1% PROPOFOL IN ANAESTHESIA FOR EMERGENCY NON CARDIAC SURGERY IN HEART FAILURE : A REPORT OF TWO CASES

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Introduction

Catastrophic cardiovascular complications in peri and post operative period, account for almost 25 to 50% of deaths following non cardiac surgery in patients with recent myocardial infarction and congestive heart failure. Both these conditions are generally regarded as absolute contraindications to anaesthesia for elective procedures. However in situations of urgent nature, anaesthesia has to proceed. The aim is to favourably maintain the already jeopardised myocardial oxygen demand and supply balance by maintaining haemodynamic stability, prevention of high rate pressure product and wide swings in blood pressure. Propofol is short acting intravenous anaesthetic agent which allows rapid clear headed recovery. In the following report, continuous infusion of 1% propofol was administered in low doses for anaesthesia in order to achieve the anaesthetic goals in two cases of heart failure of different aetiology.

Case Report-1

31 year old patient was admitted to ICU with complaints of rapid development of breathlessness, orthopnoea, cough with frothy expectoration and passing scanty urine since three days. The patient was pale, tachypnoeic, and drowsy. Blood pressure was 180/100 mm of Hg, neck veins were full, JVP raised with pedal oedema and bilateral fine crepitations were scattered throughout the lungs, more in dependent regions. Relevant investigations were Hb 5.9 g/dl, urea 96 mg/dl, creatinine 39 mg/dl, potassium 5.1 meq/l and X-ray chest showed evidence of pulmonary oedema. ECG did not show any ischaemic changes. Patient was diagnosed as acute renal failure causing heart failure with pulmonary oedema and managed with increments of frusemide up to 300 mg, titrated nitroglycerine infusion and later emergency haemodialysis. But for the next two days, he remained anuric and orthopnoeic. During second haemodialysis, he developed cardio-genic shock which was managed with dopamine and dobutamine infusions, but the state of anuria and chest congestion persisted. An ultrasound abdomen detected bilateral renal calculi with ob-

structive hydronephrosis. Patient was planned for emergency double J stenting under general anaesthesia to obtain some urine output. Due to co-existing heart failure, pulmonary oedema, and unstable haemodynamics, the patient was accepted as a poor case at extreme risk.

Management goals adopted were CVP guided optimization of preload and afterload, attenuation of intraoperative sympathetic responses and maintenance of oxygenation, stable haemodynamics and biochemistry during the procedure. Anaesthesia was induced by slow injection of 1% propofol 1 mg/kg. and midazolam 2 mg. Airway was secured by laryngeal mask airway (LMA) using 25 mg atracurium. A titrated infusion of propofol using blood pressure as guide, was administered by syringe pump at the rate of 3-4 mg/kg/hr, along with 100% oxygen and gentle IPPR through LMA to maintain anaesthesia. Morphine 0.1 mg/kg was used for analgesia and potassium free crystalloid as maintenance fluids. Procedure lasted for about one hour and patient made a smooth recovery. Post operatively nitroglycerine infusion, oxygen with PEEP valve circuit, CVP guided fluid therapy and cardiac and electrolyte monitoring was continued. He remained alert, well oxygenated and had stable blood pressure. Fluid intake was balanced with urine output. Due to development of end stage renal disease, he

Fig. 1 : LV volume plotted against LV pressure. Loop A - normal pressure volume relationship. Loop B - due to fluid overload, ESP, EDP and EDV have increased. Loop C - due to ischaemic myocardium, both EDP and EDV have increased whereas ESP and stroke volume have reduced.

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was subsequently managed with renal replacement therapy and finally underwent a successful renal transplant.

