

**Roo's Rude Awakening**

by

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## **Introduction:**

Castrations are one of the most common surgical procedures that are performed in the equine veterinarian field. Unlike small animal medicine, it is uncommon to keep a horse intact without the intention for purposeful breeding. Potential reasons that indicate castration in horses include aggressive behavior, increase risk of inguinal herniation, testicular neoplasia, or trauma. Even though castrations are a routine procedure, there are not without complications, reported complication rates range from 10.2% to 60% (Hodgson et al. 2018). These complications can be benign to life threatening. Depending on the technique, veterinary skills, animal age and size, post-operative care, and pre-existing complications morbidity and mortality can vary. Since this is one of the most common practiced surgery, it is vital that veterinarians understand the importance of castration complications, how to reduce and treat them.

## **History and Presentation:**

A Selle Francais 2-year old stallion presented to MSU-CVM Equine Medicine and Surgery Department for an elective castration and a pre-purchase exam. The owner reported no other problems at home and has no other concerns.

On initial presentation, physical examination was unremarkable. He weighed 1105 lbs (491 kg) with a body condition score of 5/9 (5 being ideal). His vital parameters were normal with a heart rate of 36 beats per minute, a respiratory rate of 20 breaths per minute, and a rectal temperature of 100.0 degrees Fahrenheit. His oral mucous membranes were pink and moist with a capillary refill time of less than two seconds. No murmurs or arrhythmias were heard on auscultation, and he had normal bronchovesicular sounds with no crackles or wheezes appreciated. He had normal gastrointestinal motility in all four abdominal quadrants and normal

digital pulses were appreciated on all limbs. All palpable lymph nodes were soft and symmetrical. No nasal drainage was noted on presentation from either nostril. There were two distended testicles in the scrotum that were soft and symmetrical, there were no abnormalities noted. The remainder of his physical examination was within normal limits.

Elective castration was selected for him since the owner did not want a stallion on her farm with the mares and they did not want to market a stallion for sale.

### **Surgical Approach:**

There are multiple different approaches and techniques to equine castration. The selection depends on the environment/facility, veterinary experience and preference, owner expectations, and horse size and predispositions. Castrations can be performed while standing or while in dorsal/lateral recumbency. Unlike a standing procedure that is performed under sedation and local block, horses can alternatively be placed in lateral or dorsal recumbency under general anesthesia. Open, closed, and semi-open technique can be performed while standing or under general anesthesia. The listed procedures can be performed in the field, stall, or a surgery suit. When selecting a technique, it heavily depends on the veterinarian's preference. No technique has significantly lower morbidity or mortality.

Regardless of the method of castration all stallions should have their surgical field prepared by using a dilute iodine or chlorhexidine, followed by intratesticular anesthesia, then aseptically prepared. The recumbent patient should be draped with sterile towels/drapes. All castration methods will require two incisions parallel to the median raphe (approximately 2cm apart and 8-10cm long) (Auer, 1992) with a scalpel. The incisions are incised through the tunica cartos, scrotal fascia, and with the open and semi-closed technique the parietal tunic as well.

Standing castration requires less expense and time, the horse does not undergo general anesthesia, so you do not have to wait for it to recover nor do you have the risk of a catastrophic injury while standing during recovery. Standing castrations are performed under sedation and a nose twitch can be applied to help aid to facilitate restraint. However, standing castrations can be dangerous if the horse isn't sedated/locally anesthetized enough or if this candidate isn't prudently selected. There is a significant increase in risk to veterinarians in standing castrations. Stallions that are anxious or have aggressive behaviors should not be castrated while standing. Horses with poorly developed testicles or small horses/ponies can be functionally more difficult to castrate standing due to the position the veterinarian must put themselves in to exteriorize the testicles.

Closed technique is when the incision is discontinued after the scrotal fascia and the parietal tunic is intact. With this procedure the parietal tunic is removed with the testicle and the spermatic cord. While performing semi-closed technique the incision extends through the parietal tunic, thus, to visualize the testicle and ensure that there isn't intestinal contents involved. However, the emasculator involves the parietal tunic, and it is removed with the testicle similarly to the closed technique. The approach to the open technique is made after and incising through the tunica dartos, scrotal fascia it is continued into the parietal tunic. The ligament of the rail of the epididymis that attaches the parietal tunic to the epididymis is bluntly transected and the testicle is stripped and completely freed from the parietal tunic. The emasculators do not involve any part of the parietal tunic and left inside the body. For each technique emasculators are used to apply crushing, cutting, and hemostasis. There are multiple different emasculators, however each work in a similar way and have the same result. The emasculators should be applied with the cutting edge toward the testicle, this way the cutting

edge is more distal to the hemostatic crushing edge. When correctly applied the nut of the emasculators will be facing the testicle. They are placed on the spermatic cord, and depending on the technique chosen, will also involve the cremaster muscle and parietal tunic. Ensure the emasculators do not involve any of the scrotal skin or any unnecessary tissue or fat that may be in or around the spermatic cord. The emasculators are then clamped for a minimum of 15-60 seconds (Auer, 1992) to insure hemostasis.

