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Research Article

Low-Cost Neutering Program and Its Postsurgical Complications for Dogs and Cats

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ABSTRACT

Low-cost neutering campaigns have been conducted to prevent the overpopulation of dogs and cats, a current public health concern. This study aimed to assess outcomes and complications after low-cost neutering through the perceptions of the owners of cats and dogs treated in a public pet population control program. Neither death nor surgical wound dehiscence were reported and the main postsurgical complication reported was pain in female dogs (12.7%) and cats (13.5%). While most of the canines did not present changes in behavior after neutering, most of the felines became calmer. The low levels of postsurgical complications and unexpected outcomes, which were similar to those reported in private clinics in developed countries, showed that the methodology used was safe and effective. Although improvement needs to me made such as in the management of postoperative pain, the methodology used in this public neutering program was considered useful to be applied in other municipalities.

Key words: Animal population control, Neutering, Postoperative complications, Dog, Cat

INTRODUCTION

The relationship between people and pets dates back thousands of years. It was not until the end of the 20th century, with the migration of human populations to urban centers, that overpopulation of dogs and cats became a problem (Thornton, 1992). The conditions for animal survival improved because of the supply of discarded human food and shelter. Reproduction was promoted by the formation of clusters of free animals. Beginning in the 1970s, there was a growing concern on the part of public agencies, public health authorities, and animal protection organizations for controlling the overpopulation of stray dogs and cats (Carter, 1990).

There are various low-cost and effective methods to reduce the overpopulation of dogs and cats. Surgical sterilization possesses certain social and physical values that make it advantageous for pets, owners, and society (Carter, 1990). Neutering campaigns, conducted over long periods of time, may achieve complete effectiveness when used in isolation. Even a small change in birth rates can make a dramatic difference in euthanasia rates over time through the impact on population dynamics (Frank, 2004). In order to be effective, public sterilization campaigns need fast, safe, and low-cost surgical procedures with the objective of reaching the greatest number of animals in the shortest span of time possible. However, to the best of our knowledge, the safety of fast procedures along with the use of alternative surgical materials has not yet been evaluated.

This study aimed to assess outcomes and complications after low-cost neutering through the perceptions of the owners of cats and dogs treated in a public pet population control program.

MATERIALS AND METHODS

The municipality of Goianá is located in the state of Minas Gerais (MG), Brazil, in the Zona da Mata region, with a resident human population of 3323 inhabitants, 967 homes, and 1046 resident families according to the 2000 census. The human population was estimated at 3464 inhabitants in July 2005 (D.A.D.S., 2005).

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The Dog and Cat Sterilization Program was conducted by the city between July 1997 and December 2008 with the objective of controlling the urban population of canines and felines. As an initial measure, educational campaigns were carried out through talk sessions aimed at the community, with the objective of informing and encouraging animal owners to bring their pets for sterilization.

All inhabitants from the rural and urban areas of Goianá-MG were eligible to bring their dogs and cats for sterilization, free of charge. The only requirement for owners was to visit City Hall and add their names to the waiting list. Dogs were given priority over cats owing to the greater urgency in controlling the canine population. When the date of the surgery was scheduled, owners were instructed to have their animals fast without food and water for 12 hour prior to surgery.

The facilities utilized in the program included a surgery room, a storeroom, a bathroom, and a kennel capable of holding 15 animals. The surgery room was equipped with a marble-topped table with 2 metal rails of different sizes.

The surgical instruments were sterilized in an oven at 270°C for 1 h and protected in 3 stainless steel boxes. The boxes were rotated such that while 1 box was in use, the other was being sterilized. The surgical suture was made of nylon fishing line, No. 0.40 and No. 0.25, threaded on hypodermic needles (No. 25G × 7/8") that had been individually packed in brown paper and sterilized in an autoclave at 127°C for 30 min. The surgical drapes and compresses were also sterilized in an autoclave.

On average, 3–5 surgeries were performed each week. Immediately prior to surgery, pets were submitted to a quick patient history and physical exam by the veterinarian. If the animal was considered fit, the owner signed a surgery consent form. Dogs were administered atropine sulfate at a dose of 0.044 mg/kg subcutaneously, followed by xylazine at a dose of 2.0 mg/kg intramuscularly after 10 min. Anesthesia was induced and maintained with an intravenous bolus dose of 12.5 mg/kg sodium thiopental. For the induction of anesthesia, enrofloxacin (5 mg/kg) and dipyrone (25 mg/kg) were administered intravenously. Cats were administered ketamine (20 mg/kg) and xylazine (1mg/kg) mixed in the same syringe and injected intramuscularly.

