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CASE REPORT **ANESTHESIA & CONCURRENT DISEASE**

Anesthesia for non-cardiac surgery in a patient with left ventricular assist device (LVAD)

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Abstract

Left ventricular assist devices (LVADs) are advanced mechanical devices for end-stage heart failure. LVADs are implanted as bridge therapy in the patient awaiting heart transplantation. A 44-year-old male patient was preoperatively evaluated for surgery due to femur fracture. In the medical history of the patient, it was learned that heart failure developed after myocarditis in 2009 and an intracardiac defibrillator (ICD) was implanted in 2014.we administered low-dose local anesthetic and opioid intrathecally, which we thought would affect the hemodynamics at least, and performed the operation with stable hemodynamics of the patient.

Key words: Left ventricular assist device; Anesthesia; Anesthesia, Spinal; Heart transplantation

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1. Introduction

The incidence of heart disease has persistently been increasing over the previous few decades. With it has incresed the frequency of heart failusre. Left ventricular assist devices (LVADs) are advanced mechanical devices, which are being used to enhance the pumping capacity of the failing or end-stage heart failure. LVADs have to be implanted as a bridge therapy in the patient awaiting heart transplantation. We present a report of a 44-year-old male patient with heart failure, who was preoperatively evaluated for surgery due to femur fracture. The medical history of the patient revealed that he developed heart failure after myocarditis in 2009, and an intracardiac defibrillator (ICD) was implanted in 2014. We administered low-dose local anesthetic and opioid intrathecally, which we thought would have the least affect on the hemodynamics. The surgery was performed and completed with stable hemodynamics throughout the perioperative period.

2. Case report

A 44 y old male patient was evaluated preoperatively to undergo surgery for open reduction of his fractured femur. The patient had a history of severe myocarditis in 2009, after which he developed heart failure, and received medical treatment. An intracardiac defibrillator (ICD) had to be implanted in 2014. Later on the patient was implanted with LVAD in 2016 and was diagnosed to be suffering from chronic kidney disease (CKD) in 2019. Low molecular weight heparin was started to replace warfarin, which had been trted after LVAD. The patient was on the emergency cardiac transplant list for the last 6 months. Preoperative echocardiography revealed that the aortic valve opening was 1 cm^2 (normal value 3 to 4 cm^2) and the ejectionfraction (EF) was only 10-15% normal range from 55% to 70%). Preoperatively, the cardiovascular surgeons were consulted, and LVAD monitoring was started. Controlled fluid replacement was the target in case of low flow alarm during the procedure. In the pre-

anesthesia evaluation of the patient; Hb was 11.9 gm/dl, thrombocyte count 256,000/dl and INR values were within normal limits. Vital signs of the patient taken to the operating room were measured as BP – 90/45 mmHg, Pulse – 80/min, rhythm – AF (atrial fibrillation), SpO_2 – 93%, and LVAD flow – 5.4 L/min. Spinal anesthesia was planned for proximal femoral nailing (PFN) surgery. The anesthesia procedure was explained to the patient and a written acceptance signed by the patient, 7 mg of bupivacaine heavy and 25 µg of fentanyl were injected into the spinal space with a 25 G quincke spinal needle in a sitting position. The eurgery started after the spinal anesthesia level was judged to reach at T11 level. The total duration of surgery was 90 min. A total of 500 ml normal saline was given intravenously. LVAD flow did not fall below 5.2 L/min during the operation. Since intraoperative vital signs remained stable, the patient was shifted to the postoperative intensive care unit.

3. Discussion

The number of patients with end-stage heart failure placed with LVAD is increasing day by day; and as a result, the number of patients fitted with LVAD, who have to undergo non-cardiac surgery has been increasing prpoportionately.[1] For every anethesiologist, it is important to know the basic principles and the working physiology of LVAD, as well as the management of this patient group.

It is important to note that the device is preload dependent to provide the LVAD current. Systemic vascular resistance (SVR) must be manipulated to establish cardiac output, tissue perfusion and blood pressure.[2] A multidisciplinary team familiar with LVAD management is required for the perioperative management of these patients, and must include an anesthesiologist, primary surgeon, LVAD technician, cardiac surgeon, and the cardiologist.[3]

For a stable intraoperative hemodynamics, e.g., mean arterial pressure ≥ 65 mm Hg, visualization of neutral interventricular septum on echocardiography is important.[4] Preoperative patient volume status and the presence and extent of right ventricular failure need to be assessed precisely.

Right ventricular dysfunction can easily be exacerbated by volume overload in such patient group.[5] It is well-known that the 30-day mortality is higher in this patient group due to the underlying secondary problems or other pre-existing comorbidities, regardless of the anesthetic management.[3]

Regarding perioperative anesthesia management, it has been documented that neuraxial anesthesia is a better option for uncomplicated cystoscopy. Many studies hve been conducted using monitored anesthetic care (MAC) in these patients.[6] In our case, we administered low-dose local anesthetic and opioid intrathecally, which least effected the hemodynamics of our patient, and the operation was completed without any untoward side effects.

4. Conclusion

All patients with heart failure, and especially those who are dependant upon implanted mechanical assist devices must be thoroughly assessed preoperatively and a meticulous plan of anesthesia must be chalked out with consultation of a multidisciplinary team for a satisfactory outcome.

5. Conflict of interest

None declared by the authors.

6. Authors' contribution

All authors took part in the conduct of the case, literature search and preparation of the manuscript.

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