A COMPARISON OF TWO CASTRTION METHODS IN TOMCATS AND DOGS

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ABSTRACT

Eight tomcats and eight dogs of different ages and sizes were castrated using two methods. Four tomcats and four dogs were castrated by catgut-ligation method, where the spermatic cord was ligated with chromic catgut. The others were castrated by autoligation method, using the vas deferens to ligate the spermatic cord. Surgical operations proceeded uneventfully in most cases. Three tomcats exhibited mild vomiting pre-surgically, which was attributed to the anaesthetic agent used. Three dogs (two autoligation and one catgut-ligation) experienced mild to severe post-surgical haemorrhage, and one with severe bleeding required a second ligation. The healing process in all animals was the same regardless of the type of castration method used. In conclusion, both methods of castration of tomcats and dogs had no major differences regarding surgical and post-surgical complications and the healing process. Autoligation was found to be quick and cheap, yet a safe method of castration.

Key words: Castration, tomcat, dog, autoligation, catgut-ligation.

INTRODUCTION

Castration, testectomy or orchiectomy is the removal of the male gonads (the testis). Castration is indicated in many medical or managemental situations. Medical situations include traumatic injury, torsion, orchitis and epididymitis, as well as many conditions resulting from steroid hormone imbalances. Hormonal imbalances may be due to testicular neoplasms such as sertoli cell tumour. This type of neoplasms cause feminization with alopecia in dogs (Weaver, 1983). Managemental indications of castration include improving breed, modifying or eliminating certain male behaviors i.e. sexual libido, urine making (Hart and Cooper, 1984), night prowling, reducing stray animal population (Carter, 1990; Olson *et al.*, 1991) and improving meat quality in food animals.

Tomcats and dogs are commonly castrated by either ligating the spermatic cord with chromic catgut or the spermatic cord is ligated using the vas deferens. In this paper for simplicity, ligation of the spermatic cord with vas deferens has been referred to as autoligation method of castration, and ligation with catgut is termed as catgut-ligation method of castration.

The purpose of this study was to compare auto-ligation and catgut-ligation methods of castration in tomcats and dogs to investigate the advantages and disadvantages in terms of species suitability, ease of execution, complications, healing process and economics. The presence or absence of complications during and after surgery has been used to determine species suitability.

MATERIALS AND METHODS

In this study, 8 tomcats and 8 dogs of different ages were castrated using autoligation and catgut ligation methods. Detailed information concerning animal grouping, age, body weight and methods of castration is presented in Tables 1 and 2. After routine examination (including body temperature, heart rate and rhythm, general body condition and behaviour), only animals in excellent health were selected for surgery. These animals were kept off feed for 12 hours prior to anaesthesia and surgery.

Although all operations were carried out under field conditions, efforts were made to keep the surgical wound area as aseptic as possible. Xylazine (Rompun 2% xylazine HCl, 20 mg/ml; Bayer Ag, Leverkusen, Germany) and ketamine (Calypsol, ketamine HCl 50 mg/ml; Chemical Works of Gideon Richter Ltd., Budapest, Hungary) mixture was used for general anaesthesia for both castration methods and animal species. The xylazine and ketamine mixture was injected intramuscularly at dose rates of 1 mg/kg and 10

mg/kg in tomcats, and 1 mg/kg and 5 mg/kg in dogs, respectively (Addison and Kolenosky, 1979).

Autoligation method

The anaesthetized tomcats were brought into dorsal recumbency on the table and hind limbs were drawn forward and tied at the level of head. The hair covering the scrotum were plucked by hand and excess fur on the inner thighs was shaved off. Standard surgical procedure was then followed to prepare the site of operation i.e. surgical area was washed once with soap and water and once with surgical scrub (Jadiphor, 7.5% and povidone-iodine surgical scrub; Jordan Antiseptic and Detergent Co., Jordan), dried and then scrubbed three times with 70% alcohol. A piece of gauze soaked in alcohol was used as surgical drape, leaving only the scrotum exposed. A 1.5-2 cm incision was made on one side of the scrotum, which was then extended to include the tunica vaginalis to free the testes, spermatic cord and vas deferens. The fascia between the vascular part of the spermatic cord and vas deferens was separated by blunt dissection, using a pair of scissors or artery forceps. The vascular part of the spermatic cord and vas deferens were each crushed using artery forceps and the testes were severed. The spermatic cord was then separated from covering tunica and ligated by a surgical knot using the vas deferens. The remaining ends were crushed again for one minute, then checked for bleeding and cut off. The stumps were allowed to retract into the scrotal cavity. The same procedure was carried out for the other testis. Castration in dogs was performed in the same way except that the animal was tied spread-eagled on its back, and its scrotum was shaven.

