Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2019; 7(5): 957-960

Received: 04-07-2019
Accepted: 06-08-2019

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Clinical evaluation of right lateral flank and ventral midline approach for ovariohysterectomy in dog

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Abstract
The present research was undertaken on 12 clinical cases of bitches presented for elective ovariohysterectomy at TVCC, PGIVAS, Akola. These cases were randomly divided into two equal groups (n=6), irrespective of their breed age and body weight. Qualitative assessment of techniques and clinico-physiological parameters were studied. The average score of surgical wounds based on swelling, exudation, pain, irritation, and wound dehiscence were recorded postoperatively. In ventral midline approach length of incision and duration of surgery was significantly (P<0.05) increased as compared to right flank approach. However, clinico-physiological parameters varied non-significantly in both groups. On the basis of merits and demerits of two surgical approaches, it can be concluded that the right lateral flank approach can be a good alternative to the commonly used ventral midline approach for ovariohysterectomy in dog.

Keywords: Ovariohysterectomy, spaying, ventral midline, right flank, dog, wound

1. Introduction
Ovariohysterectomy indicates the removal of both ovaries along with the uterus and it is a commonly performed surgical intervention in canine practice. It is recognized by World Health Organisation as a method of contraception to aid in Dog's population control programme in rabies endemic areas (Muraro and White, 2014) [1]. It also prevents diseases associated with reproductive system (Olson *et al.* 1986) [2]. Presently there are several approaches adopted for ovariohysterectomy in small animal practices such as ventral midline, oblique flank, horizontal flank, and vertical flank approach. The lateral flank approach has been described for dogs and cats. However, its use in small animal practice failed to gain widespread acceptance because of differences in surgical ideology, anaesthetics protocol and postoperative management (McGrath *et al.*2004) [3]. The lateral flank approach is a method of choice for ovariohysterectomy in lactating bitch; it reduces the potential complication like excessive haemorrhages from the skin and subcutaneous tissues, surgical wound infection and leakage from the mammary tissues which is associated with ventral midline approach therefore, they are more likely to continue nursing after surgery. Surgical wound healing is an important part of any surgical intervention. To achieve the rapid wound healing with minimal risk of complication like wound dehiscence or infection and an acceptable cosmetic result, a comparative study was undertaken with an objective to evaluate right lateral flank and mid-ventral approach for ovariohysterectomy in dog.

2. Materials and Methods
The present clinical study was undertaken during the period of March 2019 to July 2019 on twelve healthy bitches presented for elective ovariohysterectomy at TVCC, Post Graduate Institute of Veterinary and Animal Sciences, Akola. The permission was sought from Institutional Ethical Committee for Veterinary Clinical Research before undertaking the study. All dogs were randomly divided into two equal groups (n=6) irrespective of age, breed and body weight. In the group, A ovariohysterectomy was performed by the ventral midline approach (Fossum and Hedlund, 2013) [4] whereas, group B operated by right lateral flank ovariohysterectomy [Howe, 2006] [5]. Dogs of both the groups were anesthetized as per standard protocol.

2.1 Parameters studied
To evaluate the two surgical approaches clinically, a qualitative assessment of surgical technique was undertaken by recording the length of surgical incision, duration of surgery, ease of locating uterus, surgical convenience, and intraoperative complications. Clinico-physiological parameters were assessed on 0 day (before surgery), 1st, 3rd and 7th postoperative days. However, assessment of surgical wounds was undertaken on the basis of swelling, exudation, pain, irritation, and wound dehiscence on 1st, 3rd and 7th postoperative day.

2.2 Statistical analysis
The data recorded during the study were analyzed by using WASP 2.0 with two-way factorial design and two-sample T-test.

3. Results and Discussion
A. Qualitative assessment of the technique
The mean length of incision 3.13 ± 0.05 cm and 1.98 ± 0.07 cm was recorded for Group A and Group B respectively (Table no.1). The duration of surgery was considered as time from the first incision on the skin to the closing of surgical wound after removal of the uterine horns and ovaries. The duration of the surgical procedure was 47.67 ± 1.23 (min) and 38.5 ± 1.77 (min) in Group A and Group B respectively (Table no.1). The mean time to identify and locate the uterus was 2.6 ± 2.20 min and 1.35 ± 0.11 min in Group A and B respectively.

