



Self-assessment of the professional performance of a surgical team for mass neutering of canine and feline carried out on a Mobile Surgery Unit in the south of Santa Fe province.

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to low-income neighbours from Casilda city. This service has been extended to the area of influence of the Faculty through mass castrations performed in a mobile surgical theatre provided within the framework of the National Pro-Ownership Program.

The aim of this work was to carry out a self-assessment of the performance of the surgical team of the SHL&SA when involved in this Program. The methodology of work consisted in detecting the immediate and mediate post-surgical complications that the operated animals underwent to further contrast the results with those referred by other authors.

In mass neutering campaigns, the surgical technique commonly employed in males is the scrotal approach orchietomy in male feline and the pre-scrotal approach in canine. In feline and canine females, the surgical techniques used are ovariectomy and ovariohysterectomy by flancotomy as described by Mc Grath *et al.*⁽²⁰⁰⁴⁾, Mingues *et al.*⁽²⁰⁰⁵⁾ and Howe⁽²⁰⁰⁶⁾, and adjusted to mass programs according to the standards suggested by "The Association of Shelter Veterinarians" (Looney *et al.*, 2008).

The current trend with this type of techniques is to minimize the aggression caused by these interventions, reduce the time of surgery, and simplify surgical maneuvers. This leads to reduce pain and the incidence of infections, which promote the animal's welfare and their owner's by extension^(Serra *et al.*, 2009). These concepts are strengthened by Mackie⁽²⁰⁰⁷⁾, who states that the quick sterilization technique, mainly in canine and feline females through a flancotomy, confers superior results to the traditional technique, not only because of the short exposure period of the wound but also because a small incision causes less pain, less licking, thus generating a proper healing, as described by Stone⁽²⁰⁰³⁾ and Van Goethem *et al.*⁽²⁰⁰⁶⁾.

Surgical techniques performed in mass neutering campaigns are considered in the disciplinary field as simple surgical procedures. However, they are not exempt from complications. Some of them may include: accidental ligation of the ureter,

bleeding, wound infection, dehiscence, formation of fistulous tracts, neck pyometra, recurrence of heat in females, and even death^(Howe, 2006; Burrow, 2005; Gadella et al, 2004; Stone, 2003; Hedlund, 2002; Fingland, 1998).

While risks and complications are present in any surgery, the incidence of these in mass neutering campaigns may be increased due to the conditions of the surgical theatre and the large number of patients to be treated in a single day. Looney *et al.*⁽²⁰⁰⁸⁾ recognize this, but argue that the benefits of such a program, mainly the zero cost that it represents for the owners, overcomes the inconveniences.

As described by Pollari and Bonnett⁽¹⁹⁹⁶⁾ and Burrow *et al.*⁽²⁰⁰⁵⁾, the incidence of postoperative complications is between 20% and 26%, with complications occurring mostly in the surgical wound. On this subject, it is important to emphasize what Greene⁽²⁰⁰⁸⁾ states: all surgeries involve the contamination of the wounds performed, but most of them do not develop infection because other factors such as the general health of the patient, the surgical procedure employed, and, logically, the type and quantity of contaminating microorganisms. This author refers to the degree of bacterial contamination that can result from surgical wounds and classifies them into three categories. In this classification, he considers possible accidental contaminations, but emphasizes the degree of compliance with the rules of asepsis. He classifies them as:

- Clean (wounds where the rules of asepsis were respected)
- Clean-contaminated (wounds where the rules of asepsis were minimally violated)
- Contaminated (wounds where many rules of asepsis were violated)

Greene⁽²⁰⁰⁸⁾ also states that in the third type of wounds, bacterial contamination can be suspected without the presence of exudation of pus. In addition, these wounds are at high risk of developing post-surgical infections, which can be twice as high as a clean-contaminated wound. From a purely epidemiological point of view, Bojrab⁽¹⁹⁹⁶⁾ agrees with this concept when he states that an infected wound is the one that exudes pus. However, this author adds: "a wound with visible signs of inflammation or serous discharge is considered possibly infected."

