



## Evaluation and Management of a Patient with a Rotational Anomaly

<b>Description of the Activity</b>	<p>Rotational anomalies are conditions commonly encountered by pediatric surgeons in elective and emergent care settings. These surgeons must be able to accurately identify and manage the spectrum of rotational anomalies in the elective and emergent settings. In addition, the surgeon must understand which comorbid conditions can occur with rotational anomalies and how these may influence the presentation and management of rotational anomalies.</p>
<b>Functions</b>	<ul style="list-style-type: none"><li>❖ Nonoperative/Preoperative<ul style="list-style-type: none"><li>➤ Synthesize essential information from the patient's records, history, physical examination, and initial diagnostic evaluations to develop a differential diagnosis.</li><li>➤ Complete a cost-effective, evidence-based diagnostic evaluation.</li><li>➤ Communicate the diagnosis and potential treatment options to the patient, family/caregiver(s), and consultants.</li><li>➤ Obtain informed consent, describing the indications, risks, benefits, alternatives, and potential complications of the planned operation, including nuances relevant to the patient's individual condition and comorbidities, and ensure patient and family understanding.</li><li>➤ Identify and differentiate patients with midgut volvulus in whom urgent or emergent operative intervention is necessary versus patients with rotational anomaly alone.</li><li>➤ Identify patients in whom observation alone may be sufficient, and recognize the criteria for operative intervention in these patients.</li><li>➤ Identify patients in whom evaluation for rotational anomalies may be necessary, including patients with:<ul style="list-style-type: none"><li>▪ Abdominal wall defects</li><li>▪ Asymptomatic disease or atypical symptoms</li><li>▪ Congenital diaphragmatic hernia</li><li>▪ Heterotaxy syndromes</li><li>▪ Intestinal atresia</li></ul></li></ul></li><li>❖ Intraoperative<ul style="list-style-type: none"><li>➤ Perform the procedures required to manage rotational anomalies, including the Ladd procedure and minimally invasive and open techniques.<ul style="list-style-type: none"><li>▪ Untwist the intestine and mesentery if applicable.</li><li>▪ Mobilize and straighten the duodenum.</li><li>▪ Lyse all Ladd bands.</li><li>▪ Lyse all adhesions at the root of the mesentery to allow for broadening of the mesentery.</li><li>▪ Perform an appendectomy.</li><li>▪ Return the intestine to the abdomen (cecum in the left upper quadrant and small bowel in the right lower quadrant).</li><li>▪ Employ damage control principles to manage a patient with rotational anomaly and midgut volvulus.</li></ul></li><li>➤ Perform bowel resection (as indicated).</li></ul></li></ul>



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	<ul style="list-style-type: none"><li>➤ Perform temporary closure of the abdomen (as indicated)</li><li>➤ Perform second-look laparotomy (as indicated).</li> <li>➤ Manage common intraoperative complications, such as bleeding from the mesentery or bowel injury.</li> <li>➤ Recognize and develop a management plan for unexpected intraoperative findings such as intestinal atresia, significant intestinal loss, bleeding, and shock.</li> <li>❖ Postoperative<ul style="list-style-type: none"><li>➤ Provide postoperative management for patients with rotational anomalies, including:<ul style="list-style-type: none"><li>▪ Routine postoperative, immediate, and follow-up care</li><li>▪ Management of patients with volvulus who require damage control surgery</li><li>▪ Communication with the patient/family to ensure that anatomy and surgical procedures are understood</li></ul></li><li>➤ Discuss the normal postoperative course after a Ladd procedure with the family as well as long-term issues the patient may encounter.</li><li>➤ Explain to the patient and family how anatomy is changed postoperatively (the appendix is removed or the intestine may look abnormal on imaging studies).</li><li>➤ Identify early and late complications related to surgical rotational anomaly surgery, including volvulus after surgery and bowel obstruction.</li></ul></li></ul>
<h3>Scope</h3>	<ul style="list-style-type: none"><li>❖ In scope<ul style="list-style-type: none"><li>• Diagnoses<ul style="list-style-type: none"><li>▪ Malrotation</li><li>▪ Malrotation with midgut volvulus</li></ul></li><li>• Procedures<ul style="list-style-type: none"><li>▪ Ladd procedure – open or minimally invasive</li></ul></li><li>• Special populations:<ul style="list-style-type: none"><li>▪ Newborns and infants</li><li>▪ Older children</li><li>▪ Patients with:<ul style="list-style-type: none"><li>• Congenital heart disease</li><li>• Heterotaxy</li></ul></li></ul></li></ul></li></ul>



