

## **OPEN-OPEN METHOD OF CASTRATION WITH COMPARISON TO NON-SUTURING AND SUTURING OF THE SCROTAL WOUND: A REPORT OF 12 CASES**

**D.V. Vaghela\*, P.H. Tank, J.V. Vadalia, P.G. Dodiya, V.D. Dodia and M.D. Khatariya**

Department of Veterinary Surgery & Radiology,  
College of Veterinary Science & A.H.

Junagadh Agricultural University, Junagadh-362 001

E-mail: dhaval.vaghela1@gmail.com (\*Corresponding Author)

**Abstract:** Twelve clinically healthy horses were randomly divided into two groups, Group I- Open-open method of castration followed by skin suturing (n-6) and Group II- open-open method of castration without skin suturing (n-6). Minimum post-operative complications and early healing was observed in the horses belonging to group I as compare to group II.

**Keywords:** Castration, Open method, Swelling, Wound healing.

### **Introduction**

Castration is one of the most common surgical procedures performed by equine veterinarians. Several techniques have been described for castration like open method, close method, semi-close method, section-ligation release (SLR) technique *etc.* These are performed with the horse either standing or under general anesthesia. The two most common techniques are either a closed or an open technique performed through two scrotal incisions made on either side of the median raphe (James *et. al.*, 2008). After the testicles are removed, the incisions are manually enlarged to facilitate drainage and prevent seroma formation or excessive swelling. The horse should be placed in a controlled exercise program after castration for a week to reduce swelling (Saifzadeh *et al.*, 2008).

Complications that can arise following surgical castration include scrotal swelling or oedema, excessive post-operative haemorrhage, infection, hydrocele, schirrous cord, peritonitis, penile trauma, omental herniation and eventration (Railton, 1999). Evisceration typically occurs within the first 4 h of castration (Hunt and Boles, 1989), although intestinal eviceration has been reported up to 6 days after surgery (Boussauw and Wilderjans, 1996).

Obligate wound healing by second intention is common to many techniques for castrating horses. Castration sites need to heal from the inside out. If the outside skin heals first, serum and blood can accumulate in a pocket and the site will become infected. To overcome

complications that accompany traditional castration techniques researchers have experimented with primary closure of the castration wound to attain first intention healing.

## **Materials & Methods**

### **Pre-Operative Preparation**

All the horses were administered perioperative Tetanus toxoid and Fenbendazole (3gm p.o.) as deworming just before 24 prior to surgery. All the horses were premedicated with phenylbutazone (2.5 mg/kg PO) as analgesic and Benzylpenicilline (12000 IU/kg) + Gentamicin (6 mg/kg) combination as antibiotic just 30 minutes prior to surgery.

All the horses were pre-surgically evaluated by various physiological parameter like Heart rate, Respiration rate, Pulse rate, Mucous membrane color. Various hematological parameters were also evaluated like CBC, BUN, Creatinine, AST, ALT.

### **Anesthesia & Restrain**

For all the horses, feed was withheld for 24 hours and water for 12 hours prior to anaesthetic induction. All the horses were premedicated with Xylazine (1.1 mg/kg body weight) i.v. After complete sedation was achieved, Approximately, seven minute after administration of preanaesthetic; the anaesthesia was induced by Ketamine hydrochloride (2.2 mg/kg body weight) i.v., to the effect. Horse was restrained by the sideline technique. If adequate sedation was not achieved after Xylazine then Diazepam (0.033 mg/kg body weight) i.v., was given in addition to Ketamine hydrochloride. The spermatic cords were desensitized by directly injecting Lignocaine hydrochloride, to block the spermatic nerve. Maintenance of anaesthesia was done by using Xylazine (0.5 mg/kg) and Ketamine hydrochloride (1.0 mg/kg) combination approximately 20 minute after initial dosages.

### **Surgical technique:**

Horses were anesthetized and placed in dorsal recumbency. After routine aseptic skin preparation and sterile draping of the patient, An incision was made through the scrotal skin, tunica dartos, scrotal fascia and parietal tunic parallel to the median raphe, approximately 2 cm apart and 8 to 10 cm long (fig. 1). The testis was prolapsed out of the tunic but remained attached to the parietal tunic by the ligament of the epididymis (fig. 2). This ligament was transected to release the parietal tunic and cremaster muscle so as to expose the vessels and ductus deferens which was then clamped and transfixed using Catgut No. 2 (fig. 3). Fascia around the parietal tunic was digitally stripped as proximal as possible so as to facilitate easy clamping and removal. This was easily achieved by pulling the parietal tunic alone (not the parietal tunic and testicle together) distally with an Allis tissue forceps. The fascia was

stripped proximally using gauze swab. Alternatively, the parietal tunic, the cremaster muscle, the vessels and the ductus deferens could all be clamped and ligated together. In all cases, spermatic cord was incised 2 cm below the ligature and testes were removed distal to the ligature (fig. 4). Similar procedure was followed for contralateral testicle.

