Comparison Between Open and Two Ports Laparoscopic Colopexy in Dogs; an Experimental Study

Awad, M. A[1], Hassan M. M [1], Saad L. S.[1*], and Ezzeldein, S. A.[2]

[1] *Department of Surgery, Anesthesiology and Radiology, Faculty of Veterinary Medicine, Suez Canal University, Ismailia, Egypt*

[2] *Department of Surgery, Anesthesiology and Radiology, Faculty of Veterinary Medicine, Zagazig University.*

Corresponding author: Saad L. S.

Department of Surgery, Anesthesiology and Radiology, Faculty of Veterinary Medicine, Suez Canal University, Ismailia, 41522, Egypt

E-mail: saadlotfy6@gmail.com, saadlotfy@vet.suez.edu.eg

Abstract:

The current study aimed to compare between open and tow portals laparoscopic techniques for colopexy in dogs. Twenty healthy adult mongrel male dogs were divided equally into two groups: open colopexy (OC) group (*n*=10) and laparoscopic colopexy (LC) group (*n*=10). Open colopexy was performed through laparotomy while laparoscopic colopexy was performed using two port technique and transabdominal fixation of the colon. WBCs, serum CRP, ultrasongraphic, laparoscopic second look and histopathological examinations were conducted. Results declared significant increase in leukocytic counts and serum CRP in OC as compared to LC group. Moreover, ultrasonography showed intensive hyperechogenisty between the descending colon and the left abdominal wall. Laparoscopic second look revealed the adhesion between the descending colon and the left abdominal wall in both groups and the omental adhesions with the spleen and the left abdominal wall in OC group. Histopathological examination revealed that granulation tissue, inflammatory cells and tissue degeneration in OC technique were more pronounced than that in LC technique. In conclusion, LC is more recommendable than OC for its non-invasive technique, offered the advantages of direct visualization of the abdominal cavity and reduced incidence of complications.

Keywords: Laparoscopic colopexy, Open colopexy, Rectal prolapse, Ultrasonography, CRP.

Introduction

Colopexy is usually achieved for treatment of chronic rectal prolapse and perineal hernia. Colopexy and cystopexy were considered to be a two-step repair protocol for complicated bilateral perineal hernias in dogs. The aim of colopexy is to make a permanent adhesion between the descending colon serosa and the left abdominal wall to prevent rectal prolapse or help reduce contents within a perineal hernia ***(Smeak, 2020)***. Colopexy operation could be performed by traditional open surgery technique and by using laparoscopy ***(Radlinsky, 2012).***

The performance of open surgery results in more surgical trauma, increases infection, postoperative pain and adhesions formation that subsequently affect the animal health and prolong the hospitalization period ***(Barnett et al., 2011; Lansdowne et al., 2012)***. Hence, there was an urgent need to apply laparoscopic techniques as a minimal invasive technique in the veterinary practices to overcome the disadvantages of open surgery ***(Milovancev and Townsend, 2015).*** Furthermore, it provides visual observation to the abdominal and pelvic organs ***(Patel et al., 2014).***

This study was designed to elucidate the differences between the open colopexy (OC) and a novel two ports technique of laparoscopic colopexy (LC) in dogs regarding postoperative leucocytic count, serum CRP, ultrasongraphic examination, laparoscopic second look and histopathological findings.

Materials and Methods

All procedures used in the present study were approved by the Scientific Research Ethics Committee on animal researches, Faculty of Veterinary Medicine, Suez Canal University, Egypt.

Animals and grouping

This study was carried out in the Department of Surgery, Anesthesiology and Radiology, Faculty of Veterinary Medicine, in both Suez Canal University and Zagazig University. Twenty, apparently healthy mongrel male dogs aged 1-2 years and weighing 18-20 kg were randomly assigned into two groups: OC group (n=10) and LC group (n=10). The dogs were given standard dog food and free access to water. Dogs were kept for two weeks at the animal house before the study for close observation and acclimatization.