Catgut-ligation method

Tomcats and dogs were prepared for aseptic surgery in the same way as for the autoligation method. The scrotum was incised and the incision was extended to include the tunica vaginalis to free the testis. After crushing the spermatic cord and its covering tunicae, chromic catgut (Stericat, Stericat Gustrings Ltd., New Delhi, India; 1USP or 0 USP) was pulled once through all the structures and knotted twice around.

Post operative care

In both methods, incisions were left open (to allow drainage) and covered with broad spectrum antibiotic spray (CAF Spray; chloramphenicol, gentian violet; Industrial Veteriniaria, SA Invesa, Spain). No systemic prophylactic antibiotic was used. Timing in both types of castration began with the incising of the scrotum and ended with releasing both spermatic cords into the scrotal cavity. Immediate post-operative care included preparation of a warm, calm clean place for an easy recovery. Following castration, cats were kept indoors for three days, while dogs were restrained from running, jumping and other (strenuous) exercise for one week. The usual diet was offered to all animals. Follow-up checking was performed at 24 and 72h, and 7 and 14 days post operatively. Attention was given to body temperature (noting any increase as indication of possible infection), general health condition and behavior, as well as cleanliness of the wound and healing process.

RESULTS

Immediate surgical complication of autoligation method in one tomcat (tomcat No. I) was the withdrawal of the cremaster muscle during blunt dissection and vomiting in another (Table 1). However, no after-effects were recorded in tomcat No. I after ligation was carried out successfully. Two dogs experienced slight post-surgical bleeding but no second ligation was required, as the bleeding was found to originate from the tunica and skin incisions (Table 1).

In catgut-ligation method, two tomcats exhibited slight vomiting, one before and one after surgery (Table 2). Besides these two incidents, all catgut-ligation castrations in tomcats were uneventful. Dog No. III experienced severe post-operative haemorrhage, where both spermatic cords needed second ligation (Table 2).

Follow-up examination of the tomcats that underwent the autoligation castration showed rapid and clean healing resulting in completely closed scrotal wounds by day 14 post surgery (Table 3). Dogs I and II showed a good healing process, resulting in almost closed incisions after 14 days. Dogs III and IV. however, exhibited a slightly delayed healing, because the wounds were still covered by a scab and the scrotum was distinguishably swollen by day 14 post-operation.

As far as the catgut-ligation method is concerned, the healing process in tomcats was exactly the same as that for autoligation method. There was only one complication where tomcat No. I experienced prolapse of the right spermatic cord 7 days post-surgery (Table 4). After ligation and severing the prolapsed tissue, no deterioration of health or delay in healing was observed in the tomcat. Healing in dogs was similar to that described for autoligation method, with incisions being almost closed after 14 days in two dogs. Dog No. IV showed more rapid healing than the others (Table 4).

Time required for autoligation method was on an average 10 minutes for each operation in both tomcats and dogs. For the catgut-ligation method, the operations lasted on an average for 10 minutes for tomcats and 15 minutes for dogs (Tables l and 2).

Table 1: Body weight and age of animals, duration of operation and complications during autoligation method of castration

	Tomcat No.				Dog No.			
	I	II	III	IV	I	II	III	IV
Weight (Kg)	5	5	4	4.5	26	30	26	45
Age (months)	18	18	18	7	10	10	36	36
Duration of operation (min)	21	6	8	6	7	9	9	15
Complications and side effects	Cremaster muscle drew back during ligation	None	None	Slight vomiting after xylazine injection and during recovery	None	Slight bleeding 3 h post operation (originating from tunica)	None	Few drops of blood half an hour after castration

Table 2: Body weight and age of animals, duration of operation and complications during catgut-ligation method of castration

	Tomcat No.				Dog No.			
	I	II	III	IV	I	II	III	IV
Weight (Kg)	2.5	2	2	4.5	25	25	30	16
Age (months)	5	5	5	7	Adult*	Adult*	Adult*	6
Duration of operation (min)	13	11	8	9	12	13	20	15
Complications and side effects	Slight vomiting after xylazine injection	None	None	Slight vomiting during recovery	None	None	Second ligation was required to arrest post operation bleeding	None

* Adults of unknown age

DISCUSSION

Although all surgical operations were carried out under field conditions, none of the animals suffered from surgical site infection during convalescence. Rapid recovery and return to normal behaviour within 24 hours could be attributed to the good health conditions of the animals, as well as good post-surgical care. The choice of anaesthesia was also important, where minimal doses ensured short duration and rapid recovery (Lumb and Jones, 1984; Hall and Clarke, 1991). Ease of execution was determined mainly by the duration of the operation. It was obvious that there was no difference in duration in autoligation method of castration in cats and dogs, as well as catgut-ligation method in tomcats. Dogs that underwent catgut-ligation took longer time than the tomcats, mainly because their spermatic cords were larger and congested. This fact also accounted for the haemorrhage during surgery.