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- ❖ Out of scope
  - none



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<p style="text-align: center;"><b>1</b></p> <p><b>Framework:</b></p> <p>The learner demonstrates understanding of information and has basic skills</p> <p>What a new pediatric surgery fellow should know</p> <p><b>Entrustment:</b></p> <p>The attending will show and tell or the learner acts as first assistant.</p>	<ul style="list-style-type: none"> <li>With active assistance, performs a focused H&amp;P, requests appropriate diagnostic tests, and develops a differential and treatment plan for an otherwise uncomplicated patient with a rotational anomaly</li> <li>Demonstrates knowledge of typical anatomy of rotational anomaly</li> <li>Demonstrates basic knowledge of embryologic events leading to normal intestinal rotation</li> <li>With active guidance, recognizes the need for potential emergent evaluation of a patient with bilious emesis and initiates basic workup or resuscitation in a timely manner</li> <li>Establishes a professional rapport with the patient and family and communicates basic facts about rotational anomalies</li> <li>Receives a consult request for a rotational anomaly and asks clarifying questions politely</li> </ul>	<ul style="list-style-type: none"> <li>Describes the steps of and performs an uncomplicated Ladd procedure with active guidance, including untwisting intestine, lysing Ladd bands, broadening mesentery, straightening the duodenum, and replacing intestine, +/- appendectomy</li> <li>With active guidance, identifies anatomic aspects of rotational abnormalities within the abdomen</li> </ul>	<ul style="list-style-type: none"> <li>With active guidance manages the postop course of a medically uncomplicated patient following a Ladd procedure, demonstrating knowledge of when to initiate feedings and the normal postop course</li> <li>With active guidance, demonstrates basic knowledge of ethical principles for surgery in a scenario such as an asymptomatic/incidentally identified rotational anomaly (principles of “do no harm”)</li> <li>Provides basic information to the patient and family regarding the steps of the operation and the expected postop course for an uncomplicated case</li> <li>Communicates intraop findings and the surgical care plan with other members of the health care team in an uncomplicated postop case</li> </ul>
<p style="text-align: center;"><b>2</b></p> <p><b>Framework:</b></p> <p>The learner demonstrates understanding of the steps of the operation but requires direction through</p>	<ul style="list-style-type: none"> <li>With direct supervision, performs a focused H&amp;P, reviews diagnostic reports, and determines the need for additional imaging in a medically uncomplicated patient with a rotational anomaly</li> </ul>	<ul style="list-style-type: none"> <li>With indirect supervision, identifies/orients the relevant anatomy and performs most steps of a Ladd procedure in an uncomplicated patient (no intestinal ischemia or comorbid conditions, hemodynamically stable), including untwisting intestine, lysing</li> </ul>	<ul style="list-style-type: none"> <li>With direct supervision, manages the postop course of a medically uncomplicated patient following a Ladd procedure</li> </ul>



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<p>principles and does not know the nuances of a basic case</p> <p><u>Entrustment:</u></p> <p>The learner can use the tools but may not know exactly what, where, or how to do it.</p> <p>The attending gives active help throughout the case to maintain forward progression or may need to take over the case at a certain point</p>	<ul style="list-style-type: none"> <li>• Demonstrates knowledge of surgically relevant anatomic variations of rotational anomalies</li> <li>• Demonstrates knowledge of embryologic events leading to rotational anomalies and with direct supervision manages fluid resuscitation of a medically uncomplicated patient with a rotational anomaly</li> <li>• With direct supervision, recognizes the need for potential emergent evaluation of a patient with bilious emesis and initiates basic workup and resuscitation in a timely manner</li> <li>• Establishes a therapeutic relationship with a straightforward patient and their family and compassionately delivers medical information, using visual aids as necessary</li> <li>• Communicates the care plan clearly and efficiently with members of the team</li> </ul>	<p>Ladd bands, broadening mesentery, straightening the duodenum, and replacing intestine, +/- appendectomy</p> <ul style="list-style-type: none"> <li>• With direct supervision, identifies anatomic aspects of rotational abnormalities</li> </ul>	<ul style="list-style-type: none"> <li>• With passive assistance, identifies and applies ethical principles when treating an uncomplicated patient with a rotational anomaly</li> <li>• Clearly explains to a patient and family the steps of the operation and the expected postop course for an uncomplicated case</li> <li>• With indirect supervision, communicates intraop findings and the surgical care plan to other members of the health care team in an uncomplicated postop case</li> </ul>
<p><b>3</b></p> <p><u>Framework:</u></p> <p>The learner has a good understanding of surgical options and techniques but does not recognize abnormalities and does not understand the nuances of a complicated case</p>	<ul style="list-style-type: none"> <li>• With indirect supervision, performs a focused H&amp;P, reviews diagnostic reports, and develops a differential that includes both medical and surgical problems in a complicated patient with a rotational anomaly</li> <li>• Recognizes anatomic variants that may require observation (eg, heterotaxy/cardiac conditions) vs operative intervention and with active assistance adapts the management plan accordingly</li> </ul>	<ul style="list-style-type: none"> <li>• Performs a Ladd procedure in a complex scenario (ischemic bowel, heterotaxy, comorbid condition) with indirect supervision, including untwisting intestine, lysing Ladd bands, broadening mesentery, straightening the duodenum, replacing intestine, and measuring residual intestinal length, with possible bowel resection or stoma and +/- appendectomy</li> </ul>	<ul style="list-style-type: none"> <li>• With indirect supervision, formulates a postop care plan, including subsequent operative care, for a complicated patient with a rotational anomaly (patient with volvulus, damage control surgery)</li> <li>• Facilitates the resolution of professional differences of opinion between services (e.g., surgery and neonatology/anesthesiology) when</li> </ul>



