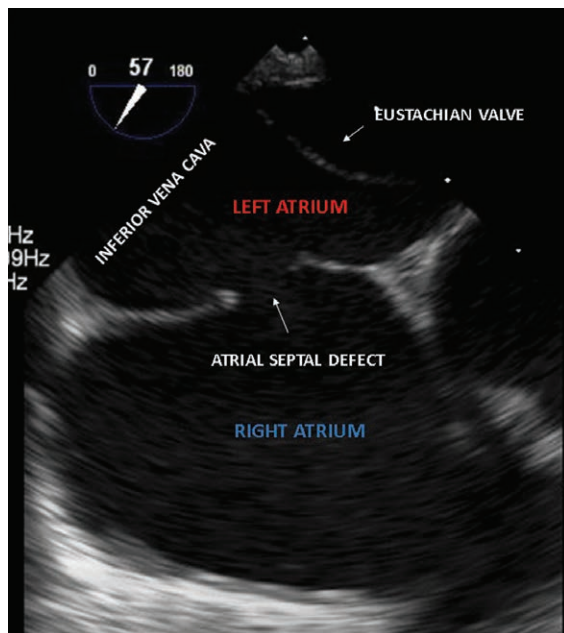
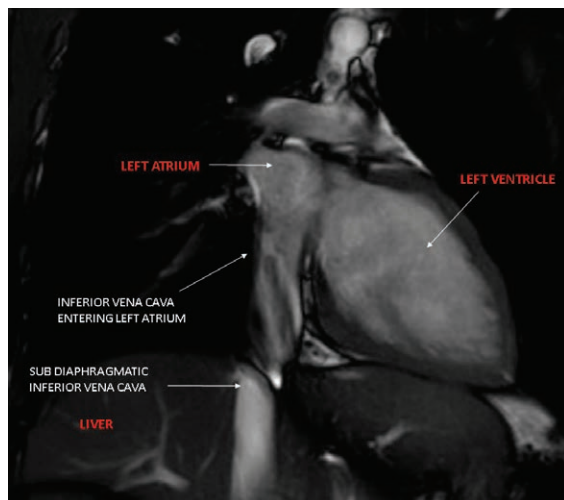


# Anomalous Drainage of Inferior Vena Cava into the Left Atrium

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**A**NOMALOUS drainage of the inferior vena cava into the left atrium is a rare cause of cyanosis in adults.<sup>1</sup> The accompanying images exhibit this condition. Magnetic resonance imaging portrays the inferior vena cava entering the left atrium (top image). An ostium secundum atrial septal defect and a prominent left atrial eustachian valve are present (bottom image). Contrast injection into the inferior vena cava confirms anomalous drainage into the left atrium (video, Supplemental Digital Content, <http://links.lww.com/ALN/B670>, exhibits left atrial drainage of inferior vena cava).

Deoxygenated blood from the inferior vena cava empties into left atrium, resulting in venous admixture. The left ventricle ejects this admixed blood into the systemic circulation. The ensuing cyanosis and persistent hypoxemia lead to erythrocytosis and hyperviscosity.

Anesthetic management during noncardiac surgery focuses on minimizing cyanosis and optimizing cardiac output. Maintenance of normal systemic vascular resistance (SVR) is prioritized. High SVR increases left atrial pressures leading to decreased filling from the inferior vena cava. Consequently, cardiac output falls. Right to left shunting across the atrial septal defect worsens cyanosis. Such shunting occurs when SVR is low and pulmonary vascular resistance is high. Increases in pulmonary vascular resistance are minimized by employing low tidal volume ventilation and avoiding hypercarbia, hypothermia, and high positive end-expiratory pressure. Judicious use of vasopressors helps prevent precipitous decreases in SVR. Intravenous access in lower extremities is discouraged. Air emboli from the inferior vena cava enter the left atrium directly and can embolize systemically. Preoperative phlebotomy is considered if hematocrit exceeds 65% to minimize risk of thrombosis. Prolonged fasting worsens hyperviscosity and is best avoided.<sup>2,3</sup>

## Competing Interests

The authors declare no competing interests.

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## References

1. Burri H, Vuille C, Sierra J, Didier D, Lerch R, Kalangos A: Drainage of the inferior vena cava to the left atrium. *Echocardiography* 2003; 20:185–9
2. Baehner T, Ellerkmann RK: Anesthesia in adults with congenital heart disease. *Curr Opin Anaesthesiol* 2017; 30:418–25
3. Cannesson M, Earing MG, Collange V, Kersten JR: Anesthesia for noncardiac surgery in adults with congenital heart disease. *ANESTHESIOLOGY* 2009; 111:432–40

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