

Equine Castration

Terminology: castration, orchiectomy, emasculation, gelding, cutting.

Equine Castration Overview:

- 'Castration' is the surgical removal of the testes. In horses, this is often performed as young colts (1 – 2 years of age).
- Indication is almost always the reduction of masculine behaviour in males not intended for future breeding. Other rare indications include testicular neoplasia, inguinal herniation, or testicular trauma.

Anatomy:

- Scrotum:
 - o Diverticulum of skin, divided on midline by medial raphe
- Testicle & Epididymis:
 - o Oval, lie on horizontal axis, covered by tunica albuginea, weigh ~150 to 300 grams
- Inguinal Canal:
 - o Oblique passage through abdominal wall, superficial and deep inguinal rings, about 15cm in length
- Tunic Vaginalis:
 - o Also known as the "common" vaginal tunic.
 - o Composed of parietal and visceral tunics.
 - Visceral tunic adhered to tunica albuginea/testes.
 - Parietal tunic continuous with parietal peritoneum of abdomen.
 - Abdominal fluid in vaginal space
- Spermatic Cord:
 - o Composed of tunic vaginalis, testicular artery & vein, ductus deferens, lymphatics, testicular nerve
 - o Cremaster muscle and genitofemoral nerve lie external to parietal tunic

Preoperative considerations:

- Palpate both testicles to ensure they have descended normally into the scrotum prior to surgery
- Ensure no systemic illness present
 - o Any indication of nasal discharge, diarrhoea, fever, etc. should be treated. Castration is

an elective procedure.

- Tetanus prophylaxis up-to-date
- NSAID administration for anti-inflammatory and analgesic effect
 - o Phenylbutazone (2.2mg/kg PO or IV)
 - o Flunixin meglumine (1.1mg/kg PO or IV)
- Antibiotics
 - o Usually a pre-operative dose, less commonly post-operatively
 - o Consider environment, potential for contamination, etc.
 - o Penicillin (22,000iu/kg IM [most often procaine formulation])
 - o Gram positive activity for skin flora
 - o Ceftiofur (2.2mg/kg IV or IM) occasionally used
- Supplies o Instrument pack, sterile gloves, scrub, emasculators, suture, ropes, towels, +/- IV catheter

Restraint:

1. Standing & Sedated

- Less expensive, less assistance, and often quicker
- Norm in certain environments (backstretch/racehorses, Europe)
- Dangerous
 - o Select candidates appropriately
 - o Avoid mules, donkeys, small ponies/horses
 - o Stallions that display temperamental behaviour during pre- operative testicular palpation are less than ideal candidates.
- Sedation
 - o Alpha-2 agonist
 - Xylazine (0.2 – 0.8mg/kg IV [suggest higher end of dose])
 - Romifidine (0.1mg/kg IV)
 - Detomidine (5 - 40µg/kg IV)
 - o Opioid
 - Butorphanol (0.01-0.1mg/kg IV)
- Locally infiltrate either spermatic cord or testicle with lidocaine/mepivacaine (approximately 25cc)
- If right handed surgeon, approach scrotum from left side of horse. Position body against horse shoulder, keep head up by the flank, and use reach of arms.

2. Recumbent & Anesthetized



- Choose a clean, open area that allows for horse & human safety (i.e., grass lawn or sand arena)
- Anaesthetic Protocol
 - o Alpha 2 agonist sedative
 - Most commonly xylazine (1.1mg/kg IV [higher end of dose])
 - o Intravenous anaesthetic
 - Ketamine (2mg/kg IV)
 - o +/- Benzodiazepine □ Diazepam (0.05-0.44mg/kg IV)
 - o Often can be achieved with one single dose of ketamine/diazepam. However, occasionally need to top-up ketamine if movement noted or longer duration of surgery.
 - Helps to have technician/assistant at head of horse
 - Top-up doses are usually ½ of the volume of induction dose of both xylazine and ketamine
 - o If anticipate a difficult or prolonged procedure, can utilize ‘triple drip’
 - Xylazine, ketamine, guaifenesin mixture
- Recumbancy
 - o Left lateral recumbancy (for right handed surgeon)
 - o Dorsal recumbancy
 - o Tie the limbs
 - Stand behind the patient. Raise the upper leg (the patient’s right leg)
 - Stand so that you are in contact with the leg so that if the patient moves you will be pushed, not kicked
 - Place the noose around the pastern.
 - Figure eight twice around the hock ending at the pastern.
 - Place a half hitch at the pastern.
 - Step back from the patient
 - Pass the rope behind yourself.

