Research article

Equine Colic Surgery: The Key Points to Be Considered

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Home Messages:

- After prompt referral to an equine hospital, surgical decision-making based on historical, clinical and diagnostic information would be crucial.
- Understanding equine gastrointestinal anatomy is an important key to the diagnosis of an involved organ resulting in colic.
- Equine colic surgery is a complex and significant procedure that requires a dedicated surgical team, inventive and experienced surgeons, and an equipped center.
- Improving veterinary aftercare could be a means to further boost horse's performance and welfare after surgery.

Keywords: Equine, Colic, Surgery

Introduction:

Equine colic, defined as abdominal pain in horses, is the single greatest killer of horses, a common emergency and potentially life-threatening condition varying from simple spasmodic colic to strangulating disorders. Colic with an incidence of 0.9-10.6 cases/ 100 horse-years accounted for approximately 30% of all emergency calls for equine surgeons/practitioners and 8-20% of cases require hospitalization for either medical or surgical treatment. Although about 90% of horses with colic are resolved spontaneously or by medical therapy, up to 10% of colic cases require surgical intervention. Studies have shown that the survival rate for horses undergoing colic surgery ranges from 60% to 90%.

Colic surgery in horses is a delicate and complex procedure requiring careful consideration and expertise. In general, multiple factors are involved in performing a riskless colic surgery including early detection and diagnosis, understanding types of colic requiring surgery, choosing the right candidate for surgery, selecting an experienced surgeon, low-risk anesthesia, postoperative care and monitoring, financial considerations, long-term prognosis and rehabilitation, prevention strategies. Among the mentioned factors, indications for surgical treatment, the interesting points of bowel anatomy, tips for a successful surgery and a proper protocol after surgery appeared to play critical roles in survival outcomes. This article briefly describes key points that equine surgeons need to contemplate for a highly principled colic surgery.

Decision for surgery:

The prompt referral to a surgery center is crucial, as delays can decrease the successful outcome and lead to either irreversible changes or systemic inflammatory response syndrome. The use of sedatives and careful monitoring during transportation can help ensure the horse's safety, especially if the horse is in a critical condition. Owners should be prepared for the financial and time commitments involved in the surgery and recovery. Early detection of colic signs can also contribute to a more favorable outcome. Clinical signs of equine colic can vary including restlessness, pawing, rolling, decreased appetite, distention of abdomen, sweating, and increased heart rate and capillary refill time. The history, physical examinations, blood tests, rectal examination, abdominal radiography and ultrasonography are crucial for identifying the cause and severity of colic. Serosanguinous peritoneal fluid (increased total protein and white blood cells), blood glucose, anion gap (lactate), and acute phase proteins (Serum amyloid A) have been reported as valuable prognostic markers in equine colic. Some indicators that surgery may be required include severe or persistent pain that does not respond to analgesia, lack of response to medical treatment, and presence of complete or partial intestinal obstruction. conservative treatments.

Anatomy:

The recognizing of anatomical landmarks is essential to discern the changes in anatomic structures resulting in colic that finally should be corrected. The length of the small intestine in horses varies from 10 to 30 meters. The duodenum, about 1 meter, extends from the pylorus to the right of

the midline. The jejunum 17 to 28 m long is characterized by extensive mesentery with vascular arcades and several vasa recta that pass from the arcuate vessels to the intestinal wall. The ileum, the length of 0.7 m, is marked by the antimesenteric band, muscular wall, and the arterial supply that travels along it. The cecum has a comma-shaped appearance, four longitudinal bands (teniae), approximately 1.25 m long, and an average capacity of 30 liters. The ileocecal fold runs from the antimesenteric border of the ileum to the dorsal band of the cecum. The cecocolic fold, the triangular fold, attaches the lateral cecal band to the lateral free band of the right ventral colon. The large colon, 3 to 3.7 m in length, has a capacity of 50 to 60 liters, four segments with tenia (the right and left ventral colon to the left and right dorsal colon), and three flexures (the sternal, pelvic, diaphragmatic). The ventral colon, pelvic flexure, and right dorsal colon have four bands, one band, and three bands, respectively. The transverse colon is short and not exteriorized because of the attachment to the root of the mesentery. The small colon, 3.5 m long, has sacculations, two teniae located on the mesocolon and the antimesenteric border and is attached to the terminal duodenum by the duodenal colic fold which is the proximal jejunum.

Surgery:

Equine colic surgery is a complex and expensive procedure which requires two scrubbed surgeons, an anesthetist, appropriate nursing support, and a well-equipped surgical center. The success rate of the surgery is approximately 70%. Preparation to undergo anesthesia (PCV above 50 %), administration of prophylactic antimicrobial (penicillin and gentamicin, IV, 30 to 60 minutes before surgery), anti-inflammatory agents (flunixin meglumine, 0.25 mg/kg, IV), fluid therapy to address hydration status should be preoperatively done. Before the surgery, the horse's mouth could be rinsed. Also, an indwelling urinary catheter should be sutured in male horses and a nasogastric tube is required to be placed especially in the small intestine obstructions. Lidocaine (1.3 mg/kg bolus, followed by 0.05 mg/kg/min) and vitamin C can be preoperatively administrated. An anesthetic-related death rate for healthy horses undergoing colic surgery is about 1.9%. The lower dose of anesthetic drugs (xylazine 0.7-1.1 mg/kg IV as sedation, induction by the mixture of ketamine 2.2 kg/mg IV and diazepam 0.2 mg/kg IV) may be tried initially to prevent deep anesthesia.

