Laparoscopic cholecystectomy in a patient with Ebstein’s anomaly: Anesthetic considerations

Sir,

We describe the anesthetic considerations in a female patient (18 years/35 kg) with Ebstein’s anomaly and mild depressive illness scheduled to undergo laparoscopic cholecystectomy under general anesthesia, which, to the best of authors’ knowledge, has not been described so far. Ebstein’s anomaly is a rare and serious congenital cardiac disorder characterized by unusually large tricuspid valve leaflets going deep inside the right ventricle and causing valvular dysfunction. The displaced and distorted tricuspid valve leaflets cause atrialization of the right ventricle, leading to tricuspid regurgitation of varying severity.

Our patient was taking Digoxin, Frusemide and Spironolactone for her cardiac ailment and Sertraline for her psychiatric illness. She did not have any symptoms for her heart disease and her vital parameters were within the normal limit. Her transthoracic echocardiography showed apical migration of septal leaflet of tricuspid valve by 5.5 cm. There was no tethering of any of the other leaflets. None of the leaflets were absent or hypoplastic. There was moderate tricuspid regurgitation with right ventricular systolic pressure of 45 mmHg and a small volume right ventricle. The right atrium was moderately dilated with size 4.8 cm. There was ostium secundum ASD of 2.8 cm size with bidirectional flow. The ejection fraction was 50% for both right and left ventricle.

She was premedicated with diazepam 5 mg on the night before surgery. The prophylaxis against infective endocarditis was adopted as per protocol. In the operating room, after securing intravenous access with an 18 G cannula, 1 mg midazolam and 100 mg fentanyl was administered. Routine monitoring was instituted with electrocardiogram, non-invasive blood pressure (NIBP), pulse oximetry, EtCO₂ and nasopharyngeal temperature probe. After induction of anesthesia, a 20 G arterial cannula was placed in the left radial artery. Central venous catheter was not inserted because of the increased risk of tachyarrhythmia.

Anesthesia was induced with Propofol 2 mg/kg IV given titrated to loss of eyelash reflex. After induction, relaxation was achieved with rocuronium 0.5 mg/kg IV and the patient was intubated with a 7.0 mm ID endotracheal tube. The preinduction heart rate (HR) and NIBP were 86/min and 130/70 mmHg and the postintubation HR and NIBP were 96/min and 140/78 mmHg. Anesthesia was maintained with oxygen, nitrous oxide and isoflurane 0.8–1% on a circle system with controlled ventilation. Our patient was hemodynamically stable throughout the operation, with mean arterial pressure between 70 and 90 mmHg and HR between 75 and 90/min. The patient was ventilated using Volume Control Ventilation with the following settings: tidal volume-350 mL; rate-18/min; I:E ratio-1:2; paw limit-30 mmHg; no positive end-expiratory pressure was used. The EtCO₂ remained between 28 and 32 mmHg and SpO₂ from 95 to 97%. The duration of surgery was around 35 min. Upon completion of surgery, reversal of neuromuscular blockade was achieved with neostigmine 2.5 mg and glycopyrrolate 0.5 mg. The recovery from anesthesia and extubation was uneventful.

A total of 1 L of crystalloid (Ringer’s lactate) was used in the intraoperative period.

The problems likely to be encountered during anesthesia for laparoscopic cholecystectomy in such patients are many.

Firstly, laparoscopic cholecystectomy is performed in steep reverse trendelenberg position with right lateral tilt to facilitate retraction of the gall bladder fundus and minimize diaphragmatic dysfunction. This position can significantly reduce the left ventricular preload and ejection fraction. This can be deleterious in patients with right to left shunt due to atrial septal defect in Ebstein’s anomaly. In our patient, we avoided hypotension and tachycardia during induction and maintenance by careful titration of fluids and anesthetic drugs.

Secondly, the mechanical effects of pneumoperitoneum can cause a reduction in the preload and an increase in the afterload due to increased systemic vascular resistance. This can produce a reduction in the cardiac index proportional to the intraabdominal pressure achieved, which can precipitate congestive heart failure. In our patient, after prior discussion with the surgeons, we restricted the creation of pneumoperitoneum up to an intraabdominal pressure of 10 mmHg. This was sufficient for good surgical exposure and acceptable hemodynamic stability.
Thirdly, the hypercapnia produced by CO₂ absorption during laparoscopy can decrease the myocardial contractility and lower the arrhythmia threshold. In our patient, we maintained the EtCO₂ between 28 and 32 mmHg by adjusting the ventilator settings to minimize the chances of hypercapnea.

Fourthly, patients with Ebstein’s anomaly already have a high propensity for tachyarrhythmias and paradoxical embolism, for which we avoided the insertion of central venous catheter. Moreover, because excess fluid administration can lead to an increase in right to left shunt and hypoxemia, we made every effort to prevent any excess fluid administration.

We believe that the anesthetic challenges posed by the patients with Ebstein’s anomaly can vary from patient to patient depending on the physical status, type of surgery and monitoring techniques.

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REFERENCES
1. Leonard IE, Cunningham AJ. Anesthetic considerations for laparoscopic cholecystectomy. Best Pract Res Clin Anaesthesiol 2002;16:1-20.
2. Galizia G, Prizio G, Lieto E, Castellano P, Pelosio L, Imperatore V, et al. Hemodynamic and pulmonary changes during open, carbon dioxide peritoneum and abdominal-wall lifting cholecystectomy. Surg Endosc 2001;15:477-83.
3. Ekici Y, Bozbas H, Karakayali F, Salman E, Moray G, Karakayali H, et al. Effects of different intra-abdominal pressure levels on QT dispersion in patients undergoing laparoscopic cholecystectomy. Surg Endosc 2009;23:2543-9.
4. Horishita T, Minami K, Koga K, Ogata J, Sata T. Anesthetic management using echocardiography for surgery of lower extremity in a patient with Ebstein’s malformation. Anesth Analg 2005;101:606-15.
5. Bengtsson IM, Magno R, Wickstrom I. Ebstein’s anomaly-anaesthetic problems. A case report. Br J Anaesth 1977;49:501-3.
6. Sinha PK, Kumar B, Varma PK. Anesthetic management for surgical repair of Ebstein’s anomaly along with coexistent Wolff-Parkinson-White syndrome in a patient with severe mitral stenosis. Ann Card Anaesth 2010;13:154-8.