Animal preparation and anesthesia

Prior to surgical intervention, food and water were withheld for 12 and 6 hours respectively. The dogs were premedicated with an intramuscular (IM) injection of chlorpromazine hydrochloride

(Neurazine, Misr Co. Pharm., S.A.A.) at a dose of 1mg/kg and atropine sulfate (Memphis pharmaceutical, Egypt) at a dose of 0.04 mg/kg, IM ***(Clarke et al., 2014)***. General anesthesia was conducted by intravenous (IV) injection of thiopental sodium 2.5% solution (E.I.P.I.C.O., Egypt) until the main reflexes were abolished ***(Clarke et al., 2014).***

Surgical techniques

Open colopexy

In this group, dogs were exposed to open colopexy (OC) according to ***Aronson (2003)***. Approximately 8 cm ventral midline skin incision was performed from the level of the umbilicus caudally to it and the abdominal explorations was performed to examine the viscera. The descending colon was identified and exteriorized. About 3 cm length scratching at the anti-mesenteric border of the descending colon without penetration of the mucosa was performed using Babcock grasping forceps (SOPRO-COMEG. Germany). The scratched area of the descending colon was sutured to the left abdominal wall in a simple continuous pattern using 2-0 polyglycolic acid suture (International Sutures Manufacturing Co. Egypt). The laparotomy incisions were closed using polyglycolic acid No.1 in a simple continuous pattern. Skin wound was sutured using silk (D-tek, Huaiyin China for Demophorius Cyprus) No. 1 using interrupted horizontal mattress pattern.

Laparoscopic colopexy

The dog was placed in dorsal recumbency position. Trendelenburg positioning of the dogs was performed to allow the stomach and small intestine to fall cranially away from the descending colon to allow suitable working area ***(Zhang et al., 2013).*** Two ports only were used for colopexy performance with transabdominal fixation of the descending colon to the left abdominal wall. A Veress needle (SOPRO-COMEG. Germany) was inserted in the last right intercostal apace. Then, the Veress needle was connected to an automatic high-flow CO2 insufflator to insufflate the abdominal cavity to an intra-abdominal pressure of 10 mmHg with carbon dioxide. Once a pneumoperitoneum was created, the insufflator was closed, and the Veress needle was removed. A first port was performed approximately at the umbilicus for introduction of a rigid laparoscope with videoendoscopic camera and light source attached to it into the peritoneal cavity with maintaining an intra-abdominal pressure of 10 mmHg via the insufflator connected to its cannula. Under laparoscopic guidance, the second port was applied at about 8 cm

caudal to the first cannula and also about 8 cm to the right of the ventral middle region for placement of laparoscopic Babcock grasping forceps (Fig. 1A). These forceps was used for grasping the descending colon and making about 3 cm seromuscular scratching of its anti-mesenteric border. A half circle round needle holding USP 2-0 polyglycolic acid suture was inserted transabdominally to fix the descending colon with the left abdominal wall. This needle was passed through the skin, subcutaneous tissue, abdominal muscles and peritoneum. When penetration of the peritoneum had been performed, the needle was passed through the seromuscular layer of the antimesenteric border of the descending colon wall for about 0.3 cm (Fig. 1 B, C, and D). Then, the needle was withdrawn outside the abdominal cavity. This process was repeated three times to make three stitches between the antimesenteric border of the descending colon wall and the left abdominal wall as recorded by ***Ko et al. (2019).***

Carbon dioxide was evacuated from the peritoneal cavity via opening the cannulas after complete fixation of the colon. The laparoscopic cannulas were withdrawn after the abdomen was decompressed. Skin incisions were sutured using only single interrupted horizontal mattress stitch for each portal.

Postoperative care

The surgical sites were observed and dressed twice daily with I/M administration of systemic antibiotic, Ceftriaxone sodium, (Ceftriaxone® 0.5 gm, SANDOZ company, Germany) in a dose of 20 mg/kg once daily for 5 days. In addition, 0.2 mg/kg Meloxicam (Mobitil, MUP Pharmaceutical company. Egypt) was administered once daily I/M for 3 days. Skin sutures were removed after complete healing of skin incisions. Dogs were kept under observation till the end of the experiment.

Biochemical analysis

Blood samples were collected before anesthesia, just after surgery, 6 hr. postoperative and on the 1st, 3rd, 5th and 7th days after surgery for hematological and biochemical analysis. ***(Zhang et al., 2013).***

Ultrasonographic examination

At the 1st, 2nd, 3rd and 4th postoperative weeks, ultrasonographic examinations (Sonoscape A5V, China) were performed to assess the adhesions between the descending colon and the left abdominal wall based on the echogenicity. Moreover, it was applied to detect any abnormalities as well as other complications in both groups.

