

# Comparison of two techniques for castration of llamas

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**Objective**—To compare a prescrotal castration technique with the conventional bilateral scrotal incision technique for castration of llamas.

**Design**—Prospective randomized controlled trial.

**Animals**—10 clinically normal, sexually intact male llamas.

**Procedure**—Five llamas were castrated by use of a 5-cm skin incision located 2 to 3 cm lateral to the ventral midline and approximately 15 cm cranial to the scrotum, which was closed with absorbable suture material to allow primary healing. Five other llamas were castrated via a more conventional technique, with a 5-cm scrotal incision positioned directly over each testis, which was allowed to heal by second intention.

**Results**—The prescrotal technique required significantly more time to complete; however, no additional anesthesia was required to complete the longer procedure. Llamas castrated with the prescrotal technique required less aftercare and had less incisional pain when the area was palpated.

**Clinical Implications**—Both techniques are safe and effective. Some clients, however, find the prescrotal technique more aesthetically acceptable. The prescrotal technique may be more clinically important where fly control is difficult. (*J Am Vet Med Assoc* 1996;208:261–262)

Castration is the most common surgical procedure performed on llamas.<sup>1</sup> Owners may desire to have llamas castrated to prevent aggressive behavior, to allow housing with females without fear of unwanted pregnancy, or to prevent the propagation of undesirable genetic characteristics. The most conventionally used method for castration of llamas involves placement of bilateral scrotal incisions over each testis, with the llama recumbent or standing. The skin incisions heal by second intention after castration.<sup>2–4</sup> Alternatively, a prescrotal technique in which the skin incision is closed to allow primary healing has been described.<sup>5</sup> The purpose of the study reported here was to critically compare the prescrotal castration technique, in which the skin is closed, with the recumbent bilateral scrotal incision technique for castration of llamas.

## Materials and Methods

Ten adult male llamas, weighing 96 to 139 kg, were randomly assigned to 1 of 2 groups containing 5 llamas each. The llamas were housed in stalls (4 × 4 m) for the duration of the study. Food was withheld for 24 hours, and water was withheld for 12 hours prior to surgery. Llamas were anes-

thetized by IV administration of propofol (3.5 mg/kg of body weight) or a mixture of xylazine hydrochloride (0.25 mg/kg) and ketamine hydrochloride (2.5 mg/kg; n = 7). The anesthetic protocol was modified after the first 3 llamas had been anesthetized with propofol because of difficulties in delivering the volume of propofol needed and the relative expense of the drug. Duration of recumbency and depth of anesthesia were virtually the same with each of the 2 protocols. Each llama was treated with procaine penicillin G (20,000 U/kg, IM) immediately before and 24 hours after castration.

Llamas were positioned in dorsal recumbency and maintained in a frog-leg position by means of a rope tied to 1 metatarsus, which was passed dorsally to the gluteal region and attached with a quick-release knot to the opposite metatarsus just proximal to the metacarpophalangeal joint. The surgical sites were prepared according to accepted aseptic technique.

**Surgical procedure**—Llamas in group 1 (n = 5) were castrated via a prescrotal technique with primary closure of the skin incision.<sup>5</sup> This technique was performed through a 5-cm skin incision located 2 to 3 cm lateral to the ventral midline and approximately 15 cm cranial to the scrotum. With the left testis moved cranially by digital pressure, a skin incision was made directly over it. The skin and subcutaneous tissues were incised to expose the parietal vaginal tunic. Tissues surrounding the tunic were bluntly dissected to free the testis and spermatic cord, which then were retracted out of the incision. The cord was ligated proximally, using No. 2 chromic gut suture material, and sharply incised distal to the ligature. The contralateral testis then was manipulated cranially from the scrotum and deep to the penis by digital pressure, which, aided by blunt dissection, allowed exteriorization through the initial skin incision. The remaining testis then was excised, using a similar technique. The subcutaneous fascia was closed by use of No. 3-0 absorbable suture placed in a simple, continuous pattern. The skin then was closed, using the same material, in a continuous subcuticular fashion.

Llamas in group 2 (n = 5) were castrated by use of a more conventional technique, with 5-cm scrotal incisions positioned directly over each testis. Skin incisions were allowed to heal by second intention. To minimize variables between the 2 groups, the spermatic cords in llamas of group 2 were ligated and sharply excised in the same fashion as those in group 1, rather than being emasculated, which is commonly performed. All surgeries were performed by the same veterinarian.