Among the most influential factors in surgical infection is the time of exposure of a wound and injury to tissues^(Spadafora, 1970). With respect to the time of exposure of a wound, bacterial counts can double during each additional hour of surgery^(Piermatei, 1993). In a study of dogs and cats, the risk of post-surgical infection was twice as high for animals operated for more than 90 minutes than for those with surgeries taking less than 60 minutes^(Greene, 2008). Bojrab and Monnet⁽²⁰¹¹⁾ agree that after 90 minutes of antiseptic preparation of the operative field, the skin begins to recover its colonies of bacteria, transforming a clean procedure into a contaminated procedure. Nicholson *et al.*⁽²⁰⁰²⁾ reported that times of anesthesia and surgery were significantly longer in animals that later developed surgical wound abnormalities, and associated surgical infection with three major risk factors: duration of surgery,

large numbers of untrained people in the operating room, and poor hygiene of the surgical area.

With respect to tissue injury, the risk of infection is directly related to the degree of manipulation and tissue trauma, as well as to the accumulation of blood in the tissue spaces and to the surgical material used (sutures, ligatures, implants). An important fact is that bacteria that invade intervened sites and surgical materials may remain dormant for months or years^(Greene, 2008).

Burrow et al.⁽²⁰⁰⁵⁾ reinforce this idea and refer to the existence of a direct relationship between complications of surgical wounds and the deficiencies of the surgical protocol used, such as: excessive manipulation of tissues, drying of the tissues as a consequence of the prolonged surgical time, inadequate operating room conditions, maintenance and sterility of surgical instruments, postoperative care of the animal and the experience of the surgeon and team.

With respect to the appearance of fistulas or granulomas, Van Goethem⁽²⁰⁰⁶⁾ and Pearson⁽¹⁹⁷³⁾ agree that these could be related to the material used in the ligatures, and refer to a non-absorbable multifilament thread that is frequently used to perform the transfixion in the ovary. A disturbing fact about this complication is that it appears months, and sometimes years, after the surgery (Bojrab, 2001).

Eugster et al.⁽²⁰⁰⁴⁾, in a study carried out in a school hospital on a total of 1,010 surgeries, refers to surgical wound complications and the results show 5.8% inflammation followed by infection and 3% infection; while similar investigations by Brown et al.⁽¹⁹⁹⁷⁾ have detected an incidence of infection between 4.4% and 5%. Burrow et al.⁽²⁰⁰⁵⁾, also in a school hospital and in neuterings performed by students of the last year, report similar values: between 2.2% and 5.7%.

MATERIALS AND METHODS:

About the Mobile Surgery Unit provided by the National Pro-Ownership Program



The Mobile Surgery Unit is a modified motor home. It has two doors, one at each extreme and two windows on one side. Inside there are cabinets in which surgical supplies and consumables are stored (instrument boxes, gauze, suture material, clothing, antiseptics and anesthetic drugs), a sink with hot and cold water, two stretchers and a bathroom.

For emergencies there are endotracheal tubes, an oxygen tank and Ambu bags. It also has a sterilizer, air conditioning (cold-heat) and a refrigerator.

The design and equipment of the mobile allow to perform two surgeries at the same time.

About the surgical protocol

The surgical team this work evaluates was composed of six professionals divided into three groups: two anesthetists, two surgeons and two circulating nurses. The protocol was organized in seven stages:

- 1st Stage. An identification form was completed and the owner was asked to sign the authorization for the surgical procedure.
- 2nd Stage. Complementary anesthetic medication(CAM), trichotomy of the forearms and the operative area were performed, an intravenous catheter was placed, and finally anesthesia was induced. This work was carried out by the anesthetists in a room adjacent to the surgical mobile.
- 3rd Stage. The animals were moved to the operating room through the front door to one of the stretchers. An assistant held them, performed the antiseptics of the operative area and infused a crystalloid solution through the intravenous catheter.
- 4th Stage. In this stage the surgeons began the surgical act. Lateral flank approach was used in females. Pre-scrotal approach for orchietomy in dogs and scrotal approach for cats were performed.
- 5th Stage. The assistant cleaned and conditioned the instruments used in the surgery, immersed it in an iodized solution and subsequently dried it with sterile gauze, and had it ready to be used in the next intervention.
- 6th Stage. After surgery, the animal was transferred by an assistant to the back of the mobile to allow for anesthesia recovery. It was kept warm and evaluated for bleeding from the surgical wound, capillary filling and the occurrence of vomiting and defecation. Then, when the animal lifted its head, the intravenous catheter was withdrawn and an antiseptic was placed on the wound.
- 7th Stage. Finally, the animal was returned to its owner through the back door and indications inherent to the postoperative care were given.

