SHORT COMMUNICATION

EFFECTS OF DIFFERENT OVARIOHYSTERECTOMY APPROACHES ON THE WOUND HEALING RATES OF CATS IN SELANGOR, MALAYSIA

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ABSTRACT. The advantages of ventral and flank approaches for ovariohysterectomy (OHE) in terms of wound healing rate when compared to each other are still understudied. The effects of different OHE approaches on the wound healing rates of cats in Selangor, Malaysia were investigated. A total of 50 female cats were randomly included in this study. They were divided into the ventral-approach group (n=25) and the flank-approach group (n=25). The wound healing rates and possible complications that could arise from the surgery in all cats were monitored daily from Day 1 until Day 7 post-surgery. Data were analysed using Independent T-test. Overall, the incision site wound healing rate in cats from the flank-approach group was found to be significantly higher ($P < 0.05$) than in cats from the ventral-approach group (72.55 ± 3.48 % vs. 59.91 ± 3.34 %; mean ± SEM). Complete healing of the incision site was observed in 12 % of cats from the flank-approach group as compared to 8 % of cats from the ventral-approach group. However, 8 % of cats from the ventral-approach group had post-surgery complications whereas the flank-approach group had none. Results from the alternative approach may be attributed to reduced accessibility and contamination of the incision site during recovery.

Keywords: ovariohysterectomy, cat, ventral, flank, healing

INTRODUCTION

Ovariohysterectomy (OHE) on cats in Malaysia is often performed using the conventional ventral midline approach. Practicing veterinarians opt for this approach mainly because of the ease of access to the uterus provided by this approach (Faisal *et al.,* 2014) and familiarity following their previous training as veterinary surgeons (Smith & Séguin, 2012). Regardless, the approach produces higher chances of wound infections and related complications in addition to the difficulty in observing the wound due to poor ventral visibility (Babu *et al.,* 2018).

The flank-approach is usually adopted by veterinarians who work with animal shelters, due to the ease of monitoring the animal's incision site post-OHE from afar (Reece *et al.,* 2012). Although this approach is not commonly practiced in Malaysia, it offers much leverage such as shorter surgical time, lesser trauma due to the surgery, and lower risks of organ hernia from suture breakdowns (Coe *et al.,* 2006). However, variation in body size and wider body conformation in larger animals may result in difficulty in accessing the contralateral ovary (McGrath *et al.,* 2004).

Thus, the anatomical differences and the size of wounds produced by these two approaches play significant roles in affecting the wound healing rate of the incision site (Mickelson *et al.,* 2016). This study aims to investigate the effects of different OHE approaches on the wound healing rates of cats in Selangor, Malaysia.

MATERIALS AND METHODS

This study is carried out in two different private clinics located in Shah Alam, Selangor, Malaysia (Approval: UPM/IACUC/AUP-U013/2020). A total of 50 cats of various breeds are selected randomly and divided into the ventral-approach group (n=25) and the flank-approach group (n=25). The mean body weight of cats is 2.81 ± 0.85 kg (mean ± SD). All cats were monitored immediately post-surgery for possible complications until they were discharged from the clinic. Measurement of the incision site was collected immediately after the surgery, before discharge, and on Day 7 post-surgery.

The measurement of the incision site was carried out using a sterile ruler and was photographed for record-keeping. Written consent was obtained from all cat owners prior to the surgery at both of the clinics.

The ventral midline approach was performed by placing the cat on dorsal recumbency. The skin and subcutaneous fat was incised about 1 cm on the midline between the caudal abdominal and the inguinal mammary. The linea alba and rectus abdominis muscle was exposed by means of blunt dissection of the subcutaneous fats. Surgical scalpel blade #15 was used to make a nick on the linea alba. A pair of mayo scissors was used to extend the incision to expose the peritoneal cavity (Coe *et al.,* 2006). The ovaries and cervix were then ligated and transected using the three-clamp pedicle technique with 3-0 polyglycolic acid suture (SIMFRA) followed by routine closure.

The flank approach was performed by placing the cat on its right lateral recumbency. The skin incision of two finger widths adjacent to the last rib was made as well as one finger width below the spinous transverse process (McGrath *et al.,* 2004). A pair of mayo scissors was used to blunt dissect the muscle fibres underneath to expose the peritoneal cavity. The ovaries and cervix were then ligated and transected using the same technique as ventral midline approach and ended with routine closure.

The wound assessment was conducted by direct observation of the incision site. The appearance of the wound was documented twice, directly after surgery and 7 days after the surgery. The percentage of wound healing rate (WHR) was calculated using the formula below. WHR = 100 % indicates complete healing of the wound whereas WHR = 0 % implies that there is no healing of the wound (Masson-Meyers *et al.,* 2020). The WHR was then analysed using Independent T-test (IBM SPSS Statistics software version 25) and expressed as mean ± SEM. A value of $P<0.05$ is considered as statistically significant.

$$\text{WHR} = \frac{(\text{Initial wound area} - \text{Final wound area})}{(\text{Initial wound area})} \times 100$$

RESULTS AND DISCUSSION

All cats from both groups showed no swelling or discharges on the suture site immediately after the surgery and prior to discharge. Although 1 out of 25 cats from the ventral group had a serosanguinous discharge (Figure 1) around the suture on Day 7 post-surgery, none of the cats from the flank group (Figure 2) had any discharges around the suture site. These results are similar to those reported by Swaffield *et al.* (2019). Apart from that, on Day 7 post-surgery, 2 out of 25 cats (8 %) from the ventral group had

suture breakdown (Figure 3 A and B) whereas cats from the flank group had none. At the end of the study, the incision site of 3 out of 25 cats (12 %) from the flank group completely healed.