**Data analysis**—The time from the beginning of the skin incision to the completion of the procedure was recorded for each surgery. The mean duration of surgery for the groups were compared, using the Mann-Whitney test. Physical examinations were performed daily for 7 days after surgery (or until no measurable edema was evident) to ensure the llamas' general well-being and, specifically, to evaluate signs of inflammation and response to palpation. Physical examination findings were not amenable to statistical analyses, but trends were noted.

## Results

Mean  $\pm$  SD duration of surgery (min:sec) was 7:58  $\pm$  1:31 (range, 5:54 to 10:08) for group-1 llamas

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Supported in part by the Southern States Llama Association.

and  $1:43 \pm 0:10$  (range, 1:29 to 1:56) for group-2 llamas. Because the variances were not equal between the 2 groups, a nonparametric test (Mann-Whitney test) was used, which indicated that the technique used in group-1 llamas required significantly ( $P = 0.01$ ) more time to complete.

There were no appreciable complications during surgery or anesthesia. Two of the llamas in group 2 had a short delay in healing because of fat protruding from the incision. Efforts were made at the time of surgery to remove fat; however, fat still protruded from these 2 llamas when they recovered from anesthesia. The 3 llamas anesthetized with propofol did not appear to have any trends in healing that varied from the other 7 llamas.

None of the llamas in group 1 had signs of discomfort when the incisions were palpated. Two group-1 llamas did not have any measurable swelling. One llama in group 1 had a  $4 \times 6$ -cm firm swelling at the incision site the day after surgery. It resolved during the subsequent 4 days. Two of the 5 llamas in this group developed edematous plaques ( $5 \times 6$  cm and  $8 \times 10$  cm) on the ventral midline surrounding the preputial orifice within 24 hours after surgery. Both dependent edemas resolved within 7 days.

One of the llamas in group 2 had no appreciable swelling after surgery. The other 4 developed plaques of edema (approx  $7 \times 9$  cm) over the scrotal incisions within 24 hours after surgery. Palpation of these edematous areas appeared to cause the llamas mild discomfort. Swelling tended to resolve during the 7-day observation period during which each llama was confined to a stall and thorough physical examinations were performed daily. The llamas then were moved to pasture where they were monitored daily for several months.

## Discussion

The technique used in group 1 (prescrotal castration) required significantly ( $P = 0.01$ ) more time to perform than did that used in group 2 (scrotal castration). The statistically significant time difference was not necessarily clinically significant, however, because the 8 to 10 minutes needed to complete the prescrotal castration is well within the anesthetic period provided by routine doses of xylazine and ketamine.<sup>6</sup> The anesthetic risk was no different between procedures, because repeated dosing or use of a prolonged anesthetic agent was not required. The only added expense to the prescrotal castration technique was that required for 2 packs of absorbable suture material, use of needle holders and forceps, and approximately 6 minutes of surgical time. Clients at the veterinary teaching hospital are charged more for the prescrotal technique, compared with that for the conventional technique. Clients that prefer the more cosmetically pleasing technique have been willing to pay for this service. No additional aftercare is required, because the absorb-

able, subcuticular sutures are buried and do not need to be removed. Llamas castrated via the prescrotal technique require less aftercare, because there is no open wound for the client to keep clean and free of insects.

Positioning llamas in dorsal recumbency may be an inconvenience to veterinarians that currently castrate llamas in lateral recumbency. Veterinarians may find, however, that they prefer dorsal positioning even when performing scrotal castrations because of the added restraint and ease of view.

The llamas undergoing prescrotal castration tended to have less swelling, and all incisions healed by first intention. There were no signs of infection. The llamas in this group did not have signs of pain on palpation of the incisions. Many llama owners appreciated the minimal aftercare required after prescrotal castration.

Although group-2 llamas had more swelling and signs of incisional discomfort, neither was severe. Llamas in this group had edematous subcutaneous tissues exposed at the incision sites. Dried serum coagulum and bedding tended to accumulate on these tissues.

At our hospital, it is routinely recommended that unlimited pasture exercise or as much handwalking as is feasible be provided for castrated llamas. Management restrictions and the desire for close postoperative observation, however, necessitated stall confinement of the llamas in this study. It is suspected that the swelling in both groups of llamas would have been less had they been allowed more exercise.

It is not our intention to recommend prescrotal castration of llamas over the bilateral scrotal incision technique. It is fully recognized that the scrotal incision technique is safe and effective when performed with llamas standing or recumbent. Some clients, however, find the prescrotal technique more aesthetically acceptable. The prescrotal technique may be more clinically important where fly control is difficult to accomplish. An incision closed for primary healing will not attract flies and their associated contaminants, thus requiring less intensive management after surgery. We believe veterinarians should be prepared to offer llama owners the option of prescrotal castration.

## References

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