Female canines were subjected to ovarian salpingo hysterectomy using the ventral midline surgical approach. Ligation of the ovarian pedicles and uterine stump was performed with No. 0.40 nylon fishing line. The abdominal wall was sutured with No. 0.40 nylon in a simple continuous pattern. The subcutaneous tissue was approximated with a simple continuous suture using No. 0.25 nylon. The skin was stitched using a continuous mattress pattern and No. 0.25 nylon.

Female felines were submitted to oophorectomy. If there was clinical suspicion of uterine disease during laparotomy, the uterus was removed. Ligation and suture of the abdominal wall, subcutaneous tissue, and skin were performed using No. 0.25 nylon with the same suture patterns previously described for dogs.

Male canines were neutered using the prescrotal approach. Ligation of the spermatic cord and suture of the subcutaneous tissue and skin were performed using No. 0.25 nylon. Male felines were neutered using the discovered technique, and hemostasis of the spermatic cord was achieved with 3 knots between the pampiniform plexus and ductus deferens. After the procedure was completed, the animals were monitored until the first signs of consciousness appeared and then they were released. As a postsurgical measure, owners were instructed to give an oral dose of enrofloxacin (5 mg/kg) for 3 days and clean the surgical wound with physiological solution. Owners also received a recommendation to have the stitches removed after 15 days; however, few owners returned for this step.

In October 2003, an assessment questionnaire about the program was administered in the urban area of Goianá to residents in homes with dogs and cats. Home interviews were conducted by employees of the municipal Zoonosis Control sector during the anti-rabies vaccination campaign. The same questionnaire was administered to the same population in December 2004, this time by agents of the Family Health Program (*PSF - Programa Saúde da Família*).

The data gathered with the questionnaire were entered in a Microsoft Office Excel spreadsheet. The absolute and relative frequencies of the responses, as well as the averages of these frequencies, were calculated for the reviewed period.

RESULTS

In 2003, 151 questionnaires concerning the neutering of 115 dogs (21 males and 94 females) and 36 cats (15 males and 21 females) were completed. In 2004, 129 questionnaires concerning the neutering of 82 dogs (20 males and 62 females) and 47 cats (22 males and 25 females) were completed.

According to the data obtained in 2003, none of the dogs or cats showed sexual activity or behavior after neutering (Table 1). In 2004, however, there were reports of sexual behavior in female canines (3.2%) and felines (4%), and sexual activity in male canines (5.9%) and felines (4.8%).

Surgical complications, according to the perceptions of the dog owners, were limited to females (Table 2). In the assessment conducted in 2003, owners reported that 7.5% of animals experienced postoperative pain and 1.0% developed hernias. In 2004, owners reported that 17.8% of the female dogs experienced postoperative pain, 1.6% presented discharge from the surgical wound, and 1.6% presented urinary incontinence. None of the male dogs presented complications during the assessed years (Table 2).

Owners of felines (Table 3) in the 2003 assessment reported that 6.7% of the males and 19.0% of the females experienced postoperative pain. In the 2004 assessment, however, cat owners reported that 4.5% of the males and 8.0% of the females experienced pain. The same year, it was reported that 27.3% of the male cats presented with urinary incontinence.

The overall behavior of roughly half the male (54.2%) and female dogs (47.1%) did not change following neutering (Table 4). Owners reported that 26.5% of the males and 43.3% of the females became calmer after surgery. In the feline group, more than half of the males (65%) and females (59.4%) demonstrated calmer behavior after neutering (Table 5).