In this study, length of incision, duration of surgery and ease of locating uterus was significantly (P<0.05) shorter in the right flank approach as compared to the ventral midline approach (Table no.1). In right flank approach, the uterine horn and ipsilateral ovary can be easily exteriorized and well exposed through small incision because it lies immediately beneath the incision, therefore, it reduces time to locate the uterine horn and ovary (Kumar *et al*. 2017 and Reece, 2018) [6, 7]. Reece *et al.* (2012) [8] recorded positive correlation between length of surgical incision and surgical time, where they discussed that smaller incision reduces the surgical duration. Murthy *et al.* (2012) [9], Kiani *et al.* (2014) [10], Acharya *et al.* (2016) [11], Kumar *et al.* (2017) [6] and Reece (2018) [7] recorded comparatively smaller surgical time in right flank approach. Murthy *et al*. (2012) [9], Coe *et al*. (2006) [12], Reece *et al*. (2012) [8] Babu *et al*. (2018) [13], reported genitalia could be easily located and exteriorized by right flank as compared to ventral midline approach. On contrary Murthy *et al.* (2012) [9] stated that right lateral flank approach can be performed through small incision as compared to ventral midline approach. However, exteriorizing the contralateral ovary and uterine bifurcation becomes challenging if the incision was incorrectly placed in the right flank Murthy *et al.* (2012) [9]. Once the surgeons become comfortable with right flank approach, ovariohysterectomy can be performed efficiently. However, Coe *et al*. (2006) [12] recorded larger incision did not affect the total duration of surgery.

Table 1: Mean ± SE values of qualitative assessment of surgical techniques in both the groups

Groups	Parameters		
	Length of the surgical incision (cm)	Duration of surgery (min)	Ease of locating uterus (min)
Group A	3.13 ± 0.05	47.67 ± 1.23	2.6 ± 0.20
Group B	1.98 ± 0.07	38.5 ± 1.77	1.35 0.11

B. Intraoperative complications
The intraoperative complications like bleeding and the extended incision were recorded during the entire study. In the present study, the intraoperative bleeding was observed in 50% and 33.33% dogs in the ventral midline and right flank approach respectively. The longer surgical incision provides better exposure and ease of locating and exteriorizing the uterus. The longer surgical incision associated with a greater degree of haemorrhages and muscle trauma Babu *et al*. (2018) [13]. The higher incidences of intraoperative bleeding were recorded in ventral midline approach, it might be attributed to large deposit of abdominal fat in an obese animal, which may complicate the procedure of ligating the ovarian pedicle and hinder the access to the ovaries (Muraro and White, 2014) [1]. The extended incision for exteriorization and identification of the uterine horns and ovaries was recorded 33.33% in ventral midline compared to 50% in right lateral flank approach. The negligible bleeding compared to ventral midline approach was recorded in the right lateral flank; this fact might be due to the right technique for separation of muscle fibers while entering the abdomen Murthy *et al*. (2012) [9]. The requirement for the extended incision in right flank approach might be due to individual variation in body size and conformation, which permits the better and easier access to the ovaries and uterus (Dorn, 1975) [14].

C. Assessment of surgical wound
The average score of surgical wounds based on presences of outcomes viz., condition of the wound, exudation, irritation and wound dehiscence was recorded on 1st, 3rd and 7th postoperative day.

i. Condition of the wound
In both, the groups, mild to moderate inflammatory swelling was observed around the periphery of surgical wounds in two cases of each group. Then it was subsided on 3rd postoperative day in both the groups. However, these findings are contradictory to Abubakar *et al.* (2014) [15], Muraro and White (2014) [1], Coe *et al.* (2006) [12] who recorded higher inflammatory swelling around surgical incision in ventral midline approach.

