# Anesthetic Management for Laparoscopic Cholecystectomy in a Patient with Restrictive Cardiomyopathy

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**Introduction:** Laparoscopic surgery is becoming a common practice in pediatric surgery, yet it is associated with many potential intraoperative complications. Risks from carbon dioxide ($CO_2$) insufflation include increased intraabdominal and intrathoracic pressure, decreased cardiac output, increased SVR, increased afterload and increased systolic wall stress. Still, laparoscopic surgery has anticipated benefits such as decreased post-operative pain, length of hospital stay and hospital costs. Restrictive cardiomyopathy is a condition that results in a stiff myocardium, which makes the heart chambers difficult to fill. Any increase in intraabdominal or intrathoracic pressure in restrictive cardiomyopathy patients could further decrease filling and cardiac output with potentially deleterious results. Thus, weighing these risks and benefits becomes a part of the pediatric anesthesiologist's role in managing these patient populations and deciding which patients can safely undergo laparoscopic procedures. We present a case of a 22-year-old with restrictive cardiomyopathy, who successfully underwent laparoscopic cholecystectomy.

**Case Report:** The patient has a complex cardiopulmonary history consisting of dextrocardia, congenital MV prolapse status post mitral valvuloplasty and ring placement, congenital lobar emphysema status post left upper lobe resection, restrictive cardiomyopathy, and atrial fibrillation. Given the patient's history of pancreatitis secondary to cholelithiasis, the patient was scheduled to have a laparascopic cholecystectomy prior to listing her for heart transplantation. Preoperatively, the patient lived a sedentary lifestyle because of poor exercise tolerance from her cardiomyopathy. She had been in atrial fibrillation for approximately one year that was refractory to medical therapy and multiple cardioversions. On echocardiogram, the patient had a giant left atrium with dimensions of 12.5 cm x 8.5 cm, mild MR and qualitatively normal left ventricular function.

The goal of this patient's intraoperative management was to maintain normotensive systemic blood pressure and heart rate in the range of 80-110 bpm in order to maintain adequate cardiac output. The patient received SBE prophylaxis, and was premedicated with IV midazolam. She underwent IV induction with etomidate and fentanyl. Pancuronium was the muscle relaxant of choice given its sympathomimetic properties. The patient underwent tracheal intubation and an arterial line was placed. In preparation for possible hypotension and intolerance to volatile anesthetics during the procedure, IV scopolamine was given for additional amnesia. Prior to the surgical procedure, the patient underwent DC cardioversion at 150 J with successful conversion to normal sinus rhythm (NSR). She remained in NSR throughout the procedure.

The patient was maintained on isoflurane, air, oxygen, and a remifentanyl infusion. In order to provide adequate anesthesia while maintaining mean arterial pressures above 70 mm Hg and heart rate within 80-110 bpm, a dopamine infusion was titrated between 3-7mcg/kg/min. The patient was in the supine position, abdominal insufflation pressure was no greater than 8-10 mm Hg, peak airway pressures were maintained at 22 mm Hg, and the respiratory rate was adjusted to keep end-tidal carbon dioxide between 38-41 mm Hg. The patient was stable throughout the surgery. After exsufflation, the dopamine was weaned off gradually with no hemodynamic consequences. The patient was successfully extubated awake and transported to the cardiac intensive care unit, where she stayed overnight before transfer to

the floor. She reverted to atrial fibrillation on post-operative day 1, but remained hemodynamically stable, and was discharged to home on post-operative day 2.

**Conclusion:** We report a case where a patient with restrictive cardiomyopathy successfully underwent laparoscopic cholecystectomy. The hemodynamic consequences from $CO_2$ insufflation and patient positioning during these procedures are well documented in healthy patients and patients with severe cardiac disease. These concerns also apply to patients with restrictive cardiomyopathy and congenital heart defects, but currently no criteria exist to risk-stratify these patients for laparoscopic versus open procedures. Despite all possible complications from iatrogenic pneumoperitoneum, we were able to effectively manage this patient via preoperative cardioversion to NSR, maintenance of the insufflation pressure <10 mm Hg, adequate oxygenation and ventilation, institution of dopamine to counterbalance her anesthetic requirement, vigilant monitoring, and continuous communication with the surgeon regarding acceptable patient positioning and insufflation pressures. Since there are no criteria to guide which patients can safely undergo laparoscopic surgery, both the anesthesiologist and surgeon must understand and weigh the risks and benefits for each patient, and have the flexibility to convert to an open procedure if necessary.

**References:**

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