# การศึกษาเปรียบเทียบวิธีการทำหมันพ่อม้า

# A Comparative Study of Stallion Castrations

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## บทคัดย่อ

ในปัจจุบันได้มีการศึกษาและปฏิบัติการผ่าตัดทำหมันหรือการตอนพ่อม้าในรูปแบบต่างๆ หลายวิธี วิธีที่ใช้ระยะเวลาในการผ่าตัดสั้น แผลจากการผ่าตัดหายเร็ว และโอกาสเกิดภาวะแทรกซ้อนหลังจากผ่าตัดน้อยจึงนับว่าเป็นวิธีที่ควรพิจารณาเลือกปฏิบัติมากที่สุด ในงานวิจัยชิ้นนี้ได้ทำการศึกษาเปรียบเทียบวิธีการทำหมันพ่อม้า 2 วิธี ได้แก่ การผ่าตัดทำหมันในท่านอนตะแคงภายใต้การวางยาสลบ โดยทำการศึกษาในพ่อม้าจำนวน 4 ตัว อายุระหว่าง 5 ปี ถึง 8 ปี และการผ่าตัดทำหมันในท่ายืนภายใต้การให้ยาซึมและการฉีดยาชาเฉพาะที่ในพ่อม้าจำนวน 7 ตัว อายุระหว่าง 2.5 ปี ถึง 7 ปี โดยทำการเปรียบเทียบในด้านของระยะเวลาที่ใช้ในการผ่าตัดทำหมัน ระยะเวลาที่ใช้ในการหายของแผล และการเกิดภาวะแทรกซ้อนหลังจากการผ่าตัด ผลจากการวิจัยเชิงการให้บริการทางคลินิกนี้พบว่า ในด้านของระยะเวลาที่ใช้ในการผ่าตัดระหว่างท่านอนและท่ายืนนั้นไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ โดยใช้ระยะเวลาเฉลี่ย 34.25 ± 2.99 นาที และ 39.43 ± 10.58 นาที ตามลำดับ ($p = 0.11$) แต่พบว่าวิธีการผ่าตัดทำหมันในท่ายืนใช้ระยะเวลาในการหายของแผลสั้นกว่าในท่านอน โดยใช้ระยะเวลาเฉลี่ย 4 ± 0 วัน และ 35.00 ± 8.66 วัน ตามลำดับ ($p = 0.03$) นอกจากนี้ยังพบภาวะแทรกซ้อนหลังการผ่าตัดในพ่อม้าจำนวน 1 ตัว จากกลุ่มที่ใช้วิธีการผ่าตัดทำหมันในท่านอน และพ่อม้าจำนวน 4 ตัว จากกลุ่มที่ทำการผ่าตัดทำหมันในท่ายืน ซึ่งถึงแม้ว่าจะพบภาวะแทรกซ้อนหลังการผ่าตัดในพ่อม้าจากกลุ่มที่ใช้ท่ายืนมากกว่าท่านอน แต่ภาวะแทรกซ้อนเหล่านั้นเป็นแบบที่ไม่รุนแรง ดังนั้นงานวิจัยชิ้นนี้จึงสรุปว่าวิธีการผ่าตัดทำหมันพ่อม้าในท่ายืนเป็นวิธีที่ควรเลือกปฏิบัติเนื่องจากระยะเวลาในการหายของแผลผ่าตัดที่สั้นกว่า

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## ABSTRACT

A large number of stallion castration techniques have been described and refined over the years. The procedure that offers minimal operative time, short wound healing time and low post-operative complication rate should be considered the method of choice. Two different castration position techniques were compared; by using a lateral recumbent position under general anesthesia on 4 stallions, aged between 5 to 8 years, and a standing position under deep sedation and local anesthesia on another 7 stallions, aged between 2.5 to 7 years. Comparisons between operating time, wound healing time and post-operative complications between these two operating positions were made. The results of this clinical services research showed that there was no significant difference in operating time between recumbent and standing positions, 34.25 ± 2.99 minutes and 39.43 ± 10.58 minutes respectively ($p = 0.11$). However, we found that castrations performed in a standing position achieved shorter wound healing time than those in a recumbent position, 4 ± 0 days and 35.00 ± 8.66 days respectively ($p = 0.03$). Non-severe post-operative complications were observed in 4 stallions, one from the recumbent group and three from the standing group. Although more post-operative complications were found in the standing group compared to the recumbent group, they were considered mild. We suggest that standing castration is an effective method for stallion castration in terms of short wound healing time.