Table 1: Sexual behavior or activity of dogs and cats after neutering, according to the owners' perceptions

Species	Sex	Sexual behavior (%)			Sexual activity (%)		
		2003	2004	Average	2003	2004	Average
Canine	Male	0.0	0.0	0.0	0.0	5.9	3.0
	Female	0.0	3.2	1.6	0.0	0.0	0.0
Feline	Male	0.0	0.0	0.0	0.0	4.8	2.4
	Female	0.0	4.0	2.0	0.0	0.0	0.0

Table 2: Postoperative complications of neutering in canines between 2003 and 2004, according to the owners' perceptions

Complication	Male canine			Female canine		
	2003 (%)	2004 (%)	Average (%)	2003 (%)	2004 (%)	Average (%)
Postoperative pain	0.0	0.0	0.0	7.5	17.8	12.7
Discharge from surgical wound	0.0	0.0	0.0	0.0	1.6	0.8
Surgical wound dehiscence	0.0	0.0	0.0	0.0	0.0	0.0
Hernia	0.0	0.0	0.0	1.0	0.0	0.5
Vaginal discharge	0.0	0.0	0.0	0.0	0.0	0.0
Urinary incontinence	0.0	0.0	0.0	0.0	1.6	0.8
Death	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0	0.0	8.5	21.0	14.8

Table 3: Postoperative complications of neutering in felines between 2003 and 2004, according to the owners' perceptions

	Male feline			Female feline		
Complication	2003 (%)	2004 (%)	Average (%)	2003 (%)	2004 (%)	Average (%)
Postoperative pain	6.7	4.5	5.6	19.0	8.0	13.5
Discharge from surgical wound	0.0	0.0	0.0	0.0	0.0	0.0
Surgical wound dehiscence	0.0	0.0	0.0	0.0	0.0	0.0
Hernia	0.0	0.0	0.0	0.0	0.0	0.0
Vaginal discharge	0.0	0.0	0.0	0.0	0.0	0.0
Urinary incontinence	0.0	27.3	13.6	0.0	0.0	0.0
Death	0.0	0.0	0.0	0.0	0.0	0.0
Total	6.7	31.8	19.3	19.0	8.0	13.5

Table 4: Post-neutering behavior presented by canine and feline pets, according to the owners' perceptions

Species	Sex	Calmer (%)			More aggressive (%)			Unchanged (%)			No answer (%)		
		2003	2004	Mean	2003	2004	Mean	2003	2004	Mean	2003	2004	Mean
Canine	Male	42.9	10.0	26.5	9.5	5.0	7.3	33.3	75.0	54.2	14.3	10.0	12.2
	Female	44.7	41.9	43.3	6.4	6.5	6.5	45.7	48.4	47.1	3.2	3.2	3.2
Feline	Male	80.0	50.0	65.0	0.0	0.0	0.0	13.3	50.0	31.7	6.7	0.0	3.4
	Female	66.7	52.0	59.4	0.0	0.0	0.0	28.6	48.0	38.3	4.8	0.0	2.4

Table 5: Post-neutering body condition presented by canine and feline pets, according to the owners' perceptions

Species	Sex	Heavier (%)			Leaner (%)			Unchanged (%)			No answer (%)		
		2003	2004	Mean	2003	2004	Mean	2003	2004	Mean	2003	2004	Mean
Canine	Male	42.9	60.0	51.5	0.0	5.0	2.5	47.6	25.0	36.3	9.5	10.0	9.8
	Female	60.6	54.8	57.7	1.1	3.2	2.2	33.0	38.7	35.9	5.3	3.2	4.3
Feline	Male	80.0	50.0	65.0	0.0	0.0	0.0	13.3	50.0	31.7	6.7	0.0	3.4
	Female	66.7	52.0	59.4	0.0	0.0	0.0	28.6	48.0	38.3	4.8	0.0	2.4

When queried about the body condition of the animals after surgery, most owners answered that their animals gained weight, regardless of species or sex (Table 5).

DISCUSSION

The overpopulation of dogs and cats has been addressed as an issue that is exclusive to municipal Zoonosis Centers and to the shelters of Animal Protection Societies. However, the solution to this problem requires the involvement of society as a whole. Neutering campaigns must be fully accepted by the community to be successful (Moulton, *et al*., 1991). To gain acceptance for surgical sterilization, it is necessary to understand owners' perceptions of the changes in their animals produced by the surgery. Armed with this understanding, measures may be taken to correct misinformation and distorted ideas about surgical sterilization. Therefore, this study aimed to assess the effectiveness of the neutering procedure conducted through Goianá's sterilization program by listening to the main stakeholders, the pet owners themselves.

