Estimation of laparotomic incision lengh in corelation with uterine size

Iulian MIHĂILĂ, Gabriela BAIDAN, Vasile VULPE
Faculty of Veterinary Medicine from Iasi, Aleea Mihail Sadoveanu nr. 8 700489, Iaşi, România *
corresponding author: e-mail:mihailaiulian1991@gmail.com

Abstract
The objective of this article is to find a way to estimate the lengh of the laparotomic incision after the size of the organ that needs to be removed was measured using an ultrasound machine. Incision size is a very important aspect in post-surgery recovery. A small incision leads to a faster recovery, reduces the risc of post-surgery infections, it leads to less pain for the animal and a lesser inflamatory response. An incision made at first too small needs to be lengthened until it gets to the proppers size and that means extending the time of surgery, producing unnecesary trauma by makeing multiple cuts and increasing the risk of error. We used a total of 25 queens and 18 bitches for this study. We performed an ultrasound exam on each animal and determened the size of the uterine horns and ovaries. Than we used the area of the largest section to estimate the lengh of the incision.
Keywords*: laparotomy, ovariohiyterectomy, ultrasound, incision size*

Introduction

The use of ultrasound exam is more often than ever found in private practices for diagnosing various abdominal organs abnormalities. Ventral median celiotomy and ovariohisterectomy was compared to laparoscopic ovariohisterectomy and laparoscopic ovariohisterectomy showed a faster recovery (Culp WT,2009). On the other hand, the lack of minimal invasive surgery set-ups makes the laparotomy the go to method for most of the surgeons. Laparotomy being the prefered method it is important to know at first how long the incision should be.

Reviewing the literature we concluded that the cases where laparoscopy was used for ovariohisterectomy when the uterus was enlarged were seldon. For this reason linea alba laparotomy is the best way to remove an enlarged uterus or ovaries. Laparoscopic asisted ovariohisterectomy can pe used in cases of pyometra but require a cerfull selection of the cases and gentle handling in order to avoid complications la uterine rupture(Adamovich-Rippe KN 2013).

A smaller incision has more benefits than a larger one, we considered that it is important to estimate the optimal size of the incision. The most important benefits are lower incidence of infections, reduced pain and faster recovery(Brenda Austin,2003)

Materials and methods

A total of 25 queens and 18 intact female dogs were selected for this study. All animals were selected after we found an enlarged uterus because of gestation or because of inflamatory disease. The queens were of age 7 months to 10 years and the intact female dogs were 2 years to 6 years old.. All animals were brought in by their owners either for an exam or for spaying.

At first all animals were clinically examined by using inspection, palpation and thermometry. We than proceded to do an ultrasound exam. During the ultrasound exam we identified the uterine horns enlarged due to pregnancy or liquid acumulation inside the uterine horns. During the ultrasound scanning we measured the diameter of the uterine horns and the area in their wides point. Then we divided the diameter uf the uterus by 2 and multiplied the result by 3.14(π), thus obtaining the lengh of the incision.

To reach this conclusion we considered the fact that in section, the uterine horns form a circle. The circle circumference being 2 times π times radius, we considered that the lenght of the incision is the circle circumferince divided by 2, thus the lengh of the incision beeing π times radius.
Circle circumferince=2·π·radius
Lengh of incision=circle circumferince / 2
Lengh of incision= π·radius

Another way to determine the lengh of the incision for cases were the utherine body was not perfectly circular was to determine the area, extrapolate and do the calculations as it would be a perfect circle.

In cases were the area of desired formation was irregular, we used the ultrasound machine to determine it's area and the sqare root of lengh of the incision is π times area. This formula was obtained by considering the formula above square root raised at the power of square.
$(\text{Lengh of incision})^2=\pi \cdot A \Rightarrow \text{Lengh of incision}=\sqrt{\pi \cdot A}$

All animals were placed in dorsal recumbercy and imobilised after they were anesthetized with xylazin and ketamine. The ventral abdomen was shaved before we performed the ultrasound exam. We desinfected the abdomen and than we placed a sterile field. We calculated the lengh of the incision based on formula and proceded to surgery. In two cases because the uterus could not be folded to be extracted we had to lenghted the incision. In this two female dogs the thickest part of the uterus showed first in the abdominal acces and we could not identify a thinner section of the uterus or the ovaries in order to not have to fold the uterine horns.

