Case Report

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Dilated Cardiomyopathy: Effect of Trendelenberg Position on Intraoperative Hemodynamics: Case Reports

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Abstract

Preoperative cardiomyopathy is a significant anaesthetic challenge. We present the anaesthetic management of two cases of dilated cardiomyopathy both with global LV hypokinesia and EF <35% Intervention. A low trendelenberg position (10^o) was used in both cases which might have helped in maintaining preload and hence hemodynamic stability. Minimum fluid was administered in the intraoperative phase in both cases.

Conclusion: Maintaining a low trendelenberg position during anaesthesia with careful monitoring may be beneficial for hemodynamic stability in dilated cardiomyopathy patients.

Keywords: Dilated Cardiomyopathy; Anesthetic management; Trendelenberg position.

Introduction

Cardiomyopathies are structural and functional disorders of the cardiac muscle. Preoperative cardiomyopathy presents a significant challenge to the anaesthetist. We present the anaesthetic management of two patients diagnosed with preoperative dilated cardiomyopathy posted for elective surgeries at our institution.

Case Report 1

46 years old male patient who was a known diabetic, hypertensive, NAFLD and also a diagnosed case of idiopathic dilated cardiomyopathy since 1 year was posted for bilateral Radiofrequency Ablation surgery for chronic venous insufficiency of the lower limbs. He was on olmesartan, hydrochlorthiazide with oral hypoglycemics with a reasonably fair effort tolerance (NYHA class 2) and compensated chronic heart failure with ECHO showing global LV hypokinesia with moderate LV systolic failure of EF=33%. ECG showed normal sinus rhythm and other blood routine investigations in normal limits. The proposed surgery was of 2-3 hr duration and the patient was taken up for surgery under informed high risk of perioperative decompensation and arrhythmias. Olmesartanwas with held on the day of surgery. Apart from the standard monitors, an invasive blood pressure monitor was attached prior to anaesthesia. A subarachnoid block with total of 10mg of 0.5% heavy bupivacaine with 20µg of fentanyl was administered in lateral decubitus position and patient was kept in 10^o of trendelenberg position thereafter. A T10-T11 final block level was achieved. Intraoperative fluid administration was kept at

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a minimal 500ml Ringers lactate only. Procedure lasted 2.5 hrs during which the patient had stable vital parameters with an uneventful postoperative period.

Case Report 2

A 41 year old obese female patient (wt=77kg) with a known history of systemic hypertension, dyslipedemia, hypothyroidism and an idiopathic dilated cardiomyopathy with an EF=34% was planned for a total abdominal hysterectomy along with amicrodochectomy left breast. The patient had a poor effort tolerance with METS < 4, NYHA class 3 symptoms and was on Thyroxin, Digoxin Spirinolactone,Telmisartan,Metoprolol,Frusemide, and Atorvastatin. Preoperative evaluation revealed a HR = 96/min with frequent ventricular ectopics but with no pulmonary oedema. Her blood reports revealed a TSH of 6.3 but with normal free T3/T4 levels, Hb of 10.4, normal electrolytes and renal functions. Patient was informed about the high risk of cardiovascular events and was taken up for surgery under GA with lumbar epidural block. As in the prior case an IBP monitor was placed along with standard ASA monitors prior to induction of anaesthesia. Preoperative lumbar epidural catheter was placed at L2-3 level with omission of a test dose in sitting position. GA was then induced with i/v Etomidate 20mg, Vecuronium 7mg following a premedication of Midazolam 1.5 mg, Glycopyrolate 0.2mg, Fentanyl 150µg, i/v lignocaine 100mg. Laryngoscopy and intubation were uneventful with no significant changes (>20%) in HR and BP. Anaesthesia was maintained with isoflurane in N20/O2 mixture along with propofol infusion and i/v Morphine 4.5mg and intermittent vecuronium boluses. Patient was kept in 10^{o} trendelenberg position and epidural boluses of 8ml and 6ml of 0.125% Bupivacaine was administered at the start and 2 hrs intraoperative period. Only 1000ml of RL was administered during the whole 4 hr procedure with adequately maintained intraoperative vitals and urine output. Recurrent Ventricular ectopics continued throughout the surgery and postoperative phase. Post operatively anaesthesia was reversed after neuromuscular block reversal using Neostigmine 3.5 mg with glycopyrolate 0.7mg and patient was extubated uneventfully in awake state. Postoperatively epidural analgesia was maintained with 0.125% bupivacaine infusion at 5ml/hrwith intermittent morphine epidural boluses. Apart from a brief period of postoperative ileus, cardiovascular status was uncomplicated.