- Sit back on the rope, allowing your weight to do the work
- DO NOT TIE THE ROPE AROUND YOURSELF.
- The rope should lie smooth and flat on the leg.
- A ¾ “rope of adequate length (15-20 feet) is the rope of choice for adult horses.
- A 5/8” rope 12-15 feet long is more suitable for minis, ponies, foals and/or burros.

Scrub:

- Place bucket behind patients' leg. The bucket should contain

- a. 1/3 to ½ full of water
- b. Disinfectant
 - Strong tea coloured if using betadine
 - 3 ounces per gallon if using nolvasan
- c. Practical/ pound cotton torn
- d. Spray or squeeze bottle of scrub floating in the bucket

ALWAYS RETURN SCRUB TO BUCKET AFTER USE, NEVER SET DOWN ON GROUND

- Place your body against the inside of the leg so that the foot is beside your shoulder

- Squirt or spray the scrotum with scrub

Remove a handful of cotton from the bucket, squeeze ½ of the water from it, and scrub the scrotum thoroughly

- For hernias or cryptorchids us a prep sponge

DO NOT PLACE USED SPONGES INTO THE CLEAN WATER BUCKET

- Rinse with clean water from the prep bucket

Block:

To increase exposure, minimize stimulation caused by manipulating the testi and stripping the cord, and paralyze the cremaster and tunic muscles. Increased exposure and muscle paralysis are also useful in the case of post-operative bleeding.

- Use a 35 cc syringe filled with block (cabocaine or lidocaine) and an 18 gauge needle

- Inject 10 mls block into the each spermatic cord. Isolate and grasp the spermatic cord firmly. Insert the needle where the cord rolls over your thumb and index finger, aspirate to insure you're not in a vessel, and inject 10 ml carbocaine into each cord. To work your needle MUST be in the cord. The block will not migrate across the tunic.

or

- Inject directly into the centre of each testis until you feel them become turgid (full). This is easier to learn, but takes more time and anaesthetic, as it must migrate up the cord. If the team is efficient, the castration may be completed before the anaesthetic has taken effect

- Slide the needle under the skin and inject 5-7 mls of block where you plan to incise

- Replace the needle on the carbocaine syringe and refill

NEVER SET A SYRINGE DOWN WITHOUT A NEEDLE!! Once you do the syringe must be considered contaminated and discarded. Do not remove the needle unless you are holding the replacement needle and are ready to place it



Injecting the Cord



Injecting the Testis



Injecting under the Skin

Surgical Techniques:

1. Open

- Scrotum and parietal tunic are incised
- Minimum 10cm in length, parallel to median raphe (2-3cm away)
- Ligament of tail of epididymis (attaching parietal tunic to epididymis) is severed or bluntly dissected
- Transection of mesorchium and mesofuniculum allow testicle, epididymis, and distal aspect of spermatic cord to be exteriorized.
- +/- Ligation of the testicular artery, vein (optional)
 - o Suture: #0 to #2, absorbable (such as Vicryl or PDS)
 - o Miller's knot or trans-fixation suture placed around entire spermatic cord; or ligature placed directly around individual vessels
 - o Ensures excellent haemostasis however can contribute to infection of spermatic cord post-operatively
- Emasculators
 - o "Nut to Nut"



- o Held clamped for minimum of 1 minute
- o Anecdotal rule of '1 minute per age year of horse' often used
- o Serra, Whites- Cut & crush at same time