**Key words:** castration, recumbence, standing, stallion

## INTRODUCTION

One of the most common surgeries in stallions is castration. The main reason owners choose to castrate their stallion, is usually to control masculine or aggressive behaviour of stallions that are not used for breeding purpose. Because testicles are primary source of androgens in the male, castration generally results in a more docile and manageable horse. Another reason for castration in horses is to remove testicular abnormality and diseases such as testicular tumors, varicocele, hydrocele, testicular trauma, orchitis, spermatic cord torsion, and scrotal hernia (McKinnon and Voss, 2005). Two surgery methods have been commonly used to castrate a stallion; recumbent castration in which stallion has to be anaesthetized, and standing castration where the stallion has to be sedated and restrained with a twitch (Turner and Mcllwraith, 1989). However, post-operative complications are commonly found, for example, excessive haemorrhage, eventration, edema, and infection (Searle *et al*., 1999). This clinical services research was performed between August 2009 and October 2010 at Rajamangala University of Technology Srivijaya (RMUTSV) Animal Hospital, Nakhon Si Thammarat Campus, Thailand. The primary objectives were to investigate operating time and wound healing time between recumbent and standing castration position, and to observe post-operative complication rates among them.

## MATERIALS AND METHODS

### Animal preparation

The eleven stallions in the study included seven Thai ponies and four crossbreds, aged between 2.5-8 years old, body condition score 2–3 (Carroll and Huntington, 1988) and weighing between 179–288 kg (Table 1). All stallions underwent general physical examination and blood checks. A dose of tetanus toxoid (Pfizer®) injection was administered one week before undergoing surgery. On the castration day, stallions were fasted for 8-12 hours and water was withheld for a two-hour period prior to castration.

### Castration methods

Recumbent castration was performed on four pony stallions, age between 5 to 8 years (Table 1). This method utilised aseptic techniques with the horse under general anesthesia, which was premedicated with 2% Xylazine hydrochloride 1 mg/kg and Acepromazine Maleate 0.05 mg/kg i.v. Anesthesia was achieved with Tiletamine and Zolazepam 1.4 mg/kg i.v. (Plumb, 2002). After the stallion was anaesthetised, it was manoeuvered into lateral recumbency (Sheldon *et al*., 2006). The scrotal area was prepared aseptically with Betadine scrub and 70% Isopropyl Alcohol and castration was then performed using the open technique. Preoperative medication included Phenylbutazone 4 mg/kg i.v. and Penicillin-Streptomycin L.A. 20,000 Units/kg i.m. (Plumb, 2002) for both groups of stallion.

Standing castration was performed on seven stallions, aged between 2.5 to 7 years (Table 1). Each stallion was individually taken into a stall which was fit to his body. Sedation was achieved by 2% Xylazine Hydrochloride 1 mg/kg and Acepromazine Maleate 0.05 mg/kg i.v. (Plumb, 2002). The horses were then left for 15–30 minutes to allow the sedatives to take effect. The scrotal area was scrubbed for at least

**Table 1** Age, breed, body condition score, weight, and position of castration

| Stallion No. | Age (yrs) | Breed* | Body Condition Score (1-5) | Weight (kg) | Recumbent or Standing Castration |
|---|---|---|---|---|---|
| 1 | 7 | P | 2 | 214 | Recumbent |
| 2 | 8 | P | 2 | 210 | Recumbent |
| 3 | 6 | P | 2 | 179 | Recumbent |
| 4 | 5 | P | 2 | 183 | Recumbent |
| 5 | 7 | P | 2 | 187 | Standing |
| 6 | 3 | P | 2 | 206 | Standing |
| 7 | 4 | P | 3 | 226 | Standing |
| 8 | 6.5 | C | 2.5 | 260 | Standing |
| 9 | 3 | C | 3 | 238 | Standing |
| 10 | 3.5 | C | 3 | 288 | Standing |
| 11 | 2.5 | C | 2.5 | 260 | Standing |

* P – pony stallion; C – crossbred stallion

five minutes with Betadine. A nose twitch was used to restrain the stallion, and then the open castration technique was performed. Three milliliters of local anesthetic, 2% Xylocaine Hydrochloride, was injected intradermally where the scrotal incision line would be positioned (Fig. 1a, arrow) and another 5ml into body of the testes and subcutaneously as the needle was withdrawn (Fig. 1b, arrow) (Samper *et al*., 2007). A 5-8 cm incision, depending on testis size, was made on the side of the median raphe and parallel to it on each testis (Fig. 2a, arrow). The tunica vaginalis surrounding each testicle was removed, leaving the testicle, epididymis, and spermatic cord exposed. The spermatic cord was separated from the testis (Fig. 2b, arrow) and was injected with 3ml of 2% Xylocaine Hydrochloride (Fig. 2c, arrow) before suturing and severing the cord, and removing the testis (Rose and Hodgson, 2000; Samper *et al*., 2007). Operation time was recorded from the time of anaesthesia to recovery.

