Air Embolism into the Right Coronary Artery During Device Occlusion of an Atrial Septal Defect: A Case Report

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Introduction
- Atrial septal defects (ASDs) account for approximately 10% of all congenital heart defects.
- The ostium secundum defect is the most common ASD, comprising 70-80% of all ASDs.
- Transcatheter device closure of ostium secundum ASDs has largely replaced open surgical repair as the primary mode of treatment in appropriate candidates.

Case
- A 3-year old, 13.2 kg girl with a large secundum ASD presented for percutaneous device closure.
- A murmur had been noted in her first year of life. Transthoracic echocardiogram (TTE) showed a large secundum ASD with evidence of right-sided volume overload (Fig. 1), but she was asymptomatic and developing normally.
- Uneventful inhalation induction followed by administration of propofol, fentanyl, and rocuronium prior to intubation.
- Dexmedetomidine infusion started at 0.2 mcg/kg/hour.
- The cardiology team performed right and antegrade left heart catheterization via the right femoral vein (RFV).
- An 8 Fr Introducer sheath was inserted into the RFV and a 25 mm Gore catheterization via the right femoral artery with resolution of the ECG changes and heart block.
- ECG changes occurred as outlined in figures 2-3. Air embolism suspected.
- Emergent right coronary artery (RCA) angiography performed via the right femoral artery with resolution of the ECG changes and return to sinus rhythm.
- Procedure continued with eventual placement of a 30 mm Gore Cardioform Septal Occluder (GCSO) device loaded.
- ST elevation, hypotension, bradycardia
- Device loaded into introducer sheath
- Oxygen 100%
- Epinephrine 30 mcg, glycopyrrolate 0.2 mg administered.
- Dexmedetomidine stopped

Discussion
- Coronary air embolism is a rare complication of cardiac catheterization. The RCA is a likely target in a supine patient given its anatomical position. Manifestations of air embolism into the RCA include: ST elevation, heart block, bradycardia, and hypotension. Preventive strategies include flushing the septal occluder device thoroughly with heparinized saline and back bleeding to eliminate air.
- Management involves an aggressive therapeutic approach.
  - Administration of 100% oxygen
  - Supportive measures as needed:
    - Pacing, IABP, defibrillation, respiratory support
    - Forceful saline or contrast injection into the coronary artery
    - Use of a guide wire to disrupt bubbles

Conclusion
While rare and often self-limiting, air embolism into the RCA may have serious consequences. The anesthesiologist must be vigilant during deployment of closure devices with particular attention paid to the ECG. Rapid diagnosis and aggressive treatment are key to successful management.

References
- Inoue, T., Yaguchi, I., Mizoguchi, K., Hoshi, S., Takayanagi, Morooka, & Saito. (n.d.). Air embolism in the right coronary artery occurring during the left coronary angiography using the guiding catheter with a side hole. Catheterization and Cardiovascular Interventions., 49(3), 331-334.