General anesthesia is maintained by the combination of isoflurane (1/5-2 %) and oxygen (4-6 liters) in a closed-circuit system. Inotropes like dobutamine 0.5 µg/kg/min can be administrated during surgery to avoid myopathy. The surgeon should be situated on the left side of the horse to properly identify the right dorsal displacement of the large colon and to exactly correct the large colon volvulus. In dorsal recumbency, the ventral abdomen is prepared aseptically. Using sterile, impervious and broad drapes and hock drapes over the limbs. The midline is incised 30-40 cm long. Enlargement of the incision is occasionally required as the bowel is being exteriorized from the abdomen to prevent increases in intraluminal pressure of the bowel. The peritoneum is picked up and is incised with Metzenbaum scissors or hand. The cecum, on the incision site, is a reference point for systematic exploration. Both the small and large intestines are exactly traced by landmarks. Gentle tissue handling, careful traction during exteriorization (particularly edematous, friable and strangulated bowel), removal of damaged tissue, decreasing of ischemia-reperfusion injuries (following surgical correction of volvulus and displacements), adequate hemostasis, and frequent lavage to keep the bowel moist have to be considered. Gas-filled portions of the bowel should be decompressed by a gauge 14 needle immediately upon opening the abdominal cavity and the penetrated site is closed using gauze soaked with isotonic solution. The compromised small intestinal and the displacement and volvulus of the large colon are corrected. The correction of the volvulus and displacement is not performed until the large colon has been evacuated, to avoid rupture during colonic manipulations, particularly the right dorsal colon. Also is key that the horse is tilted to one side to facilitate the exteriorization of the colon. The observation of the cecocolic ligament in a normal position, gas translocation, and return of serosal color are indications that the colon is corrected perfectly. Properly evaluating bowel viability is critical in both small and large intestine lesions. They are assessed for signs of devitalization by the color of the intestinal serosa and mucosa, motility, luminal pressure, fluorescein dye, and surface oximetry. The resection and anastomosis of the affected bowel is required. Enterotomies are often performed in the small intestine antimesenteric border, pelvic flexure, and antimesenteric teniae of the small colon. Intraluminal lavage by tap water is used to evacuate the ingesta through the enterotomy or by the retropulsion. It is important to ascertain if there are

more enteroliths in the gastrointestinal tract. All enterotomies were sutured with a double inverting pattern. After returning exteriorized organs to their normal anatomical position, the abdominal cavity must be lavaged with a balanced sterile electrolyte (lactated ringer's solution, 20-40 ml/kg) and the fluid must be suctioned. The abdominal incision is closed in three layers routinely. The head and tail rope-assisted recovery reduced the risk of fatal complications. Intraoperative complications consist of those related to anesthetics, hemorrhage, mesenteric tearing, gastrointestinal rupture.

Postoperative treatment:

After the surgery, post-operative care is crucial, including managing the abdominal incision, administration of antibiotics for 7 days (penicillin, 20000 IU/kg, IM, bid and gentamicin, 6.6 mg/kg, IV, sid), antiulcer medication (cimetidine 6.6 mg/kg, IV, bid), motility stimulant (metoclopramide 0.02 mg/kg, iv, sid), pain control (flunixin meglumine, 0.5 mg/kg, IV, qid), fluid therapy, supportive solutions (vitamins, electrolytes, and amino acids), box rest, and vital signs checkup. The patients are hospitalized for at least 7 days under intensive monitoring and discharged only when food consumption and defecation become normal. Feeding is gradually reintroduced once normal gastrointestinal function returns, usually within 48 hours. The horses generally require a gradual return to normal activity for around 4 months of ongoing care, including stable rest with hand walking for one month, 15 to 20 minutes twice daily, and a small paddock for two months. Implementing preventive includes using a deworming program, providing a balanced diet of good-quality roughage and concentrates, providing ample access to clean water, avoiding sudden changes in management practices, and minimizing stress.

Conclusion:

Equine colic surgery requires a high level of skill and expertise. It is a complex and multifaceted endeavor so choosing a qualified and experienced equine surgeon would be paramount. Veterinary hospitals with specialized equine surgical facilities and a history of successful colic surgeries should be preferred. Prompt referral, early intervention, and appropriate surgical decision-making are paramount in achieving successful outcomes for horses undergoing colic surgery. While many horses recover well from colic surgery, long-term prognosis depends on various factors, including the initial cause of colic and the success of the surgical intervention.

Rehabilitation often involves a gradual return to normal activity, monitored exercise, and a carefully managed diet and water. Colic surgery can be a significant financial investment. Horse owners should be prepared for the costs associated with surgery, postoperative care, and potential complications. Overall, Equine colic surgery is a challenging but sometimes necessary option for horses experiencing severe abdominal pain. A thorough understanding of gastrointestinal anatomy and disorders, early detection, proper diagnosis, experienced surgical intervention, and diligent postoperative care are all crucial components for a successful outcome. By understanding and implementing these crucial factors, veterinary professionals can navigate the challenges of equine colic surgery with confidence, ultimately saving lives and preserving the bond between humans and horses. Consideration of the mentioned keynotes can lend a hand to equine surgeons to do colic surgery with a good prognosis.

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