**Post-operative care**

Each stallion was admitted separately into the large animal hospital for wound dressing with diluted Betadine and topical antibiotic cream twice daily, as well as continuing administrated Penicillin-Streptomycin

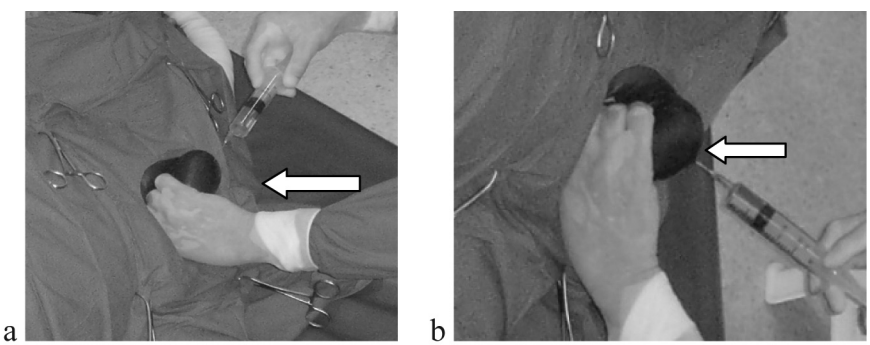


**Figure 1** An intradermal injection of 2% Xylocaine Hydrochloride along the scrotal incision line (a) and into the body of the testis (b).

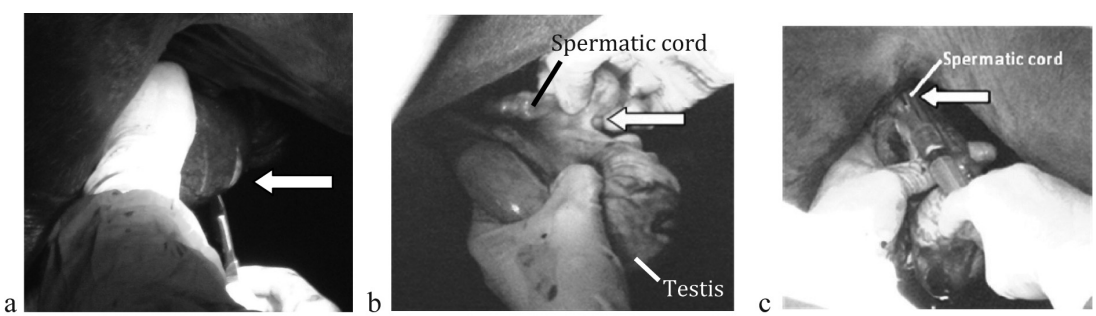


**Figure 2** Castration procedure; incision on scrotum of each testis parallel to the median raphe (a), the spermatic cord was separated from the testis (b) and 3 ml of 2% Xylocaine Hydrochloride injected into the spermatic cord (c).

and Phenylbutazone at least for five days or until the castration wound had completely healed. Castrated horses were walked for one hour every day in order to keep proper drainage at the incision wound. Wound healing time of each stallion was marked from the first day after surgery until the dermis was healed without any inflammatory signs.

**Data analysis**

Operation time and wound healing time were compared between recumbent and standing castration positions. Mann-Whitney U test was performed for the data analysis (Petrie and Watson, 1999). A significant level of $P< 0.05$ was considered acceptable.