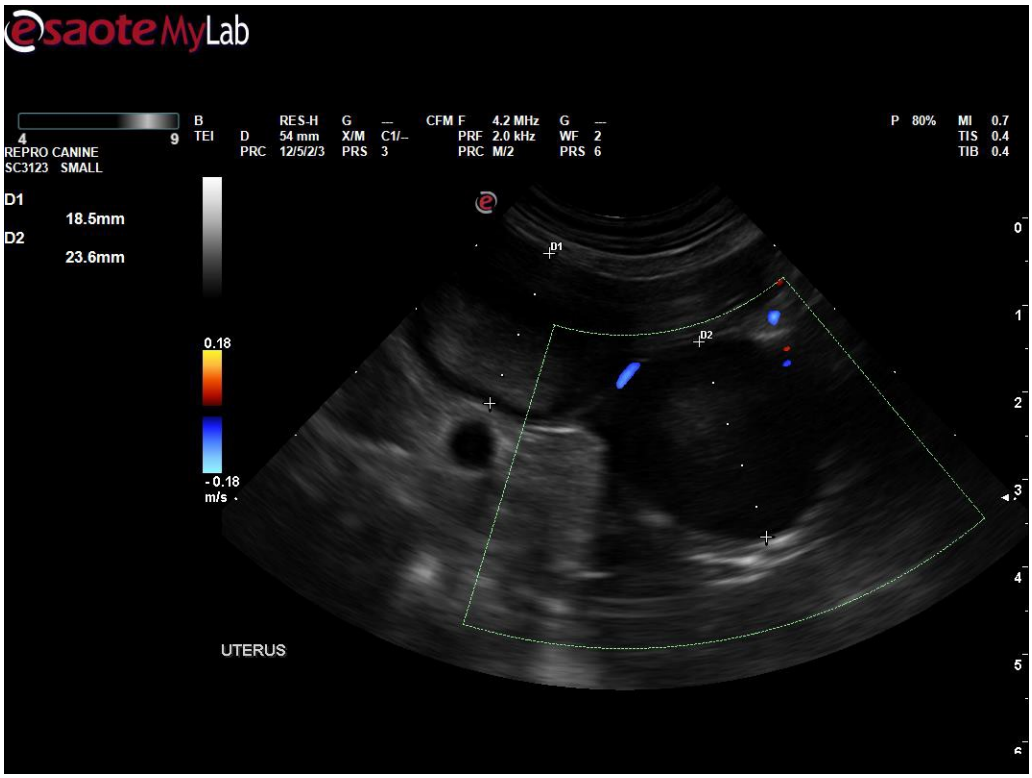

Fig. 1. Female dog, 4 years old. Uterine horns are dilated and contain both hypoecogenic and hyperecogenic areas. The wides area is 23.6 mm in diameter.

In figure 1 we examined the uterine horns using the ultrasound machine. We measured the diameter of one uterine horn in it's wides area and it measured 23.6 mm. The uterine horn beeing of approximate circular form we used the formula discussed before and divided 23.6 mm by 2 and obtained the radius of the circle that was 11.8 mm. We than multiplied this number with π and obtained 37.05 mm.

When we performed surgery the lengh of the incision was 37 mm. We managed to safely remove the uterus. The lengh of the incision sutured is shown in figure 2.

We proceded the same for all the animals included in this study and in almost all situations.