When selecting the appropriate technique for your patient it is important to evaluate the advantages and disadvantages of each technique. The advantages of removing the parietal tunic are that it does decrease the instance of a post-operative hydrocele and scirrhous cord (Auer, Schumacher 1996). In contrast, the open technique requires less dissection in larger horses and may decrease surgery time. It also allows to use ligature if there was inguinal herniation. Semi-closed castrations have been associated with increased complications (Kilcoyne et al. 2013). Moll et al. also found that semi-closed castrations have a higher occurrence of infection, edema and hemorrhage when compared to open and closed. It is suspected that the reasoning is increased tissue handling and contamination due to the increased duration of surgery.

Most castrations are left to close by second intention. This allows the incision to drain. However, some are primarily closed with a scrotal ablation as such was done in this case. This is a cosmetic procedure as the excess scrotum is removed. When primary closed the post-operative care is less intensive for the owner because post-operative exercise is not necessary, due to the closed dead space and incision.

The surgical approach and technique that was chosen for this case was an open castration with ligated spermatic cords that was primarily closed. A catheter was aseptically placed in left jugular vein. He was premedicated with xylazine (0.04mg/kg), butorphanol (0.01mg/kg)

intravenously, Procaine Penicillin G (24,000 u/kg) intramuscularly, Flunixin meglumine (1.1 mg/kg) IV and Gentamicin (6.6 mg/kg) intravenously. Once sedated he was dropped with Ketamine (2.6mg/kg) and Midazolam (0.06mg/kg) intravenously. He was placed in dorsal recumbency. He was started on GKX intravenously (5 drops/second). The scrotal area was aseptically prepped with 4% Chlorhexidine solution. A bilateral intra-testicular block was performed 10 mls of lidocaine in each testicle. The scrotal area was then prepped again with 4% Chlorhexidine. A 5 cm scrotal incision was made on the left side of the scrotum with a #10 scalpel blade. GKX was discontinued and the patient was started on inhalant due to desired anesthetic depth. The left testicle was then digitally grasped and stripped of inguinal fascia using sterile gauze. Crile hemostats were used to clamp down on the spermatic cord proximally. Serra emasculators were placed distal to the hemostats and the spermatic cord was crushed. They were kept on the cord until the spermatic cord was ligated (over 60 seconds). Using 2-0 Vicryl, the spermatic cord was ligated using the transfixation technique in the area of the 1st hemostat and one more transfixation ligature was placed distal to the first ligature. The Serra emasculators were removed, and controlled release was used to bring the stump back into the vaginal ring after determining appropriate hemostasis. Another 5cm scrotal incision was made over the right testicle. The testicle was pushed out of the scrotum and sterile gauze used to strip the spermatic cord of scrotal fascia. The procedure for removal of the left testicle was the same as was performed on the right. After removal and determination of hemostasis, the incisional sites were closed using a simple continuous pattern with 2 PDS. The patient recovered from anesthesia without any complications.

The patient was discharged after on a broad spectrum antibiotic, Uniprim (30mg/kg) by mouth Q12 for 4 days and Flunixin Meglumine (1.1mg/kg) by mouth Q12 for 3 days. The owner

was instructed to keep the patient confined to a stall during the first 2 days with 10-15 minutes hand walks. After 2 weeks post stall confinement the patient was allowed to be in a small turnout or paddock for 2 weeks. Following the small pen, the patient could return to normal exercise and turn out. The owner was to monitor the patient for any swelling or drainage and to keep him away from any mares due to residual semen.

### **Complications:**

Ten days post-operation the patient was admitted through emergency for scrotal swelling. Upon presentation, he was bright, alert, and responsive. His vital parameters were within normal limits with a temperature of 100.3 Fahrenheit, heart rate of 36 beats per minute, and respiratory rate of 14 breaths per minute. He had a capillary refill time of less than 2 seconds with pink and moist mucous membranes. His heart and lungs auscultate normally. He had normal digital pulses and GI motility. He had a large amount of swelling in his left scrotal area. There was no drainage or discharge from the incision. From a non-sedated exam, the incision appears to be healed and the scrotum is soft. The remainder of the physical exam was within normal limits.

