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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.<sup>1</sup> Fenestred Fontan is desired in high risk patients which is either a created or left small residual atrial septal defect.

## Indications for Fontan Circulation<sup>1</sup>

*Hypoplastic left ventricle*

*Tricuspid atresia*

*Mitral atresia*

*Pulmonary atresia with intact left ventricular septum*

*Double inlet left ventricle*

## Advantages and Disadvantages of Fenestration

### ADVANTAGES

*Relieves high PVR and maintains caval-pulmonary forward flow*

### DISADVANTAGES

*Paradoxial embolism*

## Management of patient with Fontan circulation during laparoscopy<sup>1,2</sup>

*Maintain preload*

*Maintain SVR*

*Decrease PVR*

*Avoid hypoxia*

*Avoid hypercarbia*

*Avoid acidosis*

*Low abdominal inflation pressure*

*Maintain normothermia*

*Adequate analgesia*

*Maintain sinus rhythm*

## Ventilation strategy in patients with Fontan circulation <sup>2</sup>

*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

1. Nayak S, Brooker PD. The Fontan Circulation. British J Anaesth Continuing Education in Anaesthesia Critical Care & Pain. 2008; 8: 26
2. Taylor KL, Holtby H, Macpherson B: Laparoscopic surgery in a patient with post Fontan procedure. Pediatric Anesth 2006; 16: 591-95