After removal of the testes, In Group-I (n=6), scrotal skin was closed by the horizontal mattress suture technique using nonabsorbable surgical suture material (fig. 5) while in rest of the six horses belonging to Group II, a sterile gauze was kept inside the scrotal sacs and kept open without suture (fig. 6).

### **Postoperative care**

The surgical wound was cleaned with Povidone iodine solution. Inj. Phenylbutazone was administered at the dose rate of 2.5 mg per kg body weight for 5 days, i.m., s.i.d., Inj. Benzylpenicilline was administered daily for 5 days at the dose rate of 12000 IU/kg, i.v., once daily and Inj. Gentamicin was administered daily for 5 days at the dose rate of 6 mg per kg body weight, i.v., once daily. The skin sutures were removed between 10th to 15th postoperative day based on wound healing. In case of open wound, daily antiseptic dressing was carried out by using 5 % povidone iodine solution until healing.

### **Result & Discussion:**

All the six horses of group I were castrated by open-open method of castration followed by skin suture at the age ranging from 1.5 to 5 years with a mean age of  $2.18 \pm 0.61$  years. The horses weighed 325 to 480 kg with a mean body weight of  $380 \pm 25.16$  kg. Mishra and Rathore (1986) performed mass castration of horses at the age of 2 to 2.5 years and mules at the age of 1 to 1.5 year. Ragle and Hawlett (1998) castrated 6 horses at the age of 1 to 5 years. Vadalía *et al.* (2012) performed castration in 18 horses by open method followed by scrotal ablation with the age ranging from 3 to 7 years and body weight ranging from 250-500 kg. This group include 4 Kathiawadi, 1 Marwadi and 1 Thoroughbred horses.

Complete wound healing required an average of 12 to 14 days in all the horses group. Postoperative swelling was seen most commonly. Similar observation was also reported by Cox (1984). Whereas, Singh *et al.* (1994), Mishra and Rathore (1986), Marntell *et al.* (2006) and Vadalía *et al.* (2012) claimed recovery of all the animals without any complications. In the present study, scrotal sac abscess and fever was observed in a horse. Break in asepsis, suture infection and failure of antibiotic might have predisposed the retrograde infection to enter the scrotal pouch through open tunics which might have led to fever. Closure of skin prevents drainage and facilitates systemic invasion of infection. It is, hence, fact that strict

asepsis, effective antibiotic coverage and prompts postoperative monitoring are some of the essential criteria for closure of wound. Otherwise, if noticed in time, the skin sutures should be removed immediately to establish local drainage and also to facilitate localization of complications.

All the six horses of group II were castrated by open-open method of castration without skin suture at the age ranging from 1.5 to 8 years with a mean age of  $4.1 \pm 1.25$  years. The horses weighed 320 to 530 kg with a mean body weight of  $410 \pm 30.52$  kg. Taylor *et al.* (1998) reported castration in sixteen yearling pony colts; weighing 100- 425 kg (mean body weight 183 kg). Vadalia *et al.* (2012) performed castration in 7 horses at the age of 2 to 7 years. This group included 4 Kathiawadi and 2 thoroughbred horses.

In all the horses of group II, postoperative clinical evaluation was carried out till the wound healing was complete. Complete wound healing required approximately 12-17 days in different horses of this group. Postoperative swelling was seen most commonly. Most of the horses recovered without any complications. When conventional castration technique is followed, the healing occurs by second intention, a process that is necessarily characterized by oedema, soreness, and secondary infections (Cox, 1984). Though, exact clinical correlation of these complications could not be established with any specific reason relevant to the method of castration, the open surgical wound for longer period might predispose the site for retrograde entry of the infection (Schumacher, 1992).

### **Post-operative observations**

#### **Swelling:**

The horses of both the groups, mild to moderate degree swelling was observed on 2<sup>nd</sup> postoperative day in 11 horses out of the 12 horses. In Group I, 5 horses (83.33 %) showed moderate degree of swelling out of the 6 horses while in group II, all the six horses showed moderate degree of swelling (fig. 7). Postoperative moderate swelling might be due to the open tunica vaginalis in both the groups. Moderate swelling was more seen in group I. Suturing of the scrotal wound lead to the accumulation of exudates and prevent the drainage. In group II, swelling was comparatively less because of open skin wound and wound drainage.

The postoperative swelling could be due to surgical trauma. Swelling could also be due to increased permeability of the capillaries by the effect of histamine and bradykinins potentiated by prostaglandins (Snow, 1981). The disappearance of mild swelling by 5th day in almost all the horses of both the groups might be due to administration of anti-inflammatory

and antimicrobial agents and the exercise given to the horses. Adequate wound drainage, mild postoperative exercise, good lymphatic drainage, minimum surgical trauma and lack of postoperative infections minimize the chances of edema following castration (Searle *et al.*, 1999).