The patient was sedated with butorphanol (0.01mg/kg) and detomidine (0.01mg/kg) intravenously for closer examination of the scrotal swelling. The swelling was digitally palpated to determine if it could be reduced into the abdomen. The swelling was soft and was easily manipulated. It was 8x8 cm that spanned from his original incision site to the caudal aspect of his sheath on the left. The swelling could not be reduced into the abdomen, but it was noted that it did track proximally toward the inguinal ring. An ultrasound was performed on the left side of his scrotum. Anechoic circular areas with hyperechoic capsules were visualized on ultrasound. These findings were consistent with an abscess or seroma. Buscopan (0.25mg/kg) was administered IV for smooth muscle relaxation in preparation for rectal palpation. Rectal palpation

was performed to evaluate if the swelling communicated with the abdomen and if the inguinal rings could be palpated. There was no swelling dorsal to the inguinal rings inside the abdominal cavity that could be appreciated. However, due to the patient's size it may have been too deep to palpate. The swelling was sterilely prepared with chlorhexidine and alcohol. An area around the proposed incision site was infiltrated with 20ml of local anesthetic (mepivacaine). A 16 gauge, 1.5 inch needle was introduced with ultrasound guidance in the most dependent fluid pocket. A significant amount of serosanguinous fluid was draining from the needle. A #10 scalpel blade was then used to make a small stab incision that was extended cranially and caudally for a total length of 4cm. Digital palpation was used to break down the septa within the fluid pocket and allow for better drainage. The pocket was lavaged with a diluted betadine in 1L of irrigation saline using a 60cc syringe.

The patient was discharged that night with an excellent prognosis since the serum did not look of infectious nature. He was discharged with Uniprim (30mg/kg) for an additional 4 days and Flunixin Meglumine (1.1mg/kg) for an additional 3 days. Since the seroma was left open to drained, it is pivotal that the patient now must be exercised 10-15 minutes a day at a trot to ensure that the incision stays open and drains. Cold hosing the scrotum was also recommended to reduce swelling.

### **Pathophysiology:**

Post-castration complications are common however, mortality is rare. In a recent study in 2013 (Kilcoyne et al. 2013) reported the overall complication rate of routine castrations in 324 equids to be 10.2% with a 0.3% mortality rate, a prospective study showed that there was a complication rate of 11.2% but most of the post-operative complications were mild and severe complications were rare (Hodgson et al. 2018). Complications of castrations include scrotal



swelling, edema, hemorrhage, omental herniation, evisceration, penile trauma, scirrhous cord, incisional infections, hydrocele formation, and peritonitis (Thomas et al. 1998; Shoemaker et al 2004). The most common from the listed above are excessive swelling, hemorrhage, infection and eventration (Moll et al. 1995). In the same review semi-closed had the highest prevalence of excessive hemorrhage, edema, and infection, followed by open, and closed had the lowest incidence. Even though one may think the open technique may have the highest rate of complications due to the fact you are leaving the parietal tunic, however it has been hypothesized that the increased time, and tissue handling in the semi-closed technique increases the post-operative complications. A survey by equine practitioners resulted in a significant rate of infection when using ligature (13.5%) compared to no ligature (2.8%) (Moll et al. 1995).

Conditions that may increase incidences of post-operative complications is increased age (May and Moll 2002), however, in another study performed by Kilcoyne there was no significant difference with age. It has been shown that NSAIDs (phenylbutazone) have the same analgesic effects than the use of butorphanol peri-operative and post-operative in young stallions (Sanz et al. 2009), and the combination of the drugs were not superior to the use of them alone.

Post-operative swelling and seroma formation is common following castration, it is most seen 4-5 days post-operation (Hunt 1991). Seroma formation can be attributed to a lack in exercise post-operative, but in this patient's case the incision was closed so exercise is typically not warranted. Treatment with NSAIDs such as Flunixin Meglumine will help decrease the swelling and increase willingness to exercise. Since the seroma formation in this case was sterile, it was the most appropriate treatment to incise and drain the fluid. Digital manipulation of the adhesions will aid in the drainage. Since the castration went from a closed incision to an open

scrotal incision to aid in drainage it is now indicated the patient be exercised, given NSAIDs, systemic antibiotics and cold hose the scrotal area.

### **Discussion:**

Multiple studies have shown that one of the most common practiced equine surgeries is castrations. Even with varied reported complication rates in multiple studies, the consistent finding was the serious complications were rare. The inconsistency in the post-complication rates may be due to the fact many horses are castrated and not closely observed, especially routine castrations in young stallions. The benefits of castration far outweigh the risk of post-operative complications and should still be practiced. The approach, technique and after care should be selected on an individual bases taking in consideration the clinician's experience, client expectations, cost implications, facilities and support available.

### **Case Outcome:**

The patient made a full recovery. After the scrotal drainage in combination with anti-inflammatories and exercise the scrotal swelling significantly decreased.

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