## RESULTS

When comparing castration operating time, there was no significant difference between recumbent and standing castration positions, 34.25 ± 2.99 minutes (range 30 – 37 minutes) and 39.43 ± 10.58 minutes (range 25 – 60 minutes) respectively ($p = 0.11$). The stallions with post-operative complications were excluded from data analysis when comparing between wound healing time of recumbent and standing castration positions. The results showed that wound healing time of stallions in the standing group was significantly shorter than those in the recumbent group, at 4 ± 0 days and 35.00 ± 8.66 days respectively ($p = 0.03$) (Table 2). None of them had any complications during the surgery. However, 1 out of 4 (25%) stallions in the recumbent group, and 3 out of 7 (42.8%) stallions in the standing group had some post-operative complications. These complications included surgical wound infection, excessive wound swelling and expanding of the tunica vaginalis (Table 2). Surgical wound infection could be observed by the presence of purulent discharge from the wound in stallion

**Table 2** Comparison of surgery parameters between recumbent and standing castration positions (mean ± SD).

| Parameters | Castration position | | P-value |
|---|---|---|---|
| | Recumbent | Standing | |
| Operating time (minute) | 34.25 ± 2.99a (n=4) | 39.43 ± 10.58a (n=7) | 0.11 |
| Wound healing time (days) | 35.00 ± 8.66a (n=3) | 4.00 ± 0b (n=4) | 0.03 |

* Means within each row showing different superscripts are significantly different at 5% level ($P<0.05$).

**Table 3** Post-operative complications between recumbent and standing castration stallions.

| Post-operative complications | Castration position | |
|---|---|---|
| | Recumbent (n = 4) | Standing (n = 7) |
| Excessive swelling | 1 | 1 |
| Expanding of tunica vaginalis | - | 1 |
| Infection | - | 1 |

no.11. Excessive swelling with edema was observed in the surgical wound of stallion no.3 and no.5 on day 1 after surgery; moreover, protrusion of spermatic cord stump was found in stallion no.3 (Fig. 3a, arrow). The wounds were gradually reducing in size on day 7 (Fig. 3b, arrow) and were considered completely normal by day 45. Furthermore, a greatly expanding tunica vaginalis on both sides was observed on the day after castration in stallion no.10 (Fig. 4a, arrow), which gradually shrank day by day (Fig. 4b, arrow), and completely healed on day 70 after castration (Fig. 4c). Interestingly, hydrocele appearances in both testes had been observed in this stallion during the castration.

## DISCUSSION AND CONCLUSION

There are two techniques commonly used to castrate a stallion. The first method is carried out in recumbency; the stallion has to be under general anaesthesia in a sterilized environment. The second method is standing castration in which the stallion has to be sedated, and restrained in a stall. The stall used for standing castration should be fitted to the

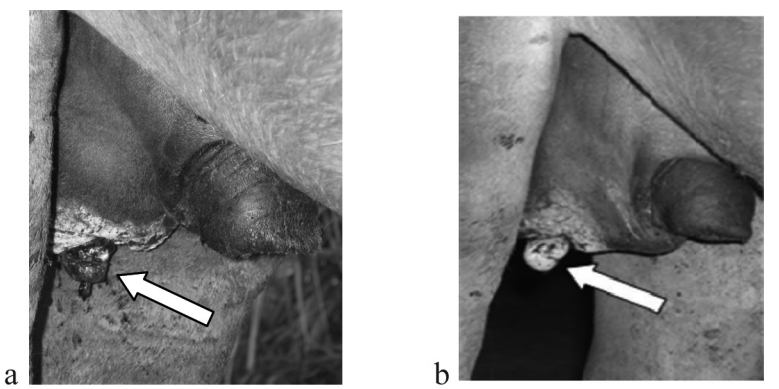


**Figure 3** Swelling and protrusion of the spermatic cord stump on day 1 after surgery (a, arrow) and reducing size on day 7 after surgery (b, arrow).

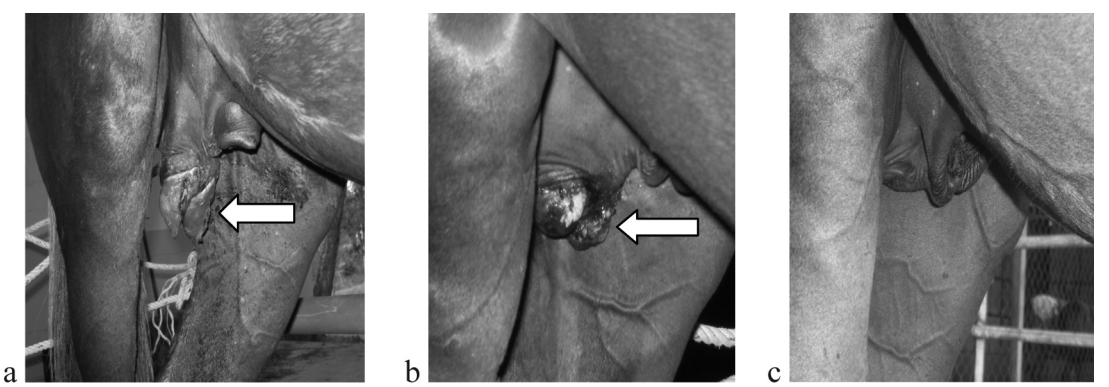


**Figure 4** Expanding of the tunica vaginalis of one castrated horse on day 1 (a, arrow), day 13 (b, arrow), and complete recovery on day 70 (c).