- o Reimer – Crush only, need to cut manually with scalpel
- Leaves parietal tunic tissue behind, can contribute to infection
- Technically creating a communication with the abdomen

<http://www.r-vets.org/Castration-Basics.html>

2. Closed

- Main difference from open is the parietal tunic is not incised
- Parietal tunic is removed with the testicle after emasculation
- Scrotal incision is made, followed by digital manipulation to dissect free the parietal tunic from the scrotal fascia
 - o “Stripping”
 - o Put traction on the testicle
 - o Push fascia proximally up the spermatic cord
 - o Often use 4x4 sterile gauze to assist with this



- Emasculate
 - o In older horses, the cremaster muscle is often bluntly dissected away from parietal tunic. The cremaster muscle and parietal tunic are then emasculated separately. This ensures an appropriate amount of tissue is crushed at one time.
- Some descriptions include closure of remaining parietal tunic following emasculation, via simple continuous suture or Miller’s knot placement, to decrease risk of herniation and evisceration.
- Closed technique is least prone to infection

3. Semi-Closed or Half-Closed

- Modification of the closed technique.
- A small incision is made in the parietal tunic (~2cm) just proximal to the testicle. The testicle is then pushed through the small incision and the tunic is everted.
- The everted tunic is used to facilitate finger placement to aide in retraction of the testicle.
- The parietal tunic is removed with the testicular tissue (hence the name ‘semi-closed’ not ‘semi-open’).

4. Scrotal healing

- Secondary intention healing

- o Most common method

- o Common practice to 'stretch' the incisions to help post-operative drainage

- o Some surgeons stress the importance of only stretching the deeper scrotal fascia, since digital stretching of the skin can be associated with localized trauma and reflex contraction of skin margins.

- o Ensure any excess scrotal fascia remaining is trimmed

- Primary closure

- o Can be used if castration performed in sterile, operating room environment and adequate haemostasis was maintained during surgery

- o Has been shown to decrease post-operative complications compared to leaving incisions open, if done in the right environment with sterile technique (Mason 2005)

- o Absorbable sutures

 - Monocryl, PDS

 - #2-0 to #0

- o Performing castration under surgical operating room conditions (as opposed to field or recovery box) incurs increased costs (\$).

Other: - It is common at time of castration for veterinarians to remove wolf teeth (deciduous 505, 605) if present while horse is anesthetized.

Post-operative Recommendations:

- Open Scrotal Incision:

- o Restricted activity for 24 hours, followed by daily exercise (lunging at the trot 10 to 20 minutes/day for 3 weeks) to decrease oedema formation and promote drainage.

- o Can consider daily hydrotherapy to aide in control of swelling

- o Incisions will heal in 2-3 weeks

- Closed Scrotal Incision:

- o Confined horse to stall rest for two weeks while scrotum heals

- o Monitor scrotum closely for signs of swelling, pain, inflammation, drainage

- Isolate the gelding from mares for at least 2-3 days after castration. After 2 days, ejaculates are highly unlikely to contain sufficient spermatozoa to cause impregnation.

Complications:

1. Haemorrhage - Emasculator improperly applied (not 'nut-to-nut') or in poor working condition

- o Right angle application

- o Serra vs. Reimer emasculators

- o Thicker cords

- Testicular artery

o Some dripping of blood after surgery is expected. Scrotal vessels will vasoconstrict and coagulate following transection. Testicular artery is a much larger vessel and requires facilitated haemostasis (i.e., crushing with emasculators, ligature placed, etc.)

o Streaming of blood or constant dripping of blood past 30 minutes post-operatively cause for concern.

