Gastrointestinal Disease

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Gastroesophageal Reflux
Inflammatory Bowel Disease
Neonatal Hyperbilirubinemia
Chronic Liver Disease

Most serious gastrointestinal diseases in children are surgical in nature and are discussed in detail in Chapter 28. In this chapter common pediatric medical diseases of the digestive tract are reviewed. These include gastroesophageal reflux, inflammatory bowel disease, neonatal hyperbilirubinemia, and chronic liver disease.

GASTROESOPHAGEAL REFLUX

In gastroesophageal reflux (GER), the lower esophageal sphincter is incompetent and the child regurgitates recently ingested meals. It is very common in the first year of life, especially in children born prematurely, and is commonly seen in children with respiratory disorders such as asthma and bronchopulmonary dysplasia. Children with GER related to neuromuscular disorders, such as cerebral palsy, will continue to reflux throughout childhood. Because of weakened airway protective mechanisms, these children will demonstrate chronic pulmonary aspiration that results in repeated episodes of pneumonitis and chronic hypoxemia. Some children will have undergone a Nissen fundoplication, a surgical “tightening” of the lower esophageal sphincter, to prevent chronic GER.

Many anesthesiologists assume that children with GER are at risk for pulmonary aspiration on induction of anesthesia, and will therefore opt for a rapid sequence induction. But in order to do so, an IV catheter must be placed preoperatively, which is not a routine procedure in most pediatric centers. This practice also obligates the placement of an endotracheal tube instead of facemask or LMA anesthesia. However, no data exist to justify this practice. Studies that assessed residual gastric volumes after a normal preanesthetic fast have demonstrated no differences between children with GER and normal controls. This author’s opinion is that GER occurs only when there is food in the stomach of susceptible children, and when these children are fasted normally, gastric volumes at induction of anesthesia are low and do not pose an increased risk for pulmonary aspiration.

There are additional valid reasons for not performing a rapid sequence induction of general anesthesia in children with GER. Firstly, the performance of cricoid pressure reflexively decreases lower esophageal pressure, thus promoting passive regurgitation of gastric contents. Second, paralysis or relaxation of the cricopharyngeus muscle (a striated skeletal muscle) that forms the upper esophageal sphincter may allow passively regurgitated gastric contents to reach the larynx. Lastly, acid reflux into the lower third of the esophagus reflexively causes an increase in upper esophageal sphincter tone, which would not occur in the presence of neuromuscular blockade.

INFLAMMATORY BOWEL DISEASE

Inflammatory bowel disease (IBD) primarily consists of Crohn’s disease and ulcerative colitis (UC). Crohn’s disease is a chronic inflammatory bowel disease that is seen in older children and young adults. Clinical manifestations include diarrhea, abdominal pain, rectal bleeding, anal fistulas, anemia, and weight loss. Extraintestinal manifestations include joint pain and swelling, growth failure and delayed puberty. Therapy includes administration of 5-aminosalicylic acid (5-ASA) preparations (e.g., sulfasalazine, olsalazine, mesalamine), steroids, immunosuppressants, and anti-inflammatory cytokines (e.g., interleukins).

Ulcerative colitis is characterized by intermittent bouts of inflammation of the large intestine that are
manifest clinically as abdominal cramping, diarrhea, and bloody stools. Associated systemic findings include anorexia, weight loss, low-grade fever, and mild anemia. Severe cases of colitis can result in hypoalbuminemia and toxic megacolon. Approximately 20% of cases of UC present during childhood. As with Crohn’s disease, the primary therapeutic options are anti-inflammatory therapy with 5-ASA preparations, steroids, and immunosuppressants.

Children with IBD are subjected to repeated colonoscopies during the course of their disease, for which general anesthesia or deep sedation is required. In Crohn’s disease, surgery is indicated when medical therapy has failed or when microperforations have resulted in abscesses, strictures, and obstruction. Intestinal or colonic resections are palliative but not curative. In UC, surgery is indicated for intractable colitis and toxic megacolon with peritonitis, or to prevent or treat malignancy. Since UC is confined to the large intestine, colectomy is considered curative.

There are no unique anesthetic considerations for children with IBD. Epidural analgesia is indicated for postoperative analgesia in selected patients. Anecdotal (and unproven) data indicate that these children require higher than usual amounts of opioids. This may be related to tolerance from intermittent or chronic opioid use.

### NEONATAL HYPERBILIRUBINEMIA

In the first week of life, unconjugated (indirect) hyperbilirubinemia occurs because of the breakdown of fetal erythrocytes in combination with low activity of glucuronyl transferase, the enzyme responsible for conjugation of bilirubin to glucuronic acid. It is manifested clinically as jaundice of the skin and sclera, and is most prominent after the third day of life, in prematurely born infants, and in term breast-fed infants. Concomitant medical disorders that cause hemolysis and contribute to hyperbilirubinemia in an additive fashion include hemolytic disease of the newborn, spherocytosis, G-6-PD deficiency, and the presence of a cephalohematoma.

Treatment is indicated when serum bilirubin levels rise excessively. The potential for neurotoxicity of the developing brain (kernicterus), which is historically associated with bilirubin levels greater than 20 mg/dL in full-term infants. Prematurity, hypoxemia, acidosis, and hypothermia increase the likelihood of kernicterus in the presence of hyperbilirubinemia. Phototherapy is the primary initial treatment; exchange transfusions are rarely required in accelerated cases. Bilirubin values that trigger phototherapy or exchange transfusion vary widely between institutions.

### CHRONIC LIVER DISEASE

Chronic liver disease in children is most commonly associated with congenital biliary atresia for which a Kasai procedure (see Chapter 28) or a liver transplant has been performed. Other possible causes include $\alpha_1$-antitrypsin deficiency, cystic fibrosis, tyrosinemia, and Wilson’s disease, among others. Clinical manifestations will depend on the remaining degree of liver function and will include ascites, portal hypertension (with esophageal varices), and coagulopathy. Respiratory insufficiency in children with advanced liver disease is caused by loss of functional residual capacity (FRC) from the mass effect of ascites or hepatomegaly, and creation of intrapulmonary shunts (hepatopulmonary syndrome). Fulminant hepatic failure is associated with encephalopathy and increased intracranial pressure (see Chapter 38).

Principles of anesthetic management are centered on avoidance of medications that are metabolized in the liver (e.g., steroidal neuromuscular blockers) and will have an abnormally increased duration of action. All inhalational agents except for halothane demonstrate minimal liver metabolism and reduced hepatic blood flow to a similar extent. Because of halothane’s extensive metabolism (20%), and its association with halothane hepatitis, it is relatively contraindicated in children with preexisting liver disease.

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