ii. Exudation
No exudation was observed in group A except in case no. 5, it was observed on the 3rd postoperative day which completely ceased on 7th postoperative day. However, in Group B the exudation was recorded in all the dogs on 1st postoperative day except case no. 4. Then it was completely ceased on 3rd postoperative day onwards. The higher incidences of exudation in right lateral flank approach might be due to the greater thickness of fat and muscle incised during a surgical procedure; this might lead to increased chances of bacterial infection or may result in seroma. In addition to that, the greater visibility of the flank site would have probably increased the chances of exudation being observed by the veterinarian Coe *et al.* (2006) [12]. Murthy *et al.* (2012) [9],

Abubakar *et al.* (2014) [15], Kiani *et al.* (2014) [10], Muraro and White (2014) [1], Coe *et al.* (2006) [12] have also reported presence of exudation from surgical wound postoperatively in right lateral flank approach.

iii. Pain sensation at the site of the wound

In Group A moderate pain at the site of the surgical wound was observed in cases no 3 and 4. However, mild pain was recorded in case no 2 and 6 which completely subsided by 7th postoperative day. In Group B, mild pain was recorded in 3 cases while moderate pain at the surgical site was observed in one case. The pain decreased gradually from 3rd postoperative day and completely subsided by 7th postoperative day. The pain sensation around the surgical wound might be due to muscle trauma during surgery. Grint *et al.* (2006) [16], Hancock *et al.* (2005) [17], Muraro and White (2014) [1] have also reported similar findings.

iv. Irritation

The irritation was elicited by licking and rubbing wounds against hard objects. No irritation was recorded in Group A except case no 5, where irritation was observed on 1st postoperative day only. In Group B, moderate irritation was recorded in 2 cases and mild irritation in 3 cases. The irritation around the surgical site was subsided by 3rd postoperative day in all the animals except case no 5, where moderate irritation was observed which gradually reduced by 3rd postoperative day and subsided by 7th postoperative day. The higher irritation score was recorded in flank ovariohysterectomy which might be due to an inflammatory response against the wound and self-mutilation due to accessible surgical site, therefore, animals tend to rub or lick the surgical site Abubakar *et al.* (2014) [15].

v. Wound dehiscence

The surgical wound dehiscence was observed in 33.33% (2 cases) on 3rd postoperative day in Group A, whereas in Group B all the surgical wounds were completely healed by 7th postoperative day without any complication. The surgical wound dehiscence score was higher in the ventral midline approach compared to the right lateral flank approach. This can be attributed to the fact that surgical incision is longer in ventral midline approach as compared to right lateral flank approach. In ventral midline approach an incision is made on linea alba, which hinders the healing process due to lack of vascular supply and the surgical site is under constant abdominal pressure as compared to right lateral flank approach Acharya *et al.* (2016) [11]. In addition to this, malnourishment, infection, obesity, diabetes, and hypersensitivity to catgut could be the various factors causing surgical wound dehiscence Rafee *et al.* (2015) [18]. Krzaczynski (1974) [19], McGrath *et al.* (2004) [3], Bencharif *et al.* (2010) [20], Rafee *et al.* (2015) [18], Acharya *et al.* (2016) [11], Kumar *et al.* (2017) [6] and Reece (2018) [7] also reported surgical wound dehiscence in ventral midline approach.

D. Clinico-physiological parameters

In the present study, non-significant variations were recorded in rectal temperature, respiratory rate and heart rate in both the groups. However, heart rate and respiration rate were statistically significant at various intervals postoperatively, this might be attributed to the excitement caused by dog and due to human interaction (Hancock *et al.* 2005 and Kumar, 2006) [17, 21].

4. Conclusion

On the basis of inferences drawn during the present study, it was revealed that the right lateral flank approach reduces the surgical duration, incidences of intraoperative bleeding, time to identify and locate the uterine horns and reduces the chances of surgical wound dehiscence as well. Hence it can be concluded that the right lateral flank approach is less time consuming, minimally invasive and can be used as a good alternative to ventral midline approach for ovariohysterectomy in dog.

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