




# Laparoscopic cholecystectomy for a heart transplant candidate: A case report

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## ABSTRACT

Laparoscopic cholecystectomy remains the standard treatment for cholelithiasis. An increasing number of patients with numerous medical diseases are being treated with this technique. However, there is a surgical concern about its safety in patients with cardiac comorbidities. Cardiac arrest developed at 15 min pre-operative during laparoscopic cholecystectomy in a patient with a diagnosis of advanced heart failure (EF: 15–20%), who was a heart transplant candidate, and CPR was started. Peripheral VA-ECMO was inserted in the patient who did not respond to conventional CPR and was transferred to the surgical intensive care unit with inotropic medication and VA-ECMO support. Laparoscopic cholecystectomy was decided before the transplant because the patient's complaints increased and there were immunosuppressives, anticoagulant drugs used after the heart transplant, and health problems with increased risk after the transplant.

**Keywords:** Anesthesia, cholecystectomy, heart transplantation, laparoscopy

## Introduction

Laparoscopic cholecystectomy is a minimally invasive surgical procedure used in gallbladder diseases. Since the introduction of laparoscopic cholecystectomy by Philip Mouret in 1987, its use has grown steadily. Less pain and quick return to normal activities have made this procedure popular.<sup>[1]</sup> Since pneumoperitoneum occurring during laparoscopic cholecystectomy has known adverse effects on cardiopulmonary physiology, patients with CHF may be at increased risk during minimally invasive procedures.<sup>[2]</sup> Positive pressure pneumoperitoneum caused by the carbon dioxide used during la-

paroscopy may have deleterious effects on the cardiovascular system.<sup>[3]</sup> Therefore, it is often stated that patients with cardiac dysfunction are a relative contraindication for laparoscopic cholecystectomy.<sup>[4]</sup> It raises the question whether the risk of occurring pneumoperitoneum can be balanced with the reduced stress after laparoscopic cholecystectomy and thus include patients with cardiac comorbidities in the scope of laparoscopic cholecystectomy. The aim of this case report is to discuss the complications after laparoscopic cholecystectomy in a patient with advanced heart failure and the anesthetic management of these complications.



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## Case Report

A patient aged 62, weighing 70 kg, with known DM, HT, CRF, COPD, and advanced heart failure, with dilated CMP (EF: 15–20%), NHYA III, was admitted to the gastroenterology outpatient clinic with complaints of pain in the epigastric region and pain in the right upper quadrant. As a result of the examinations, the patient was diagnosed with cholelithiasis, and pre-operative evaluation and consultations were made. In the transthoracic echocardiography of the patient who had stents and pace markers in two coronary arteries due to a previous MI; left ventricular global hypokinesia, EF: 15–20%, left ventricular diastolic dysfunction Stage III, left heart chamber enlargement, advanced secondary mitral regurgitation, PABS: 60 mmHg, TAPSE: 1.5 cm. The patient, whose treatment was arranged according to the results of the consultation, was taken to the operation as high risk.

## Operative Period

Before induction, the patient underwent venous access with 5-lead ECG, sPO<sub>2</sub>, 18 G angiocath, and left radial artery cannulation was performed under local anesthesia. After 3 min of pre-oxygenation with 100% oxygen, anesthesia was induced with fentanyl (1.3 mcg/kg), propofol (1.3 mg/kg), and rocuronium bromide (0.6 mg/kg). Anesthesia was maintained with 60% oxygen, MAC 1 with sevoflurane. Heart rate, invasive blood pressure, sPO<sub>2</sub>, ECG, and end tidal CO<sub>2</sub> (ETCO<sub>2</sub>) were continuously monitored. Intravenous crystalloid solution was administered carefully and ETCO<sub>2</sub> was maintained between 30 and 35 mmHg (Datex-ohmeda, Madison, USA). After induction, central venous cannulation was performed through the right internal jugular vein. Patient with permanent pacemaker and mode changed to fixed mode before surgery. Temporary pacemaker, defibrillator, and injectors filled with pre-prepared inotropic drugs were kept ready. Surgeon made the choice of surgical procedure. Standard 4-port laparoscopic cholecystectomy was started.

Carbon dioxide insufflation was started and maintained at 5 l/min and other ports were introduced under vision. The upper limit of intra-abdominal pressure was kept as 8 mmHg and the operation was performed in 15–20° reverse Trendelenburg position with the right tilt. After the surgeon started lap cholecystectomy, the patient developed hypotension, and intravenous infusion of desufflation and vasopressor agents (noradrenaline 0.1–0.2 mcg/kg/

min and adrenaline 0.1–0.5 mcg/kg/min) was started immediately. The patient developed cardiac arrest following bradycardia. Cardiopulmonary resuscitation was started. Peripheral va-ECMO was implanted in the patient who did not respond to conventional CPR and was transferred to the surgical intensive care unit with inotropic medication and va-ECMO support. The patient was weaned from ECMO on the 11th postoperative day. In this state, the patient is being followed up in the CVC ICU as a heart transplant candidate.

## Discussion

Laparoscopic surgery is widely used all over the world as a safer and superior technique in many general surgical procedures. Its positive effects such as less pain and fatigue, and early return to normal activities have made laparoscopy the first choice surgical procedure, especially in abdominal surgeries.<sup>[1]</sup> However, concerns remain regarding the safety of this technique in patients with cardiac comorbidities. Carbon dioxide used during laparoscopy may have deleterious effects on the cardiovascular system because it causes positive pressure pneumoperitoneum.<sup>[3]</sup> It is known that pneumoperitoneum that occurs during the use of laparoscopy affects many hemodynamic factors, including increased systemic and pulmonary vascular resistance, as well as decreased cardiac index and stroke work index.<sup>[5,6]</sup> Therefore, it is stated that patients with cardiac dysfunction are a relative contraindication for laparoscopic cholecystectomy.<sup>[4]</sup> On the contrary, some studies have reported that laparoscopic surgery in patients with advanced heart failure is a safe method if it is performed in centers experienced in heart failure.<sup>[2,7]</sup>

VA-ECMO is a form of rescue therapy used as a bridge to recovery or transfer in patients with acute cardiopulmonary failure who do not respond to conventional treatment. In a study conducted in our clinic, the rate of withdrawal from VA-ECMO applied in in-hospital cardiac arrest cases due to myocardial infarction was 59.1% and the rate of discharge was found to be 36.4%.<sup>[8]</sup> In the case we presented in this study, cardiac failure due to pneumoperitoneum developed in a patient with advanced heart failure who underwent laparoscopic surgery. Peripheral VA-ECMO was applied urgently to the patient who did not respond to all necessary conventional treatment, and the patient was weaned from ECMO on the 11<sup>th</sup> post-operative day.

As a result, such patients should be evaluated very well by cardiologists, anesthesiologists, and gastroenterologists. Optimization of cardiac status, administration of balanced anesthesia, and low pressure pneumoperitoneum are necessary steps to ensure patient safety. In patients with advanced heart failure who will undergo laparoscopic cholecystectomy, the operation should be decided by considering open cholecystectomy as an alternative (in terms of profit/loss). Despite all these safety precautions, advanced treatment methods such as VA-ECMO should be applicable and accessible for complications that may develop. Although the possibility of life-threatening complications is rare, the complications that may develop can be easily managed in a fully equipped hospital with adequate cardiovascular support.

### Disclosures

**Informed Consent:** Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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**Conflict of Interest:** None declared.

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