

Post Castration Evisceration and Hemorrhage

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Castration is one of the most common surgical procedures performed in equine practice. Although an elective and routine procedure, surgical complications of castration constitute the most common cause of malpractice claims against equine practitioners. Evisceration through the vaginal ring and open scrotal incision is uncommon and potentially fatal. Evisceration generally occurs within 4 hours, but may occur up to 6 days after castration. Evisceration of the small intestine makes up 67% of cases while omental prolapse compromises the remainder. A survival rate of 85 to 100% can be expected where appropriate treatment is carried out.

Post-castration evisceration is always a risk following open castrations, but the risk is increased in certain breeds with large inguinal rings, or after castration of an adult stallion. Standardbreds, Tennessee Walking Horses and Belgians are at greater risk because they have larger inguinal rings. Other predisposing factors include a pre-existing undetected inguinal hernia, presence of visceral structures adjacent to the internal inguinal ring, and increased abdominal pressure after surgery. Palpation of the scrotum and inguinal structures for hernias prior to castration is recommended.

Evisceration of omentum or small intestine can occur and must be appropriately identified prior to treatment. The main objective is to clean and protect the intestine and return it to the abdomen before it is excessively traumatized or contaminated. Prior to the veterinarian's arrival it is important to instruct the owner to keep the horse quiet. The structure should be supported by a moistened towel in a sling fashion to support the eviscerated structure to avoid further stretching or damage. Examination will quickly reveal what structure is involved so that treatment can be initiated.

Excessive hemorrhage is usually the result of an emasculator that is improperly applied or is in imperfect working order. Reversing the emasculator by placing the cutting edge toward the abdomen usually results in severe hemorrhage because the cord is crushed distal to the site of transection. The emasculator should be applied perpendicular to the cord because transection of the cord other than at a right angle increases the diameter of the severed ends of the testicular vessels. The blade of the emasculator should not be so sharp that the testicular vessels are severed before they are crushed properly. A blade that is too sharp can be dulled by using it several times with a cotton rope.

The testicular vessels may be insufficiently crushed if scrotal skin is inadvertently included in the emasculator jaws. The thick cord of a mature stallion may require double emasculation to sufficiently crush the vessels. Using this technique, the parietal tunic and cremaster muscle are crushed and transected separately from the testicular vessels and ductus deferens.

TREATMENT

Omental Evisceration

Prolapse of the omentum through the scrotal incision after castration generally is not an immediate emergency but signals the possibility for potential evisceration. A rectal palpation should be performed to ensure that there is no associated small intestinal

involvement. Prolapse of the omentum through the inguinal ring can usually be managed using sedation and transecting the prolapsed omentum as far proximal as possible. In more severe cases a short-term general anesthetic is given. The omentum and scrotum are cleaned and prepped, and the omental segment is emasculated. The scrotum is packed with gauze and closed, and the horse is given systemic antibiotics. The packing can be removed after 2 days, and antibiotics are continued for 24 hours after removal of the pack.

Small Intestinal Evisceration

It is important to replace the intestine within the abdomen as soon as possible after evisceration. Delay in repair of the evisceration puts undue stress on the mesenteric vessels leading to avulsion of the mesenteric vessels, thrombosis, and further damage to the intestine proper. In the field the intestine should be lavaged and where possible placed back within the scrotum which is then sutured.

The horse should be anesthetized immediately to minimize contamination and damage to prolapsed intestine. Intravenous fluids and hypertonic saline should be administered to minimize hypotension. The intestine is copiously lavaged and examined for damage. If avulsion of mesenteric vessels or strangulation has occurred, requiring intestinal resection, the scrotum is sutured closed containing the intestine and the horse is referred to a surgical facility.

If the intestine is clean and appears healthy, it is replaced in the abdomen. To replace the intestine in the abdomen, the internal inguinal ring often must be dilated. Care must be made that the intestine is replaced within the abdomen through the inguinal canal, and not through a separate iatrogenic opening. If the herniation cannot be reduced confidently, or if there is avulsion of mesenteric vessels or strangulation requiring resection the intestine is replaced in the scrotum, packed with gauze and the horse is referred to a surgical facility. The horse is placed in dorsal recumbency under general anesthesia. A ventral midline celiotomy is used to expose the abdomen for the presence of further damage to the intestine and associated mesenteric structures. To replace the intestine into the abdomen, dilation of the vaginal ring and traction on the intestines through the abdominal incision are usually necessary. Devitalized intestine outside the abdomen is resected and healthy intestine anastomosed prior to replacing the intestine through the vaginal canal and into the abdomen. Lesions involving the ileum may require resection of the ileum and jejunocecostomy.

