Airway Obstruction in an Infant with Double Aortic Arch for Repair

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INTRODUCTION
Double aortic arch is type of congenital complete vascular ring that is formed by the two aortic arches. Congenital vascular rings can cause compression of the trachea and the esophagus in the pediatric patient. This can result in obstruction of the airway causing cyanosis, stridor, and apparent life threatening events. Long-term compression may result in chronic airway disease such as tracheomalacia and dynamic airway obstruction. It is important for pediatric anesthesiologists to be able to manage an anesthetic for patients with double aortic arch and the associated airway issues because of the potential severity in , as experts in airway management.

CASE
This report discusses a case of an infant with a double aortic arch presenting with severe airway obstruction from laryngotracheomalacia who had division of a double aortic arch and aortopexy. The patient was born at full term with no prenatal complications. At five weeks of age, the patient was brought to the University Of California Davis Medical Center for treatment after an apparent life threatening event involving cyanosis and stridor. He was admitted to the pediatric intensive care unit (PICU) for monitoring and scheduled for direct laryngoscopy and awake intubation and airway evaluation on the following day. Overnight in PICU he was noted to have stridor with desaturations from 100% to 85% with agitation. In the operating room he maintained spontaneous ventilation and was anesthetized using a propofol infusion. During the procedure, severe tracheomalacia was noted in the main bronchi with significant pulsatile collapse. A 3.0 cuff endotracheal tube was placed under direct vision. He was directly imaged computed tomography. This showed a double aortic arch with an atretic left branch, resulting in a vascular ring with focal compression of the trachea and esophagus. The pediatric cardiothoracic surgeons scheduled him for a double aortic arch division and aortopexy the following day. Overnight in PICU, the patient had significant difficulty ventilating despite being mechanically ventilated. He had one severe episode of airway obstruction with severe desaturation. The PICU physicians were able to improve ventilation by placing him into the prone position. Prior to his surgery the patient was again desaturated. Albuterol and muscle relaxation were administered. At that point, the PICU physicians requested that the patient be brought emergently to the operating room for the corrective surgery.

He was swiftly transported in the prone position to the operating room as the cardiac bypass machine was prepared. There were two peripheral intravenous lines in situ. An arterial line was deferred because of the high risk to benefit ratio from delaying surgery. He was positioned on his left lateral side and was administered midazolam, fentanyl, and sevoflurane. Muscle relaxation was maintained. The patient was at times difficult to ventilate during some surgical retraction but ventilation improved dramatically throughout the procedure. The mean arterial pressures were kept between 40-50mmHg throughout the case without vasoactive support. After surgery he was transported back to PICU and was extubated two days later. He had no further episodes of airway compromise for the rest of his admission and was discharged home two days after extubation. This case report discusses anesthetic management of an infant with severe airway obstruction from vascular occlusion of the trachea presenting for corrective surgery. Physicians dealing with an infant in this situation must be aware of the importance of positioning in infants with lower airway obstruction and be able to evaluate the risks and benefits of positioning in anesthetic interventions.

DISCUSSION
This patient presents a very severe case of airway obstruction from double aortic arch. A key factor in successful management of these patients is a detailed discussion with the pediatric intensive care physician. Their knowledge of the severity of obstruction and the medications and maneuvers which minimize airway obstruction can influence the anesthetic management. At the time of surgery, the PICU physicians had all ready attempted to stabilize this patient's critical airway through positioning, heliox, neuromuscular blockade, and beta agonists. Once other options had been exhausted, the decision to urgently perform surgery on this patient was made as a jointly between the intensivists, anesthesists, and surgeons because of the critical nature of the obstruction. In an otherwise healthy patient, it may be more imperative to perform definitive surgical repair than continue marginal medical stabilization.

REFERENCES


