Anesthetic Management for Laparoscopy in a Patient With Complete Non-Fenestrated Fontan Circulation

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Anesthetic Management for Laparoscopy in a Patient With Complete Non-Fenestrated Fontan Circulation

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CASE DESCRIPTION

A 37 year old female who had repair of transposition of great arteries in infancy and with non-fenestrated Fontan circulation presented for laparoscopic cholecystectomy. The primary objective in this patient is maintenance transpulmonary gradient (mean pulmonary artery pressure-left atrial pressure). After adequate hydration to maintain the preload, an induction of anesthesia was done with 50 mg propofol and 250 mcg of fentanyl, and vasopressin was administered to maintain the mean arterial pressure. The increase in pulmonary vascular resistance was minimized by low abdominal inflation pressure, lower tidal volume, lower PEEP and low peak airway pressure. Perioperative course was uneventful.

CASE DISCUSSION

Fontan Procedure is a palliative surgical procedure used in children with univentricular hearts whereby the systemic venous flow from superior vena cava and inferior vena cava is diverted to pulmonary venous circulation without passing through the right ventricle. The forward flow from systemic venous to pulmonary circulation is dependent on the pressure gradient between pulmonary and systemic venous circulation.1 Fenestrated Fontan is desired in high risk patients which is either a created or left small residual atrial septal defect.

Advantages and Disadvantages of Fenestration

- ADVANTAGES
  - Relieves high PVR and maintains caval-pulmonary forward flow
- DISADVANTAGES
  - Paradoxical embolism

Indications for Fontan Circulation1

- Hypoplastic left ventricle
- Tricuspid atresia
- Mitral atresia
- Pulmonary atresia with intact left ventricular septum
- Double inlet left ventricle

Management of patient with Fontan circulation during laparoscopy2,3

- Maintain preload
- Maintain SVR
-Decrease PVR
-Avoid hypoxia
-Avoid hypercarbia
-Avoid acidosis
-Low abdominal inflation pressure
-Maintain normothermia
-Adequate analgesia
-Maintain sinus rhythm

Factors negatively affecting Fontan circulation during general anesthesia for laparoscopy2

- IPPV
- High peak airway pressure
- High PEEP
- Hypercarbia
- Decreased preload

Ventilation strategy in patients with Fontan circulation2

- Maintain low peak airway pressure
-Avoid high PEEP
-Use short inspiratory time
-Use lower tidal volume
-Use slower respiratory rate

CONCLUSION

The laparoscopic procedures can be successfully managed in patients with Fontan with a ventilation strategy to avoid high pulmonary vascular resistance.

REFERENCES