The mean wound healing rate of the flank OHE method is significantly different ($P<0.05$) from the ventral midline OHE method (72.55 ± 3.48 % vs. 59.91 ± 3.34 %; mean ± SEM, Figure 4). This is comparable to the findings of Kiani *et al.,* (2014). The disparities in wound healing rates between the two approaches could be attributed to a variety of anatomical variables. For instance, the ventral midline incision was made on the linea alba, which lacks vascularity and is under constant pressure from the abdominal organs pushing down on the incision site due to gravity thus predisposing the site to breakdown. Furthermore, the ventral-approach anatomical placement produces a highly accessible wound site for cats to lick during the recovery period, exacerbating the problem and consequently slowing the healing process (Acharya *et al.,* 2016). Furthermore, cats in the ventral-approach group are more prone to wound contamination as the wound site may come into direct touch with dirty floorings.

According to Reece *et al.,* (2012), the flank method is preferable to the ventral midline route because it requires minimal incision size and reduces the danger of abdominal hernia if the body closure fails. Despite the fact that the initial incision length for cats in ventral group (0.96 cm ± 0.16 cm) was shorter than that of the flank group (2.17 cm ± 0.54 cm), the wound healing rate in the flank approach was still higher than that of the ventral midline approach. Aside from the suture material used, number of throws per knot, and surgeon experience (Miller, 2016), the choice of suture pattern used during skin closure i.e., horizontal mattress versus intradermal suture pattern such as for cats in the flank-approach group may also influence the likelihood of the knot remaining secure and breakdowns to be avoided (Sylvestre *et al.,* 2002).

Figure 1. Serosanguinous discharge around the incision site of a cat from the ventral-approach group.

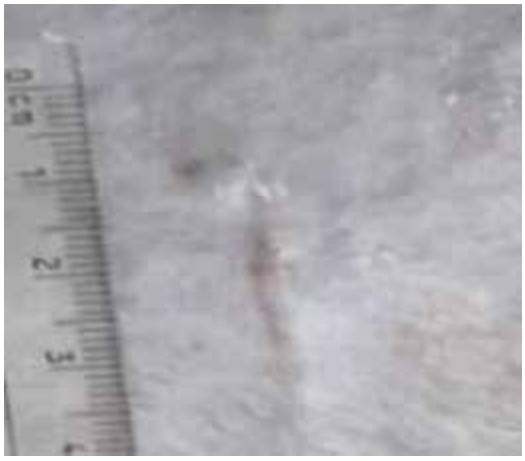

Figure 2. Normal appearance of incision site of a cat from the flank-approach group.

Figure 3. (A), (B) Suture breakdown in two different cats from the ventral-approach group (C) Normal appearance of the incision site of a cat on Day 7 post ventral midline OHE.

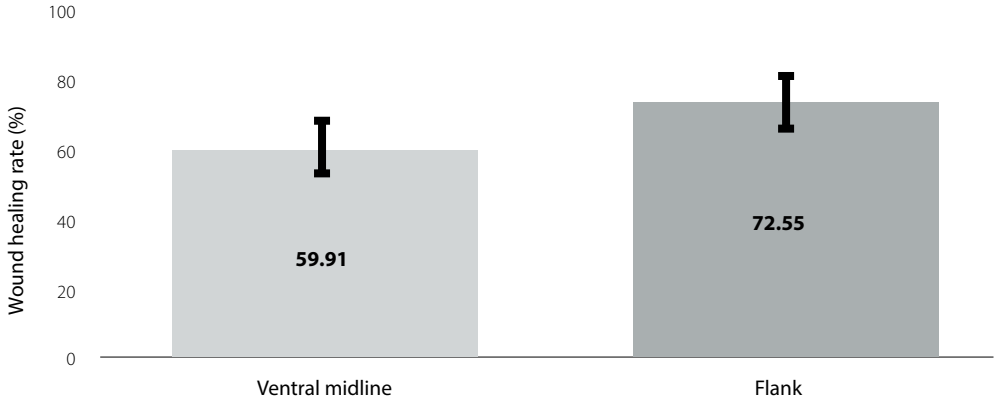

Figure 4. WHR of cats that underwent ventral midline versus flank OHE. Values are presented as mean ± S.E.M.

CONCLUSION

Cats that underwent OHE via the flank approach had significantly higher wound healing rates and lesser post-surgery complications than those of the ventral midline-approach group. Contributing factors to this outcome include accessibility of the animal to the wound and reduced wound contamination from dirty surfaces due to the anatomical location of the incision site.

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