increased wall tension, increased afterload (hypertension), and increased myocardial contractility are factors that raise oxygen demand.(3) To prevent ischemia, all anesthetic procedures must maintain myocardial oxygen delivery above demand. Avoiding tachycardia and extremes in blood pressure, both of which have a negative impact on the balance between oxygen supply and demand, is a crucial component of general anesthesia for IHD.(3) Depending on the procedure and the patient's needs, general or regional anesthesia can be used singly or in combination as a part of a balanced method. The major objectives are to maintain hemodynamic stability while reducing the hemodynamic reactions to intubation and surgical stimulation.(4) In intermediate- and low-risk procedures affecting the extremities, perineum, and lower abdomen, either spinal or epidural anesthesia can be a wise choice. For patients who are taking anticoagulant medications, guidelines must be observed. Hypotension from central

neuraxial blockage should be addressed with enough preload and vasopressors such phenylephrine.(5) Monitoring is crucial for spotting early ischemia and rhythm problems. Another crucial element is post-operative pain control. As a result, successful perioperative care and assessment are essential. As per ACC / AHA guideline integrate risk stratification in cardiac patients according to 1) Clinical risk factor and ECG review 2) Functional capacity in form of Metabolic equivalent of tasks 3)Surgery specific risk factors. The goals of anesthesia is to prevent peri-operative myocardial ischemia by 1) optimizing oxygen supply and reducing oxygen demands 2) To monitor for ischemia 3) Institute appropriate measure to treat ischemia if happened during peri-operatively.

Fig.1. Clinical Predictors of increased peri-operative cardiac events

Clinical predictor of increased peri-operative cardiovascular risk :		
Major :	**Intermediate**	**Minor**
Unstable coronary syndrome	Stable angina	Age > 70 years
Acute / recent MI	Previous MI	ECG : LVH , LBBB , ST-T changes
Unstable Severe angina	Compensated heart failure	Low functional capacity
Decompensated heart failure	DM / Renal insufficiency	H/O CVS / HTN
High grade AV block		
Symptomatic ventricular dysrhythmias		
Severe valvular heart disease		

Fig. 2 METs Classification

Sitting watching television	1 MET
Light gardening e.g weeding	2 METs
Getting dressed	2-3 METs
General housework	3-4 METS
Taking a shower	3-4 METS
Brisk walking (3 mph)	3.3 METs
Golfing (carrying clubs)	4-5 METs
Strenuous hiking	6-7 METs
Swimming (front crawl)	9-10 METs

Fig. 3: Risk associated with type of surgeries in cardiac patient

High Risk Procedures	**Cardiac Risk > 5 %**
Emergency major operation , particularly in elderly patients	
Aortic and other major vascular surgery	
Peripheral vascular surgery	
Anticipated prolonged surgical procedures associated with large fluid shifts or blood loss	
Intermediate Risk Procedures	**Cardiac Risk < 5 %**
Carotid endarterectomy	
Head & Neck surgery	
Intra-peritoneal & Intra-thoracic surgery	
Orthopedic surgery	
Prostate surgery	
Low Risk Procedures	**Cardiac Risk < 1 %**
Superficial procedures	
Cataract surgery	
Endoscopic procedures	
Breast surgery	

Fig. 4: Lee's Revised Cardiac Risk Index

Risk Factors	Points
History of ischemic heart disease	1
High-risk type of surgery	1
History of congestive heart failure	1
History of cerebrovascular disease	1
Preoperative treatment with insulin	1
Preoperative serum creatinine >2.0 mg/dL	1

RISK OF MAJOR CARDIAC EVENT

Points	Class	Risk
0	I	0.4%
1	II	0.9%
2	III	6.6%
3 or more	IV	11%

Fig. 5 : Causes of myocardial oxygen imbalance

Causes of myocardial oxygen imbalance	
Decreased oxygen supply	**Increased oxygen demands**
Decreased coronary blood flow : 1) Tachycardia - decreased perfusion time 2) hypotension - decreased DBP 3) hypocapnia - coronary vasospasm **Decreased oxygen content** : 1) anemia 2) hypoxemia 3) ODC shift to left	1) tachycardia 2) increased wall tension 3) increase preload 4) increased afterload 5) increased myocardial contractility

CASE REPORT:

A Sixty nine year old, elderly male patient posted for an elective right tibia open reduction and internal fixation of tibia fracture. His pre-anesthetic evaluation revealed Hypertension on Enalapril and Type II DM on Tab Glimepiride with Insulin since last 15 years , and both are under well controlled. Patient METs Score of more then 4. In addition, he has documented past history of Inferior wall MI seven years ago , which was managed by emergency PCI with drug-eluting stents for for RCA and LCX. Tab clopidogrel 75 mg once daily, Tab aspirin 75 mg and Beta-blocker were commenced. Patient is very compliant with his medications and doing regular exercise for 45 minutes.

On physical examination, his pre-operative BP 136/84 mmhg and pulse rate 68 bpm with normal volume and regular rhythm. His cardiovascular and respiratory examination findings were unremarkable. His Airway examination showed MP 2 and with BMI of 25 kg/m2. His Laboratory findings of CBC, LFTs, RFTs were with in normal range with hemoglobin level of 13.5 g%, platelet count of 150,000, and blood sugar of 100 mg/dl. His chest X-ray was normal finding and ECG showed normal sinus rhythm with Q wave (old infarct). His Echocardiography report showed RCA territory akinesia, mild diastolic dysfunction, with an ejection fraction of 45 %.