### **Scrotal abscess**

Postoperative scrotal abscess was observed in 1 (8.33 %) of the 12 horses. In group I, out of 6 horses, 1 (16.66 %) horses showed scrotal abscess (fig. 8). These were treated by a surgical drainage and daily antiseptic dressing for additional 4 days. Parsania *et al.* (1999), Schumacher (1999) and Searle *et al.* (1999) also observed the postoperative infection of surgical wound after castration. In the present study, it might have occurred due to the failure of antibiotic response and aseptic dressing. The entire infected wound was treated by antiseptic dressing with the use of povidone iodine solution (5%) and antibiotics postoperatively. It took additional 4 days' time for healing of surgical wounds as compared to the other horses of group IB.

### **Rectal temperature**

Rectal temperature was taken every day by using digital thermometer in all the horses of group I and II postoperatively up to 4 days. In present study, 1 (8.33 %) of 12 horses showed fever postoperatively, that responded to an antimicrobial therapy and antiseptic dressing. In group I, out of the 6 horses, 1 (16.66 %) horses showed fever postoperatively. Sedrish and Leonard (2001) observed fever in 2 of 63 horses (3.17%), that experienced a fever above 102° F postoperatively which was resolved by the next day with no treatment. Vadalía *et al.* (2012) also observed postoperative fever in 3 horses out of 38 horses which was resolved by administration of Ceftriaxone 3 gm. i.m. Richard *et al.* (2015) observed that 138 out of 604 horses had a post-operative fever after castration. In the present study, the cause of the fever in two horses was due to the scrotal abscess and the suture line infection. However, response to change of antibiotic and use of analgesic led to resolution is suggestive of presence of infection and inflammation in these cases.

### **Wound healing time:**

Clinical wound healing was complete after approximately 12-17 days. Clinical wound healing time was 12 days 5 (83.33 %) horses out of 6 horses in Group I. Whereas, 1 (16.66 %) horses out of the 6 horses took additional 4 days' time for healing of surgical wound as compared to the other horses of group I. This might be attributed to the scrotal abscess observed in these horses. Clinical wound healing time was 14 days in 4 (66.66 %) horses out

of the 6 horses of group II. Whereas, 2 (33.33 %) horses out of the 6 horses took additional 5 days' time for healing of surgical wound as compared to the other horses of group II. This might be attributed to the moderate degree of swelling observed in these horses.

Limitations of the open method were necessarily the oedema, pain, haemorrhage and secondary infection leading to schirrous cord. Here, the skin of the scrotum was not sutured and mild exercise after castration was mandatory to drain out the accumulated transudate (Schumacher, 1992). Needless to say that in such modality, high degree of surgical preparation is mandatory to reduce possibility of the infection.

Open-open method followed by scrotal wound suturing was found better as compare to open wound. Because suturing of the scrotal wound was prevent entry of infection inside the scrotal sac and also early healing was observed in these horses.

### **Conclusions**

Postoperative swelling of various degree in and around the site was a common feature in all the horses subjected to castration but it was comparatively more severe following castration in horses wherein the tunica vaginalis was kept open but scrotal skin was sutured. Wound healing took longer time following open-open method of castration wherein the skin wound was kept open.

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Fig.1 SKIN INSCISION



Fig. 2 INSCISION ON TUNICA

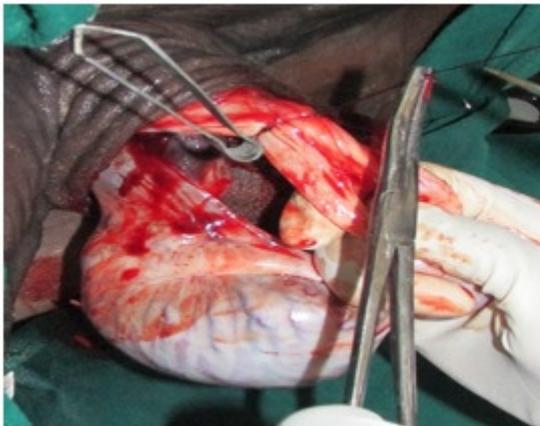


Fig. 3 TRANSLIGATION OF THE SPERMATIC CORD



Fig. 4 CUTTING OF SPERMATIC CORD BY EMASCULATOR



Fig. 5 SKIN SUTURES ON SCROTAL SAC



Fig.6 OPEN SCROTAL WOUND



Fig. 7 MODERATE DEGREE OF SWELLING



Fig. 8 SCROTAL ABSCESS FORMATION