Anaesthetic Management of a Patient with Left Ventricular Non-Compaction Undergoing Laparotomy

Anwar ul Huda and Tauseef Ahmed

ABSTRACT

We report a case of left ventricular non-compaction as patient underwent laparotomy for ovarian cystectomy. Left ventricular non-compaction is a rare congenital cardiomyopathy with clinical features of heart failure, systemic thromboembolic events and arrhythmias. Perioperative management of these patients can be very challenging. We used general anaesthesia with subarachnoid block for our patient. We used perioperative, goal-directed, fluid therapy using LiDCO rapid in this case. Patient was monitored in high dependency unit for the risk of perioperative arrhythmias and discharged home in next 24 hours.

Key Words: *Ventricular non-compaction. Goal-directed fluid therapy. Arrhythmias. Cardiomyopathy.*

INTRODUCTION

Left ventricular non-compaction (LVNC) is a rare congenital cardiomyopathy that can present at any age. It is characterised anatomically by a thin, compacted epicardium and an extensive non-compacted endocardium with prominent trabeculations and deep recesses.[1] The compacted and non-compacted segments contract paradoxically and hence, result in poor left ventricular function presenting clinically with heart failure. Other important clinical characteristics include thrombo-embolic events and arrhythmias.[2]

We report anaesthetic management of a case of LVNC in a patient who underwent laparotomy.

CASE REPORT

A 23-year lady was planned for laparotomy for a large ovarian cyst. She had a background history of atrial septal defect (ASD) and ventricular non-compaction. She underwent ablation of conductive pathways four times in the past because of her frequent atrial tachycardias. Her last ablation was done about 5 months ago. She did not have any further hospital admissions since then. Her recent echocardiogram (ECG) revealed preserved left ventricular function. Her preoperative ECG showed normal sinus rhythm with a rate of 77 beats per minute. Her preoperative blood pressure was 118/67 mmHg and oxygen saturation was 100% on room air. Her full blood count, electrolytes, and renal functions were normal preoperatively.

Department of Anaesthesia, Southport and Ormskirk NHS Hospitals, UK.

Correspondence: Dr. Anwar ul Huda, Consultant Anaesthetist, Department of Anaesthesia, Southport and Ormskirk NHS Hospitals, UK.
E-mail: hudaanwar90@yahoo.com

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We discussed with her cardiologist preoperatively, who advised to keep her on regular beta blockers for perioperative period. Perioperative care was discussed with the patient; and she was explained that there are risks for perioperative arrhythmias. Critical care team was involved and high dependency unit was booked for postoperative period for monitoring. General anaesthesia with subarachnoid block was planned.

On arrival to anaesthetic room, an intravenous cannula and arterial line were inserted. Subarachnoid block was placed under all aseptic measures and 2.7 mL of 0.5% heavy bupivacaine with 500 ug of diamorphine was injected into subarachnoid space. She was induced with 2 mg Midazolam, 100 mg Fentanyl, 140 mg Propofol and 40 mg Atracurium, given intravenously. She was intubated with size 7.5 endotracheal tube. Intravenous (IV) magnesium was started at induction at the rate of 1 gram per hour. Cardiac output-guided intravenous fluid therapy was used intraoperatively by using LiDCO rapid. A large sized ovarian cyst was removed. The whole operation went well apart from few episodes of hypotension, which were treated with intravenous boluses of metaraminol. She received 2 litres of Hartman's solution intraoperatively. Blood loss was about 200 mL. Muscle relaxation was regularly monitored with train of four and reversed at the end with IV Neostigmine and Glycopyrolate. She was extubated in theatre, kept in recovery room for 30 minutes, and was then transferred to high dependency unit. Her postoperative course was non-complicated. She did not have any major arrhythmias and was discharged home on the second postoperative day.

DISCUSSION

Transthoracic echocardiography is considered as diagnostic test of choice for LVNC but other important modalities include contrast echocardiography, tissue Doppler and speckle myocardial imaging, computed

tomography and MRI.[1] The current recommended treatments for LVNC include beta blockers, angiotensin converting enzyme inhibitor (ACEIs) and diuretics.[1] Routine anticoagulation is mostly considered in only high risk patients like atrial fibrillation, systolic dysfunction or previous systemic embolism.[2,3] There are some poor prognostic factors for LVNC which include age, NYHA (New York heart association) class III/IV, high filling pressure, increased left atrial size, presentation with cardiac complications, ventricular arrhythmias, LV dilation and systolic dysfunction.[4]

There is very limited data and guidelines available in literature due to rarity of this condition with poor prognosis. The incidence of new postoperative arrhythmias after cardiac and non cardiac operations in patients with LVNC is 21% and 3%, respectively. Hence, these patients need to be monitored very carefully in postoperative period for complications.[5] The anaesthetic considerations while managing these patients include the presence of any additional cardiac abnormality, underlying neuromuscular diseases or any associated respiratory problems. Other important factors to consider include previous medical history particularly systolic dysfunction, embolism, arrhythmias or previous adverse reactions to anaesthesia.[6] We used subarachnoid block with general anaesthesia in order to optimise good pain control intraoperatively and postoperatively so that risk of perioperative, arrhythmias could be minimised.

As LVNC is often associated with myopathy, it is recommended to fully assess each patient for neuro-muscular disease, especially those scheduled for general anaesthesia because of association with malignant hyperthermia.[6] Although in this case, patient had a few general anaesthesia procedures before for her atrial ablation with no reported complications.

Transoesphageal echocardiography is a useful monitor to guide intraoperative fluid management in the presence of severely depressed left and right ventricular function.[7] When echocardiography is not suitable, minimally invasive cardiac output monitoring devices might be helpful in evaluation of cardiac function. We used LiDCO rapid monitoring in our case to guide intravenous fluid therapy.

The LiDCO rapid is a monitor for cardiac output and it analyses the arterial pressure waveform to give more information in high risk surgical and critically ill patients to assist in fluid therapy. The LiDCO rapid uses Pulse CO TM algorithm, which converts blood pressure to its constituent parts of flow (cardiac output, stroke volume) and resistance (SVR).[8,9]

As these patients are more vulnerable to severe arrhythmias, it is extremely important to avoid the stressors that increase sympathetic tone and also those anaesthetic drugs that can provoke severe arrhythmias including fatal ventricular fibrillations. We used intravenous magnesium infusion to avoid arrhythmias intraoperatively, which worked well in this case. In addition, the dose of non-depolarising neuromuscular blocking agents should be titrated under continuous monitoring of train of four; and it was done in this case as well.[10]

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