The questionnaire was administered 2 times during a 14-month period. The same population was surveyed both times. The questionnaires were administered by 2 independent teams. The first survey was conducted by professionals directly involved in the low-cost neutering program, while the second assessment was conducted by *PSF* agents who did not participate in the program. The methodological objective was to reduce interviewer bias in the gathered responses. This effect can be seen as discrepancies between the percentages of reported occurrence for several items related to surgical complications and animal behavior after surgery.

One such discrepancy was the difference in the occurrence of sexual activity and behavior in canines and

felines in the two assessments. No sexual activity and behavior were reported in 2003; however, low rates of sexual activity and behavior were recorded in 2004. These findings may be due to an error in the surgical technique applied to the females (ovarian remnant syndrome). Nevertheless, such behaviors have not been reported in other studies that assessed the postoperative phase of animals neutered by a similar technique (Stubbs and Bloomberg, 1995). Logically, new animals were neutered in the interval between interviews, which could alter the outcome; however, possible errors in the administration of the questionnaire should also be considered. Errors could hypothetically occur more easily with interviewers who were not involved in the program and who had little knowledge of the topic. Despite reported differences between assessments, the low average incidence of sexual activity or behavior showed that the method used was effective.

There were no reports of serious complications (dehiscence of the surgical wound and death) in the 2003 and 2004 assessments. A retrospective study of neutering complications in small animals, conducted at Texas A&M University in the United States, reported one death by hemorrhage after neutering and three deaths by cardiac arrest from anesthesia (HOWE, 1997). Our results showed that the surgeries were safe and did not put animals' lives at increased risk, despite simple methodology and use of low-cost and alternative materials.

According to the owners' perceptions, 12.7% of the female dogs, 13.5% of the female cats, and 5.6% of the male cats experienced pain in the postsurgical phase. This observation highlights the importance of adequate perioperative analgesia, because an owner's refusal to have their animals neutered may be rooted in the fear that the animals will suffer. The inclusion of analgesic medications in the postoperative protocol must be considered to minimize such occurrences.

Urinary incontinence was reported in 1.6% of the female dogs and in none of the female cats. This is a positive result, as the incidence of urinary incontinence in ovariectomized female dogs is reported between 4 and 20% (Arnold *et al*., 1989; Stocklin-Gautschi *et al*., 2001). On the other hand, the high incidence of urinary incontinence in male felines following neutering (27.3%) was completely unexpected, because this change was not found in the literature as a complication in neutered male felines. This result shows, once again, a probable error in administering the survey during the December 2004 assessment.

The total incidence of postoperative complications in female canines (14.8%) in this study was similar to the incidence reported for clinics in England (14.1%), and was in the range reported for clinics in Canada (4-35%) (BURROW, BATCHELPR, CRIPPS, 2005; POLLARI *et al*., 1997). The total incidence of complications in female cats (13.5%) was consistent with the incidence observed in Canadian clinics (0-31%)[11]. The low incidence of discharge from the incision (0.6%) and hernia (0.5%) in dogs may have occurred due to errors in the surgical technique or shortcomings in postoperative care.

An analysis of behavioral characteristics such as aggressiveness and activity level showed that the average frequency of canines that became calmer was lower than that of felines; the average frequency of canines that did not have behavioral changes was higher than that of felines; and the average frequency of those who became more aggressive was higher for canines than for felines. Such findings corroborate the assertion by Stubbs and Bloomberg (1995), that neutering does not result in lethargy or inactivity for dogs and cats.

According to the owners' perceptions, most canines (56.8%) and felines (60.6%) gained weight following surgery. The role of gonadectomy in the development of obesity in dogs and cats is not fully explained. Although gonadal hormones influence body weight, obesity is a multifactorial problem, which makes it difficult to determine the significance of gonadectomy among other uncontrolled variables, such as exercise and diet[6]. Independent studies have shown that neutered dogs have a 1.2–3 times greater chance of becoming overweight or obese when compared with intact dogs (Edney and Smith, 1986; McGreevy *et al*., 2005).

Conclusions

The low levels of postsurgical complications and unexpected outcomes, which were similar to or lower than those verified in private clinics in developed countries, showed that the methodology used for this low-cost neutering campaign for canines and felines is safe and effective. Although improvements could be obtained through the use of a better analgesic protocol, our results indicate that this methodology can be successfully applied in other municipalities.

An increase in body condition (adipose tissue deposition) after neutering was verified by owners of most animals, regardless of species or sex; therefore, it is a factor that must be controlled following surgery.

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