
Anesthetic Concerns for Robot-assisted Laparoscopy in an Infant

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Introduction: The treatment of choice for biliary atresia is the Kasai portoenterostomy. The laparoscopic Kasai procedure has the potential advantages of minimally invasive surgery, fewer adhesions, and rapid postoperative recovery (1). Challenges with traditional laparoscopy include limited instrument mobility, two-dimensional vision, and amplification of natural tremor (2). The robotic surgical system is designed to improve the surgeon's ability to perform complex procedures, but its use presents unique challenges to the pediatric anesthesiologist. We report the first case of an infant undergoing laparoscopic Kasai with robot-assistance and discuss the anesthetic implications.

Case Presentation: A 2 month-old, 4.1 kg, male infant with biliary atresia was scheduled for laparoscopic Kasai using the da Vinci® Surgical System (Intuitive Surgical, Sunnyvale, CA). A practice run with the robotic equipment was initiated prior to induction to ensure that we could maneuver the cart away from the operating room (OR) table in less than 1 minute. After standard monitoring and inhalation induction with sevoflurane, peripheral IV access, tracheal intubation, and radial arterial line insertion followed without difficulty. Endotracheal tube (ETT) position was confirmed by auscultation, and a precordial stethoscope was placed over the patient's left chest. The patient was elevated 4 inches off the OR table on blankets and egg-crate to allow the greatest range of motion for the robotic arms. The OR table was positioned in 30 degrees of reverse Trendelenburg to facilitate surgical exposure then swiveled to the side approximately 45 degrees. The cart was positioned over the head of the table and away from the anesthesia machine. Robotic preparation, port placement, and docking took 53 minutes. The entire procedure except for the Roux-en-Y was performed laparoscopically with an insufflation pressure of 10-15 mmHg over 8 hours 50 minutes. Anesthetic maintenance consisted of isoflurane at 1 MAC in oxygen/air, fentanyl, and rocuronium with pressure control ventilation. The patient remained hemodynamically stable intraoperatively without significant acidosis. Following skin closure and drape removal, the patient was found to have bilateral lower extremity pitting edema presumably due to positioning and the pneumoperitoneum. The patient was admitted to the intensive care unit for recovery, and the edema resolved within 24 hours. He was extubated the next day, had his first stool on postoperative day (POD) #2, and was discharged home on POD #5 following an uneventful postoperative course.

Discussion: Patient safety during robot-assisted laparoscopy requires advance planning. Although robotic technology offers distinct advantages to the pediatric laparoscopic surgeon, pediatric anesthesiologists need to familiarize themselves with issues related to robot-assisted surgery. Specifically, robotic equipment can severely limit patient access. In the case of an airway emergency or cardiac arrest, resuscitating the patient requires disengaging the robotic

new technology into the operating room emphasizes the need for teamwork among the anesthesiologists, surgeons, and nurses to maximize safety and minimize risk to our patients.

References:

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