Discussion

Cardiomyopathies are now classified into many more subtypes apart from the conventional distinction into 3 types of dilated, hypertrophic and restrictive based on gross pathology.[1] Yet the prevalance statistics show hypertrophic cardiomyopathy(HCM) and dilated cardiomyopathy (DCM) to be the more common ones (about 1 in 500 people) and more likely to be encountered in anaesthetic practice.[2] DCM is characterized primarily by a systolic dysfunction with no to minimal symptoms in the early stages followed by systolic failure symptoms of fatigue and dyspnoea further complicated with peripheral oedema, ascites, nocturnal dyspnea and arrhythmias in later stages. Embolic phenomena and sudden death may also occur in later stages.[3] Symptomatically our first patient was probably in early stage of the disease (stage B heart failure) while the second patient was significantly advanced pathophysiologically(stage C heart failure) with c/o intermittent pedal oedema and PND and effort intolerance.

Perioperative period is a particularly risky scenario for these patients with high risk of cardiogenic shock, acute pulmonary oedema, significant arrhythmias, sudden cardiac death and DVT.The anaesthetic goals in such patients relate to the pathophysiological changes in these patients.[3]

1. Avoid hypovolemia and decreased preload – These patients have dilated cardiac chambers with reduced ionotopy, and are very much dependent on the preload to produce the stretch of cardiac muscle to produce the ejection.
2. Avoid any increase in afterload – The failing heart has decreased ability to pump against increased systemic afterload.
3. Avoid drugs causing direct myocardial depression.
4. Avoid tachycardia and increased cardiac muscle O_2 demand.
5. Avoid volume overload–very prone for heart failure.
6. Avoid sudden hypotension by careful titration of anaesthetic agents.[3]

For our first patient we chose spinal anaesthesia with a low dose heavy bupivacaine to avoid hypotension associated with higher block levels. Fentanyl as an adjuvant provides better quality and prolongation of the spinal block when added with heavy bupivacaine.[4] Olmesartan was omitted on the day of surgery as ARB and ACEI drugs can

precipitate spinal hypotension as has been reported even in recent meta-analytic studies.[5] Preloading and co-loading with i/v crystalloids is generally used to counter spinal hypotension. In our case in view of deranged heart function, we used an auto loading technique by giving a 10° trendelenberg position during the block administration, which caused autotransfusion of pooled blood towards the heart maintaining its preload. As expected we did not encounter any hypotension after the block administration needing vasopressor administration. In view of the low drug dose used, fear of higher migration of drug with higher level of block also did not come to pass. Only 500ml of crystalloid was used during the procedure showing the benefit of auto transfusion.

Our second case was much more challenging as the the patient was symptomatically in advanced stage of the disease complicated with presence of obesity, subclinical hypothyroidism, systemic hypertension, and planned for a more prolonged surgery. Invasive BP monitor was attached prior to the anaesthesia induction in anticipation of cardiovascular events, though central venous line was omitted as the significant blood loss, and fluid shifts were not expected. An epidural catheter was placed preoperatively but a test dose was omitted as both lignocaine 2% and adrenaline used in standard test dose could have been risky in view of the cardiac condition. Fentanyl at 2μg/kg and i/v lignocaine 1.5 mg/kg was administered in the premedication to blunt the intubation stress. Cardio-stable drugs like Etomidate and Vecuronium were used for anaesthesia induction. All inhalational drugs are cardiac depressants when used alone hence a combination of low concentration of isoflurane along with propofol infusion was used for maintenance anaesthesia. Again in this case, presence of a 10° trendelenbergposition helped us to maintain adequate preload throughout the procedure even during epidural administration with no need for vasopressor use. It also might have helped us to minimize external fluid administration inspite of a 300-400 ml blood loss. Total fluid administered was kept at 1000ml with no intra or postoperative fluid overload.

Past studies have shown that trendelenberg positioning after spinal anaesthesia prevents decrease in cardiac output.[6] Our findings were consistent with those results and may be investigated further as a clinical hypothesis especially in cardiac compromised patients where fluid loading might be risky.

Conclusion

Perioperative dilated cardiomyopathy can present to the anaesthestist for routine surgeries with a similar incidence as seen in the general population and a good understanding of the pathophysiology can prevent potential anticipated complications. Low trendelenberg position along with dose limitation may be good technique to maintain preload in these patients especially during neuraxial block without causing undue high sympathetic blockade.

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