About the methodological aspects of the research

An evaluative study was carried out on a sample of the neutered animals in the mobile operating room from 2014 to 2015 in the towns of Casilda, Sanford, Villa Constitución, Rosario and Chañar Ladeado. The total of the neutered animals was 1,099, 656 were canine females, 170 canine males, 273 feline females and 87 feline males. Of the 1,099 animals, a total of 600 animals were randomly considered from all the towns visited.

The detection of complications was performed in four stages:

- a) 1st Stage (Immediate postoperative period)
- b) 2nd Stage (15 days after the intervention)
- c) 3rd Stage (6 months after the intervention)

The 1st Stage consisted of observations made to the animal before being delivered to its owner. Stages 2 and 3 were carried out through the following telephone surveys:

Survey conducted at 15 days

- a) Did you notice any problems with the wound? (Licking, biting, color change, enlargement, suppuration)
- b) Did you need to take it to the veterinarian?

Survey conducted at 180 days

- a) Did you notice any changes in the area of the surgical wound?
- b) Did the heat return?
- c) Would you neuter your pet in a mass campaign again?

RESULTS

- 1st Stage (Immediate postoperative period): No complications were observed.
- 2nd Stage (15 days after the intervention): Complications were reported in the surgical wound: 1.6% of the animals showed signs of inflammation and of these, one animal presented dehiscence of the wound, without requiring a new suture.
- 3rd Stage (6 months after the intervention): No complications or disconformities were found on the part of the owners.

DISCUSSION

As could be seen in the results, the frequency of complications obtained was lower than those reported by the authors consulted.

Despite these data, someone with mastery of the discipline knows that surgical work in a mass neutering program is not free of factors that negatively influence the expected outcomes. These factors can be: environmental contamination in an operating room where a superlative number of surgeries is performed, the lack of pre-surgical examinations of the patients, the reuse of the instruments and the impossibility of the team to perform the postoperative care of the wounds. In such a context it is assumed that the rules of aseptic technique are not fully complied with. The question that underlies this reality is the following:

- Why is the complication report so low?

From a methodological approach, although it is true that the sample studied is representative of the population, since it corresponds to 54% of the population, the instrument for evaluating mediate complications (telephone survey) could be unreliable. It cannot be ruled out that the interpretation of the observations made by the owners may be error-prone. This situation could have caused data losses and would explain the low percentages of complications detected.

From a biological approach, the wounds evaluated in this paper could be categorized as proposed by Greene⁽²⁰⁰⁸⁾ as clean-contaminated wounds or, according to Bojrab⁽¹⁹⁹⁶⁾, potentially contaminated wounds that do not exude pus. This could explain the lack of information provided by the owners, since the signs that exhibit wounds of this type are barely perceptible to the eyes of a layperson. However, due to the possibility of non-informed complications, it is interesting to note that none were serious, since no animal in the sample studied died or required post-surgical veterinary treatment.

The authors of this paper infer that the key point to explain the results obtained could be the use of a fast surgical technique and minimal invasion, which results in a time of limited exposure of the wound and a slight tissue injury.

CONCLUSION

The results obtained in this investigation indicate that the postoperative complications expected in massive neutering campaigns can be significantly reduced when using fast and minimal invasive techniques. Nevertheless, and in line with the bibliography consulted, it is emphasized that, in order to achieve these objectives, the surgeries must be performed by a qualified and experienced surgical team, following the guidelines of a rigorous working protocol. It is well known that programs aimed at limiting the population of dogs and cats always contemplate animal welfare, therefore, the evaluation of working protocols should be a continuous task that allows adjustments and changes for a more efficient performance of all the actors involved.

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