- Treatment

o If dripping blood (not streaming) observe closely for 20 – 30 minutes. May stop with time.

o If cord was previously anesthetized with lidocaine, it can be grasped while horse is standing and clamped with haemostat or re-emasculated.

o If cord is inaccessible can pack the scrotum with sterile gauze and hold in place with towel clamps. Remove pack in 24 hours.

o If blood stream is pronounced or other methods fail with time, anesthetize the horse, find the bleeding vessel, and ligate.

o Legal consideration: Do not leave bleeding horse unattended / leave farm for owner to „watch“. If you can't stay on-farm, refer horse to hospital for observation/management.

2. Evisceration

- Uncommon prolapse of intestinal or omental contents through inguinal canal and out of scrotal incision.

- Standard bred and draft horses may be predisposed due to congenital inguinal hernias.

- Usually occur within 1-12 hours following castration.

- Intestinal contents must be protected / replaced back into abdomen ASAP

. Referral to hospital situation.

- Prolapsed omentum can be emasculated close to the body wall.

- Strangulation of intestine or septic peritonitis a potential sequel

3. Oedema

- Normal response to local inflammation following castration. Very common and most pronounced day 3-4 post-op.

- Causes significant discomfort in horse

- Exercise and hydrotherapy for excessive cases.

- Ensure adequate drainage from scrotal incisions. Consider reopening scrotal skin & fascia if necessary.

4. Septic Funiculitis

- Infection of spermatic cord, usually subsequent to improper drainage.

- Open method of castration leaves tunic tissue behind, more predisposed to development of funiculitis. - Antibiotics, drainage, occasionally surgical excision

o Champignon: Streptococcus infection

o Scirrhus cord: Staphylococcus infection

5. Clostridial Infection

- Paralytics
 - o Clostridium tetani: Spastic paralysis
 - o Clostridium botulinum: Flaccid paralysis
- Tissue necrosis, cellulitis, fever, depression, toxemia, death ('Malignant Oedema')
 - o Clostridium: septicum, perfringens, chavoei, fallax
- Poor prognosis, even with appropriate treatment

6. Septic Peritonitis

- Subclinical, non-septic peritonitis always present following castration due to normal communication between abdominal cavity and vaginal cavity of scrotum.
- Septic peritonitis requires aggressive NSAIDs, antimicrobials, peritoneal lavage (referral situation).

7. Penile Damage

- Inadvertent emasculation of penile tissue
- Excessive oedema, develop paraphimosis
- Know your anatomy so you don't make a mistake

8. Hydrocele

- Fluid filled, painless swelling in scrotum from abdominal fluid that collects in the vaginal cavity
- Associated with open castration technique
- No treatment necessary unless cosmetics a concern. Abdominal fluid can often be reduced back into peritoneal cavity.
- Drainage doesn't help, more abdominal fluid will accumulate. If treatment is elected, need to remove remaining parietal tunic.

9. Continued Masculine Behaviour

- 'Proud Cut'
- Behaviour is often learnt, and older animals undergoing castration may retain masculine behaviour following procedure. Inform owners.

Cryptorchidism:

- Anomaly wherein one or both testicles have failed to descend normally into the scrotum.
- Either retained in abdominal cavity or within inguinal canal
 - o Left testicle more commonly in abdomen
 - o Right testicle more commonly in inguinal canal
- Retained testicles do not produce functional sperm (elevated temperature) but do produce testosterone.
- Considered an inherited trait
- Diagnosis from palpation, ultrasound, exploratory surgery, laparoscopy, hormone assays

- Do not remove a descended testicle if the other testicle cannot be located. Remove the retained testicle first or leave descended testicle intact prior to referral.
- Surgical removal includes inguinal, parainguinal, flank, or laparoscopic approach depending on location of retained testi(s).

Conclusion:

- Understand the anatomy, know your basic surgical principles, and evaluate the unique factors present (specie, purpose of animal, animal temperament, surgical environment, owner expectations, owner budget etc.)
- Recognize potential complications from castration and know how to manage them appropriately.
- There is no “one right way” to perform castration -the right way is to know every way and apply the appropriate technique to the individual / situation.

LARGE ANIMAL ORCHIECTOMY
“Castration Techniques & Considerations”
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