Patient was classified as ASA III and fit for both general and regional anesthesia. Discussed risk and benefits of anesthesia with patient and relative, and patient prefer Spinal anesthesia with peripheral nerve block. His surgery was planned electively 6 days after pre-operative evaluation. He was advised to stop clopidogrel 5 days before the surgery by cardiologist and advised to continue aspirin. He was also advised to continue Antihypertensive medication and avoid DM medication on the day of surgery.

On the day of surgery, fasting status was confirmed and preoperative fasting blood sugar was 91 mg/dl was noted. His pre-operative vitals were stable and his BP of 138/82 mmhg and Pulse rate of 82 bpm. After sign in, all essential monitor and DVT prophylaxis by calf compression device were attached. Under all aseptic condition spinal anesthesia was performed with 25G spinal needle and Bupivacaine 12 mg with Fentanyl 10 mcg were injected in L3-L4 subarachnoid space in sitting position. Patient was pre-loaded with 500 ml Ringer lactate solution before spinal anesthesia inside the OR. After Spinal anesthesia, Patient was laid supine and level of sensory and motor blockade below the T12 level which was assessed by ice test. Inj. Midazolam 2 mg was given IV and Oxygen administered via venti mask. Vitals were recorded every 3 minutes for first 15 minutes and every 5 minutes thereafter. Intra-operative his SBP and DBP were maintained between 108-132 mmhg and 68 – 82 mmhg respectively with heart rate of 62 – 85 bpm. The patient remained hemodynamically stable throughout the procedure and surgery was completed uneventfully. Duration of surgery was 75 minutes and total intravenous fluid given intraoperatively 950 ml. His intra-operative blood sugar was 95 mg/dl and received Inj. Ondensetron 4 mg for prophylactic for nausea and vomiting. At the end of of surgery, patient received ultrasound guided right side femoral nerve block for postoperative analgesia.

Post-operatively, patient was observed in recovery room for 45 minutes with attached essential monitoring with

supplemental oxygen with Venti-mask 2-4 lit/min. A Cardiology review was sought for reinstitution of anti platelet therapy. Beta-blocker and antihypertensives were continued in the post-operative period and patient was discharged home on first post-operative day.

DISCUSSION:

IHD is the main global cause of morbidity and death as well as perioperative complications in patients with cardiac conditions. Patients who are at risk for IHD require careful preoperative diagnosis and optimization, medical therapy, monitoring, and the use of the proper anesthetic technique and medications.(4) Perioperative myocardial injury's precise nature is yet unknown. If the causes of perioperative myocardial ischemia episodes could be determined, preventative strategies could be able to enhance perioperative cardiac prognosis. The cause of PMI is still unknown, however in certain patients, the major mechanism may be long-lasting subendocardial myocardial ischemia or abrupt coronary occlusion brought on by breakdown of the plaque or thrombosis.(6) Recent MI, Congestive Cardiac Failure, Peripheral Vascular Disease, Angina Pectoris, Diabetes Mellitus, Hypertension, Hypercholesterolemia, Dysrhythmias, Age, Renal Dysfunction, Obesity, Lifestyle, and Smoking may all have an impact on perioperative cardiac morbidity.(4) After non-cardiac surgery, cardiovascular problems are responsible for 25–50% of fatalities. Anesthesia selection and perioperative treatment are influenced by the patient's features, the planned kind of operation, and therefore the possible anesthetic hazards. Preserving a healthy myocardial oxygen supply-demand relationship, stable hemodynamics, preventing perioperative MI, checking for ischemia, preserving normothermia, and preventing considerable blood loss are the anesthetic aims while treating patients with IHD. Surgery can cause an inflammatory, hypercoagulable stress, and hypoxic state that are linked to perioperative troponin increase, arterial thrombosis, and mortality due to the trauma and anesthetic it causes.(7) Regional anaesthetic procedures have the ability to reduce the stress response, perform cardiac sympathectomy, shorten hospital stays, and provide intense postoperative analgesia in patients with cardiovascular disease.(7)

The majority of cardiac events in noncardiac surgery patients occur postoperatively; the postoperative period may be the time where ablation of stress, unfavorable hemodynamics, and hypercoagulable reactions are most significant. As a result, pain management may be a crucial component of perioperative therapy. Cardiologists often treat acute pre- or post-operative MI, but the anesthesiologist plays a key role in the intraoperative setting.(8)

The patient in this instance was known to have diabetes mellitus and a history of MI. By maintaining myocardial oxygen supply above demand, all anesthetic treatments must work to prevent ischemia. Avoiding tachycardia and blood pressure extremes, both of which adversely influence the equilibrium between oxygen supply and demand, is a necessity for general anesthesia for IHD. General anesthesia (GA) is linked to cardiac morbidity such as hypotension from IV inducing drugs, tachycardia, and hypertension from pressor response during direct laryngoscopy, although these conditions weren't present in this instance.(9) Following surgery, the patient was monitored for 45 minutes in the recovery room with linked vital signs monitoring and additional oxygen provided by a Venti-mask 2-4 lit/min. Preload and afterload, stress response, coagulation reactions, the need for post-operative analgesics, and the risk of perioperative MI are all decreased by RA . There is proof that regional anesthesia preserves immune responses and the neuroendocrine system's homeostasis better than general anesthesia.(4)

This case was done at private hospital in India during working period of author in India

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