Case Report-2

77 year old patient was admitted in CCU with complaints of chest pain, breathlessness, orthopnoea, cough and expectoration. Patient was a known case of MI and COPD, on long term treatment with diltiazem, sorbitrate, aspirin and bronchodilators. Clinically patient was restless, tachypnoeic and sweating. JVP was raised with pedal oedema. BP was 170/100 mm Hg. S₃ gallop and bilateral crepitations with rhonchi were present. ECG showed evidence of old infarct with acute anterolateral MI. X-ray chest showed cardiomegaly with early pulmonary oedema. Patient was diagnosed as acute MI in heart failure and chest infection. He was managed with nitroglycerine infusion, frusemide, low molecular weight heparin, aspirin, enalaprilat, oxygen, antibiotics and salbutamol nebulizations. Patients also developed atrial fibrillation which was controlled with digoxin 0.25 mg. An echocardiography showed poor EF 35% with LV dysfunction and wall motion abnormality in LAD territory. On fourth day the patient had an accidental fall and sustained compound fracture of lower end of humerus, necessitating an early open reduction with plate fixation in prone position. Patient was assessed as a high risk for GA, scoring 45 out of 53 points in Goldman multifactorial risk index. Major risk factors were recent MI within ten days, non sinus rhythm, heart failure, age > 70 years and early surgery.

Min anaesthesia goals were to reduce afterload, maintain good cardiac function and coronary perfusion, prevent any sympathetic stimulation and maintain favourable myocardial oxygen consumption/delivery balance. Anaesthesia was induced with midazolam 2 mg and slow titrated dose of 1% propofol 1 mg/kg and maintained by infusion of 10-20 ml per hour using syringe pump to prevent sudden hypotension. Vecuronium was used for endotracheal intubation and muscle relaxation to facilitate IPPR. A supplement of pain relieving supraclavicular brachial block using 20 ml of 0.25% bupivacaine was done to reduce requirement of analgesics. Before any stressful manoeuvre like intubation, positioning, tourniquet etc, the sympathetic responses were prevented by additional small boluses of propofol 0.5 mg/kg. A stable BP and heart rate was maintained throughout surgery. Neuromuscular monitoring was also employed to top up muscle relaxant. At the end, reversal from anaesthesia and extubation were smooth. Post operatively nitroglycerine infusion and all cardiac monitorings were continued. The patient did not develop any post operative MI, or heart failure except recurrence of atrial fibrillation which was controlled with digoxin 0.25 mg. He later made an uneventful recovery.

Discussion

Propofol is an intravenous anaesthetic agent which has a short alpha half life of 2.5 min, high hepatic clearance of 1.81 min and no bioactive metabolite. The pharmacokinetics are not affected by renal and moderate hepatic dysfunction. This leads to a rapid, clear headed and emesis free awakening. Continuous infusion of propofol using a programmable target controlled infusion syringe pump, allows it to be used like a vaporizer, fine tuning the anaesthetic depth by achieving a desired blood level of 3-5 ug/ml. Propofol infusion can be regulated to administer sedative as well as anaesthetic doses thus eliminating the need for long acting anxiolytics and volatile anaesthetics. It

finds main role as a sole total intravenous anaesthetic agent allowing patient to be ventilated with higher oxygen percentage than conventional anaesthesia techniques. Though propofol reduces systemic blood pressure by 15-20% and at infusion rate above 100-200 ug/kg per minute may jeopardize coronary perfusion, in low dose infusion of 10-20 ml/hour, negative haemodynamic effects are minimal and stroke volume is maintained. It also reduces preload and tachycardia thus reducing myocardial oxygen consumption and allows lower arterial pressures for the given heart rate [1].

MI within one month and presence of uncontrolled heart failure are absolute contraindications to elective surgery. A 22.7% peri or post operative mortality/catastrophic complication rate has been predicted in Goldman's class 4 risk cases [2]. In cases anaesthetized within three months of acute MI the incidence of peri or post op, reinfarction is approximately 30% [3]. Both these cases were in heart failure and class 4 risk. Doppler echocardiography gave sufficient information about cardiac volumes, wall motion and ejection fraction. A study of reconstructed ventricular pressure volume loops was useful in planning anaesthesia. In first case the myocardium was not infarcted but cardiac failure was due to fluid overload and severe anaemia, so the end systolic as well as the end diastolic points were shifted upwards and to right (Fig-1), thus he benefited from reduction in preload and use of vasodilators. Propofol had a favourable effect in reducing afterload and rate pressure product. It also allowed ventilation with 100% oxygen through LMA thus improving oxygen carriage in presence of pulmonary oedema. In second case the myocardium was infarcted and EF was poor, so both end systolic and end diastolic points were depressed and shifted to right so the main anaesthesia considerations were preservation of contractility and reduction of rate pressure product and wall stress. Thus a technique using balanced anaesthesia with propofol, morphine and vecuronium, combined with regional pain relief block was selected.

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