Surgical Diseases of the Neonate  (21-Nov-2003)

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1. Introduction
Diseases of foals less than four weeks of age that require surgery can affect the digestive, respiratory, urogenital, musculo-skeletal, and integumentary systems. This paper focuses primarily on the surgical diseases of the abdomen (gastrointestinal tract, umbilicus, and urogenital tract) and of the upper airway. The gastrointestinal system presents the largest number of surgical indications.

Assessment of abdominal pain and the need for surgery was discussed in the previous paper. It is important to recognize that duration of an abdominal abnormality usually plays a large roll in the outcome. Time makes a difference at each step. This includes the time taken: from recognition of abdominal pain to arrival at a surgical facility, to evaluate the need for surgery, to prepare the foal for surgery, and to perform the surgery.

2. Abdominal Surgery
For abdominal surgery in general, the foal should be in the best possible condition, which may require IV fluid replacement, balancing electrolyte levels, and correction of acid-base abnormalities. Preoperative antibiotics and flunixin meglumine are indicated. A nasogastric tube should be in place and the stomach decompressed prior to induction of anesthesia.

Cautious anesthesia with careful monitoring is imperative. Direct arterial blood pressure monitoring is imperative for sick foals. The foal should be placed in a stable, well-padded position that is also comfortable for the surgeon. The ventral abdomen should be prepped from the xyphoid to caudal to the umbilicus.

**Surgical Technique** - The goal of the surgery is rapid correction of the abdominal lesion in as atraumatic manner as possible. The incision is made cranial to the umbilicus. If the incision needs to be extended caudally, the umbilical structures should be removed prior to abdominal closure. A primary concern during abdominal surgery, especially in the foal, is prevention of adhesions. This is best accomplished by practicing aseptic technique, minimizing surgical time (time = trauma), and minimizing tissue trauma, especially of the serosa. Powder should be rinsed off the surgical gloves. The intestines should be kept moist by using large amounts of saline during the procedure and by keeping the intestines in the abdomen as much as possible. As much omentum as possible is resected, and the abdomen is lavaged prior to closure. Intra-abdominal sodium carboxymethylcellulose is used by some to reduce adhesions.

Following resolution of the abdominal abnormality, the abdomen is closed. This is generally done with a continuous suture line, in the linea alba, in the subcutaneous tissue, and in the skin. The post-operative care generally involves transient restricted oral intake, antibiotics, flunixin meglumine, and heparin. The foal can be turned out with other mares and foals three to four weeks postoperatively.

3. Abdominal Abnormalities - Gastrointestinal
**Gastric Outflow Obstruction** - Suspicion of this condition is confirmed by a radiographic contrast study of the stomach, where none of the radiopaque suspension leaves the stomach within 30 to 45 minutes. The site of the obstruction can be determined by visualization and palpation during abdominal exploration. A stricture is usually found at the pylorus or along the distending duodenum. A gastroduodenostomy will allow ingesta to bypass a strictured pylorus. A gastrojejunostomy will allow ingesta to bypass a strictured duodenum. The surgery can be technically challenging.
Small Intestinal (SI) Lesions - Strangulation obstructions generally cause significant unrelenting pain leading to prompt surgical intervention. If the duration of the strangulation is less than approximately three hours or if the bowel is not tightly strangulated, the abnormality can often be resolved without resection of bowel. The most common form of strangulation obstruction in the young foal is volvulus of the small intestine. Other examples of SI strangulation would include strangulation through a rent in a mesodiverticular band, a tear in the diaphragm, a tear in the vaginal tunic, or in an umbilical hernia.

Non-strangulating SI abnormalities include intussusceptions (which can become strangulating), impaction with ascarids or even ingesta, and enteritis with ileus.

Large Intestinal (LI) Lesions - Strangulation obstruction of the LI is most commonly due to volvulus, but can be from incarceration through a hernia (e.g., diaphragm). Parietal hernias are uncommon and usually affect older foals. Non-strangulating obstruction of the LI is most commonly due to meconium retention in the small colon. Other causes include large colon displacement, segmental colonic atresia, and ileocolonic aganglionosis.

4. Abdominal Abnormalities - Urogenital, Umbilical

Uroperitoneum - The most common cause of uroperitoneum is a ruptured bladder. This occurs during foaling with the adverse effects seen 24 to 48 hours later. The site of the tear is almost always dorsal, mid body and of variable length. Infrequently even with meticulous closure, the repair site may leak, requiring another surgery. A urinary catheter left in place for two to three days will keep the bladder decompressed and help prevent leakage.

Uroperitoneum can also result from a leak in the urachal area or apex of the bladder. This usually occurs in a slightly older neonate that has had other health problems. This necessitates resection of the umbilical structures and the apex of the bladder. Patent urachus usually develops a few days after birth from a local infection resulting in loss of the seal at the apex of the bladder. These usually resolve with systemic antibiotics. However, if this does not resolve with antibiotics surgical resection and repair is indicated.

Umbilical evisceration of the small intestine can occur at foaling as a result of incomplete development of the body wall at the umbilicus. If the eviscerated small intestine can be kept clean prior to surgical repair, these foals can survive and develop normally.

Umbilical remnant infection can usually be successfully treated medically. However, surgical resection of the infected umbilical structures is occasionally needed. Ultrasound evaluation of these structures is important in initially determining what is involved and subsequently, the response to medical treatment. Umbilical vein infections often necessitate surgery to debulk the infection and remove the vein. Omentum is usually already adhered to the vein by the time surgery is performed.

5. Upper Airway Abnormalities

Guttural pouch tympanitis presents as externally visible swelling in the throat in a foal that also may make significant upper airway noise due to pharyngeal swelling. The distention of the pouch with air is due to an abnormality of the flap covering the guttural pouch opening. This results in the opening functioning as a one-way valve. If unilateral, the problem can be resolved by fenestration of the septum between the left and right guttural pouches. This is usually done under anesthesia with a laser through the endoscope. If bilateral, in addition to the septal fenestration, another opening can be created into one of the pouches from the pharynx.

Choanal atresia is a congenital anomaly where a membrane separating the caudal nasal passage from the nasopharynx is present. An opening can be created through this tissue, usually using a laser through the endoscope. However, it is questionable if the opening created will allow enough airflow for the foal to become an athlete.

A cleft palate is usually diagnosed soon after birth, as milk running out of the nose usually draws attention to the problem. Some foals with a cleft palate are able to mature into adulthood with the abnormality. However, most foals develop aspiration pneumonia and are eventually euthanized. Surgical repair is difficult, but can be successful. The prognosis is guarded and the prognosis for an athlete is very poor.

References


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