stallion's body with front, side and rear cushion. A cradle can be applied to restrain and prevent the stallion from slipping down, getting injured, and wound contamination.

Our study indicated no marked difference in operating time between the two castration positions as long as the horse is appropriately restrained and the sedation status is monitored throughout the operation period. Nil per os (NPO) and a quiet operative environment are important key factors for stallions that undergo surgery (Chantaraprateep *et al*., 1981). Our study demonstrated shorter wound healing times in the standing castration position compared to the recumbent position, in cases of no post-operative complications. However, a good restraining technique is important to prevent stallions from injury and can shorten the operation time. Previous studies reported the overall complication rate of routine castrations in the horse was 10 - 20 % (Mason *et al*., 2005; Kilcoyne, 2013). The most common complications after castration were excessive swelling, haemorrhage and infection. Less commonly encountered complications include iatrogenic penile trauma, penile paralysis, hydrocoele, septic peritonitis, eventration of intestine or omentum, penile trauma and anaesthetic incidents (Searle *et al*. 1999; Pollock, 2012). Post-operative complications in our study were mild and not considered life-threatening. Similar to this study, Mason *et al*. (2005) founded that recumbent stallion castration had lower complication prevalence than standing castration. They also found 1% of mortality rate in recumbent group due to recovery problem, but there was none in our study. This implies that a lower prevalence of post-operative complications occur in recumbent castration; however, there is a risk of mortality from an adverse reaction to the anaesthetic drugs and of injury when the stallions attempt to stand after the procedure. Moreover, the financial cost of standing castration, without complications, was approximately one-third of the cost of uncomplicated recumbent castration. Even with complications in the standing method, the financial cost was still less than the recumbent procedure under general anaesthetic (Mason *et al*., 2005.)

Purulent discharge from wound that was found in a stallion might indicate an infection. This problem is usually resolved with administration of anti-inflammatory agents and antibiotics, establishment of extensive wound dressing and exercise (Moll *et al*, 1995). Infection of the spermatic cord can result from intraoperative contamination, contamination of a haematoma, or an infection spreading from the scrotal incision, and then becomes schirrous cord. Successful treatment of chronic schirrous cord generally requires surgical exploration and resection of the infected and fibrous tissue (Wilson *et al*., 2006). Excessive wound swelling without infection is the most common post-operative complication in stallion castration, which usually resolves within 4-6 weeks, but may last several months. Haemorrhage or infection can lead to swelling, but most of the cases are caused by edema and poor drainage at the surgical site. A quick operation process can prevent tissue trauma, haemorrhage and therefore post-operative swelling. Furthermore,

the incision should be large enough to allow adequate drainage, and removing the skin between the two incisions to leave one large opening may facilitate this (Pollock, 2012). The open method of castration, which does not involve the removal of the vaginal tunic, may predispose animals to a hydrocele from the expansion of the vaginal tunic. Therefore, the excess vaginal tunic should be resected, and the spermatic cord should be ligated proximal to the abdomen and distal spermatic cord, and then removed during the operation (May and Moll, 2002). Moreover, prophylactic treatment with antibiotics before surgery and continued for 5-7 days post-surgery, together with intensive wound dressing are necessary to prevent infection. Vaccination with tetanus toxoid before surgery is a preferable method to protecting horses from tetanus. In addition, castrated horses need exercise for at least one hour every day to promote drainage and prevent immediate closure of the scrotal wound.

In conclusion, this clinical service research suggests that the standing castration position can be an effective method for stallion castration in terms of wound healing time. Furthermore, it is more convenient for the veterinarian to perform in a field, more economic, and minimises the risk of general anaesthesia and trauma on recovery. Further studies should recruit more horses, and evaluate associations among surgery duration, post-operative complications and other factors such as breed, age and weight.

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