If the herniation can be reduced successfully, the fundus of the vaginal sac is identified if it has not been shredded during the initial castration or reduction of the prolapse. The fundus of the vaginal sac is ligated with absorbable suture and transfixed to the edge of the superficial inguinal ring. This procedure seals the exit of the intestine. The superficial inguinal ring is then closed with double absorbable suture in a continuous pattern. The superficial layers of the wound are left unsutured if the wound is grossly contaminated. Sterile gauze can be packed into the inguinal canal and scrotum rather than suturing the superficial inguinal ring. Care must be taken to avoid introducing gauze into the abdomen. A short segment of gauze is left exposed through the scrotal closure. . If the horse progresses well, the gauze packing can be removed in 48 hours, and the antibiotics discontinued 24 hours after removal of the packing. The deep inguinal ring should be palpated per rectum before the packing is removed to confirm that intestine is not adhered to the pack.

Broad spectrum antimicrobial therapy should be initiated, analgesic doses of flunixin meglumine (1 mg/kg IV) administered and the horse immediately referred to a surgical facility to be monitored closely for development of colic or ileus, indicating intestinal devitalization has occurred requiring immediate exploratory celiotomy

HEMORRHAGE

A ligature placed around the entire spermatic cord or around the testicular vessels can be used alone or in conjunction with an emasculator, to prevent hemorrhage. Although a ligature, with or without an emasculator may be more effective than the emasculator alone in preventing hemorrhage, the use of a ligature may increase the incidence of infection at the surgery site. The increase risk of infection associated with the use of a ligature is likely to be the result of reduced resistance of tissue contaminated with bacteria to infection in the presence of foreign material, especially if nonabsorbable suture is used.

Dripping of blood from the wound for several minutes after emasculation is expected and should cause no concern. Continuous streaming of blood for 15 to 30 minutes is abnormal and an indication for concern. The testicular artery is the usual source of severe hemorrhage. Because the testicular veins are valved, hemorrhage from these vessels is usually mild. Hemorrhage from scrotal vessels is usually not serious and soon ceases spontaneously. If the horse refuses to stand quietly for 15 to 30 minutes, hemorrhage does not diminish, the end of the cord can be grasped using fingers and stretched to allow application of a crushing forceps or an emasculator. A crushing forceps with curved jaws, such as a kidney clamp, is easier to apply and maintain in position than a strait forceps. If the horse is castrated while standing, the end of the cord is likely to be desensitized, and the forceps or emasculator can usually be applied without causing serious discomfort to the horse. The forceps is removed the next day. If the horse is castrated while recumbent, the cord is not desensitized, so to safely grasp and crush the end of the cord the horse may need to be reanaesthetized.

If the end of the cord is inaccessible through the scrotal incision, hemorrhage can be stopped by ligating the testicular vessels intra-abdominally using the procedure described for laparoscopic removal of an abdominal testis. Laparoscopic surgery to stop hemorrhage after castration can be performed with the horse standing or anesthetized and positioned in dorsal recumbency. The testicular artery can be coagulated using electrocoagulation, or occluded with a laparoscopic suture loop or vascular clip.

If the end of the cord is inaccessible, and if intra-abdominal ligation of the testicular vessels using laparoscopy is not an option, sterile gauze can be packed tightly into the inguinal canal and scrotum, the scrotum closed with sutures or towel clamps. The pack is removed the next day.

Ten percent formalin (1 part 37% formaldehyde and 9 parts water) has been used with questionable success to stop hemorrhage. In one study, 8-16 ml of a 4%-12% formaldehyde solution administered intravenously to average size horses decreased time of coagulation by 67% in 24 hours. However, another study demonstrated no variation in time of coagulation after intravenous administration of formaldehyde solution.

Formaldehyde solution is pyretogenic and accelerates pulse and respiration. Other side effects include restlessness, lacrimation, salivation, elevation of the tail, nasal discharge, increased peristalsis with frequent defecation, sweating, quivering of muscles, signs of severe abdominal pain and tenesmus. Physical reaction is minimal when 10 ml of 4% formaldehyde solution (i.e., 10% formalin) diluted in a liter or more of physiological saline administered intravenously. Although empirical evidence clearly demonstrates its clinical effect in decreasing hemorrhage minutes after administration convincing scientific evidence of the safety and efficacy of formaldehyde solution in reducing hemorrhage is lacking.

References:

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