In this study, the surgical wounds were left unsutured to provide drainage for any fluids (transudate, blood, etc.), which may, otherwise, accumulate inside the scrotum and result in complications. Since surgery was performed taking all possible aseptic measures and wounds were considered clean, systemic antibiotics were not used. There was no difference in the healing process in all tomcats, as wounds were completely closed in two weeks. Tomcat's compulsive cleaning behaviour probably caused the prolapse of the spermatic cord in tomcat I (catgut-ligation method). It seems that licking at the wounds results in pulling out of the knot. Smaller sized catgut (1/0 or 2/0 USP) may prevent such problems.

The healing process in dogs was generally the same, with variations due to the age of the animal, as well as individual sensitivity, as some dogs tended to lick their scrotum more than others. This licking provided an additional source of irritation, which prolonged the disappearance of the post-operative swelling. A delay in healing brought upon by the dog's licking of the wound was also noticed by Roecken *et al.* (1994), This could have been greatly reduced if an "Elizabethan Collar" was used, since it would render the dog unable to lick its wounds. However, it may predispose the animal to infection, as the dog cannot clean its scrotum. In this case, a course of antibiotic may be indicated.

Age related differences in wound healing have been clearly documented in humans (Gerstein *et al.*, 1993) and rats (Quirinia and Viidik, 1991). Cutaneous wounds close more slowly in rats and monkeys as age increases (Roth *et al.*, 1997). In this study, the healing

Table 3: Wound healing following autoligation method of castration

Healing after	Tomcat No.				Dog No.			
	I	II	III	IV	I	II	III	IV
24 h	+++	+++	+++	+++	++	++	++	++
72 h	++++	++++	++++	++++	++	++	++	+++
7 days	A	A	A	A	++++	++++	+++	+++
14 days	C	C	C	C	A	A	++++	++++

Table 4: Wound healing following catgut-ligation method of castration

Healing after	Tomcat No.				Dog No.			
	I	II	III	IV	I	II	III	IV
24 h	+++	+++	+++	+++	++	++	++	++
72 h	++++	++++	++++	++++	++	++	++	+++
7 days	Prolapse of right spermatic cord	A	A	A	+++	+++	+++	++++
14 days	C	C	C	C	A	++++	++++	A

Keys for tables 3 and 4.

\+ poor healing; wound was grossly swollen, open and wet with blood or pus oozing.
++ fair healing; wound was grossly swollen, open, wet and clean.
+++ good healing; wound was swollen, open, wet and clean.
++++ good healing; wound was slightly swollen, open, dry and clean.
A wound was almost closed (with granulation). C wound was closed.

process was also faster in younger dogs as compared with older dogs (Tables 3 and 4).

The only direct surgical complication of auto-ligation method was the withdrawal of the cremaster muscle in tomcat No. I. If not corrected immediately, such a slip may cause internal haemorrhage, peritonitis and hemia of the intestine and even interfere with wound healing (Tons *et al.*, 1991). This complication arises when the cremaster muscle is not clamped correctly, or due to improper procedure, other complications included vomiting and it was observed in three of the eight tomcats. It could be attributed to the properties of xylazine, which is known to induce vomiting upon onset of sedation (Perez and Rodriguez, 1986). However, fasting for 12 hours prior to surgery prevented the discomfort of vomiting in most animals. A third complication observed was post- operative bleeding, which occurred in three of the eight dogs. In two of them it was found to originate from the incisions, while the third was actually due to an improper ligation that had slipped off.

Perez and Rodriguez (1986) carried out castration by autoligation in calves, in which four knots were tied at the thinnest section of the spermatic cord, using the ductus deferens. They found that this type of castration provided excellent haemostasis. This study confirms the finding of Perez and Rodriguez (1986) regarding haemostasis, although the autoligation method of castration used was slightly different.

Regarding the economics, both methods required the same materials, with the exception of catgut-ligation method where the only significant difference in cost was the use of catgut. Individual differences in the amount of anaesthetic are encountered in any operation, and were, therefore, not considered. It can, therefore, be recommended that autoligation method could be used in cats of all ages and in young dogs as well. This method greatly reduces haemorrhage and improves healing in older dogs. Furthermore, it is strongly recommended as a quick and cheap, yet a safe method of castration in developing countries to castrate stray animals at minimum cost and thereby reduce their population and means of transmitting diseases. This is of special importance because veterinarians stand challenged to develop cheaper methods to reduce the number of stray animals, in order to compete with (non-) veterinarian, non-profit organizations (Olson *et al.*, 1991).

In conclusion, both methods of castration presented in this study were indicated for castration of tomcats and dogs without any major differences in surgical and wound healing complications.

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