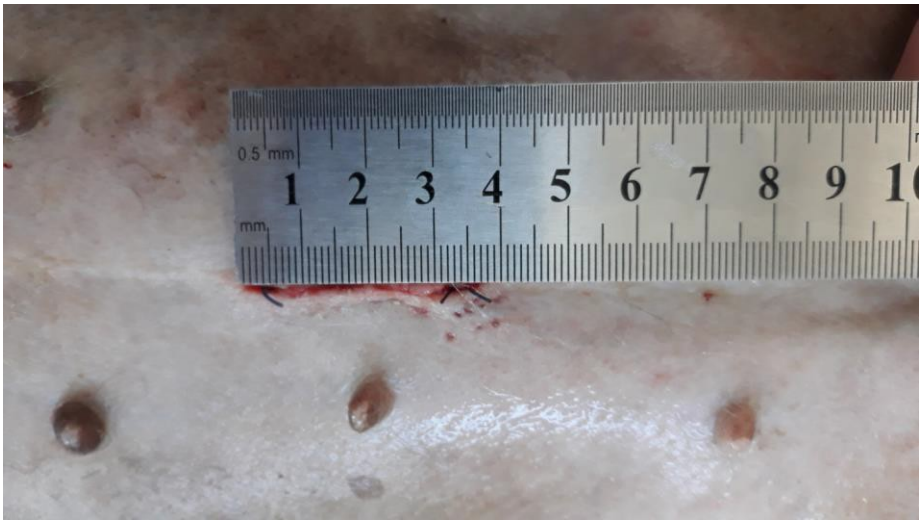

Fig. 2. Female dog, 4 years old. Lengh of incision is 37 mm.

Discussion

Laparotomy is a procedure that is regularly used in animal practice. It is the most used method for spaying bitches and queens and also for solving distocies, pyometra and aother uterine patologies.

Considering this, it is advised that the incision to be made as small as posible in order to ensure a faster recovery. Other benefits of small incisions are reduced pain, smaller chances of infections and other post-surgical complications.

On the other hand an incision too small increases the risk of accidents or makes the procedure impossible. The solution to this problem is extending the incision line but this means wasted time and materials.

We concluded that we needed a way of determening the lengh of the incision before we started surgery. After reaching the formula lengh of incision is πtimes radius of the circle that is described by the uterine horn we aplied it in practice.

The estimated lengh was correct. Considering that all anatomical structures involved have a certain degree of elasticity, this works further more into our advantage. Linea alba is formed of connective tissue and permits a small degree of elasticity. On the other hand, the uterus is elastic and allows to be folded or compressed in order to fit through the incision. This is harder to achive with pregnant uteruses because fetuses tent to stay in place inside a uterus. In pregnant animals we identified the ovaries first and starting from the ovary we pulled the uterine horns and body out in order to ligaturate it.

Concusions

A basic rule in surgery is that incision should be long enough in order to provide propper acces to the area of pathology and to be confortable for the surgeon.

Incision should provide propper acces to the area of interest. Considering that a smaller incision behaves better than a long one, estimating it's lengh before surgery commences it's a factor that betters the odds of a good recovery.

References

1. Adamovich-Rippe, K. N., Mayhew, P. D., Runge, J. J., Culp, W. T., Steffey, M. A., Mayhew, K. N. and Hunt, G. B. (2013), Evaluation of Laparoscopic-Assisted Ovariohysterectomy for Treatment of Canine Pyometra. Veterinary Surgery, 42: 572-578
2. Brenda Austin and Otto I. Lanz and Stephanie M. Hamilton and Richard V. Broadstone and Robert A. Martin , 2003 Laparoscopic Ovariohysterectomy in Nine Dogs, Journal of the American Animal Hospital Association,39, 4, 391-396,
3. CULP, W. T., MAYHEW, P. D. and BROWN, D. C. (2009), The Effect of Laparoscopic Versus Open Ovariectomy on Postsurgical Activity in Small Dogs. Veterinary Surgery, 38: 811-817.
4. Davidson, E. B., David moll, H. and Payton, M. E. (2004), Comparison of Laparoscopic Ovariohysterectomy and Ovariohysterectomy in Dogs. Veterinary Surgery, 33: 62-69.
5. O. G. AJAO 2007 Abdominal incisions in general surgery: a review. Ann Ib Postgrad Med. 2007 Dec;5(2):59-63. PMID: 25161434; PMCID: PMC4110992.
6. Wallace, M. L., Case, J. B., Singh, A. , Ellison, G. W. and Monnet, E. (2015), Single Incision, Laparoscopic-Assisted Ovariohysterectomy for Mucometra and Pyometra in Dogs. Veterinary Surgery, 44: 66-70.