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<p><u>Entrustment:</u></p> <p>The learner can perform the operation/task independently in the uncomplicated patient</p> <p>or</p> <p>The attending provides passive/indirect supervision/suggestions in the complicated patient but still allows the learner to perform the operation/task themselves</p>	<ul style="list-style-type: none"> <li>• Demonstrates knowledge of embryologic events leading to rotational anomalies and with indirect supervision manages fluid resuscitation of a medically complicated patient with a rotational anomaly</li> <li>• With indirect supervision, recognizes the need for potential emergent evaluation of a patient with bilious emesis and initiates comprehensive workup and resuscitation in a timely manner</li> <li>• Engages the patient and family to determine goals of care while confirming understanding of the disease process and care plan</li> <li>• Independently triages and coordinates the care of an uncomplicated patient with a rotational anomaly with the referring physician and other members of the team to resuscitate, conduct necessary diagnostic tests, and prepare for the OR in an efficient manner</li> </ul>	<ul style="list-style-type: none"> <li>• With indirect supervision, identifies pertinent anatomic variations of rotational anomalies and adapts the operative plan accordingly</li> </ul>	<p>treating a complicated patient with a rotational anomaly</p> <ul style="list-style-type: none"> <li>• Establishes a therapeutic relationship by engaging a medically complicated patient with a rotational anomaly and their family in a discussion of postop care and the expected postop course, acknowledging disparate care goals</li> <li>• With indirect supervision coordinates care with other members of the health care team to continue resuscitation and supportive care in a complicated patient with a rotational anomaly</li> </ul>
<p>4</p> <p><u>Framework:</u></p> <p>The learner has a strong and in-depth understanding of surgical options and techniques</p> <p><u>Entrustment:</u></p>	<ul style="list-style-type: none"> <li>• When a patient presents with malrotation with or without midgut volvulus, independently reads and interprets diagnostic images and formulates a plan for a timely operation</li> <li>• Independently recognizes anatomic variants that may require observation (eg, heterotaxy/cardiac conditions) vs operative</li> </ul>	<ul style="list-style-type: none"> <li>• Independently performs all steps of a Ladd procedure in a complex scenario (intestinal ischemia, heterotaxy, concurrent comorbid conditions), performing damage control laparotomy, temporary abdominal closure, second-look laparotomy, intestinal resection or ostomy, and measurement of residual</li> </ul>	<ul style="list-style-type: none"> <li>• Independently formulates a plan for subsequent operative and postop care for a patient who has undergone damage control surgery; independently addresses complications of surgery for a rotational anomaly (malabsorption, intestinal failure, need for parenteral nutrition or bowel-lengthening procedure)</li> </ul>



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<p>Can perform the operation/task independently in complicated cases</p> <p><u>or</u></p> <p>The attending may need to provide indirect supervision or suggestions in the context of extremely rare or severely complicated cases</p>	<p>intervention and adapts the management plan accordingly</p> <ul style="list-style-type: none"><li>• Demonstrates comprehensive understanding of the considerations for observation, fluid resuscitation and operative intervention in the setting of comorbid conditions (CDH, gastroschisis, omphalocele)</li><li>• Leads the resuscitation of the infant with bilious emesis and independently determines the need for emergent operation without complete diagnostic imaging</li><li>• Independently counsels the patient and family regarding anatomic variants and options for observation or operative intervention; demonstrates understanding of patient and family goals and uses shared decision-making to develop a care plan</li><li>• Independently triages and coordinates the care of a complicated patient with a rotational anomaly (eg, volvulus) with the referring physician and other members of the team to resuscitate, conduct necessary diagnostic tests, and prepare for the OR in an efficient manner</li></ul>	<p>intestinal length with consideration for a gastrostomy tube when necessary.</p> <ul style="list-style-type: none"><li>• Independently identifies pertinent anatomic variations of rotational anomalies and adapts the operative plan accordingly</li></ul>	<ul style="list-style-type: none"><li>• Independently leads a discussion about end-of-life care for a patient with significant bowel loss or irreversible shock as appropriate</li><li>• Independently advises a complicated patient with a rotational anomaly and their family on operative findings, the expected postop course, possible future complications, and overall prognosis</li><li>• Independently coordinates care with other members of the health care team to continue resuscitation and supportive care in a complicated patient with a rotational anomaly (e.g., volvulus)</li></ul>