Laparoscopic second look:

Five dogs of each group were examined laparoscopically using only one portal for viewing the abdominal viscera and the colopexy site to evaluate the adhesions. This process was performed at the 4th week postoperatively according to ***(Ezzeldein, 2016).***

Histopathological examination

The dogs were euthanized by overdose of thiopental sodium (SIGMATEC Egypt) at the 2nd and 4th postoperative weeks to evaluate the colopexy sites. The specimens from adhesions, surrounding colon and abdominal wall muscles were obtained and the routine histopathological technique was performed according to ***Bancroft and Gamble (2008).*** Histopathological was performed for each sample according to the scoring system proposed by ***Greenhalgh et al. (1990).*** The score was performed from 1 to 12 as follow:

1-3 denoted none to minimal cell accumulation with no granulation tissue or epithelial travel.

4-6 denoted thin, immature granulation that is dominated by inflammatory cells but has few fibroblasts and blood capillaries or collagen deposition with minimal epithelial migration.

7-9 denoted moderate thick granulation tissue that can range from being dominated by inflammatory cells to more fibroblasts and collagen deposition and extensive neovascularization. Epithelium can range from minimal to moderate migration.

9-12 denoted thick vascular granulation tissue dominated by fibroblasts and extensive collagen deposition with epithelium partially to completely cover the wound.

Statistical analysis

All data was statistically analyzed using a normality test (Kolmogorov-Smirnov) to check normal distribution of the samples, Statistical analysis was performed using the computer program SPSS software for windows version 22.0 (Statistical Package for Social Science, Armonk, NY: IBM Corp) at significant levels ≤ 0.05. Two - ways ANOVA (Analysis of variance) was used to compare between the treatments and period interval in open and laparoscopic groups. Duncan`s post hoc tests was performed for the evaluation of statistical significances among the factors.

Results

In the current study, all dogs survived the operation with no clinical complications. The evaluation of inflammation and postoperative adhesions were assessed through the WBCs, serum CRP, ultrasonographic, laparoscopic look and histopathological findings.

The hematological and serum biochemical finding

The OC group showed a significant (P<0.001) elevation in the WBCs count of OC group (19.75±1.01) when compared to LC group (13.84±0.66). Besides, significant increments in the WBCs of both OC and LC group along postoperative days especially the first postoperative day as compared to base line and at 6 hrs postoperative (Fig. 2).

Serum CRP levels were significantly (P<0.001) upgraded in OC group (14.40±0.99 mg/L) as compared to LC group (11.32±0.68 mg/L). Levels of CRP in OC and LC group started to be significantly elevated just after surgery, at the 1st and 2nd postoperative days in comparison to base line (Fig. 3).

Ultrasonographic findings

Ultrasonographic imaging showed a hyperechoic area between the descending colon and the left abdominal wall in both surgical groups. Additionally, OC group revealed larger amount of anechoic fluids in the 1st week postoperative than LC technique. The amount of these fluids decreased at the 2nd week in both groups. At the 3rd and 4th postoperative weeks, OC group revealed omental hyperechogenicity with the abdominal wall in two cases and with the spleen in another case. On the other side, there were no abnormalities and complications were detected in the LC technique at the 3rd and 4th postoperative weeks (Fig. 4).

Laparoscopic second look:

Laparoscopic look showed the adhesion between the descending colon and the left abdominal wall. Moreover, there were omental adhesions with the left abdominal wall in two cases and with the spleen in another case in OC group. On the other hand, there were no any complications in LC group (Fig. 5).

Histopathological findings

At the 2nd week postoperative, histopathological examination of OC group revealed massive granulation tissue formation between the descending colon serosa and the left abdominal wall and remnants of suture materials and massive tissue destruction. There was congestion of the peritoneal blood vessels and inflammatory cells. Angioblasts, fibroblasts and macrophages were also detected in the formed granulation tissue (Fig. 6 A). In the 4th week postoperative, there was marked shrinkage in the granulation tissue between the descending colon serosa and the left abdominal wall. Additionally, appearance of an adhered part of omentum to the left abdominal was detected in two cases in this group. Congestion of the blood vessels and presence of inflammatory cells

in the granulation tissue were noticed (Fig. 6 B).

At the 2nd week postoperatively, the histopathological examination of LC group revealed moderate amount of granulation tissue formation between the descending colon serosa and the left abdominal wall. Granulation tissue was infiltrated by angioblasts and fibroblasts with minimal tissue destruction, less congested blood vessels and small number of inflammatory cells in LC when compared to OC (Fig. 6 C). In the 4th week postoperative, the granulation tissue formed between the descending colon serosa and the left abdominal wall markedly contracted with improvement of the adhesion site architecture (Fig. 6 D). The scoring of histopathological lesions revealed significant ($P<0.001$) increase in OC group (9.15±0.63) when compared with LC group (5.23±0.44).

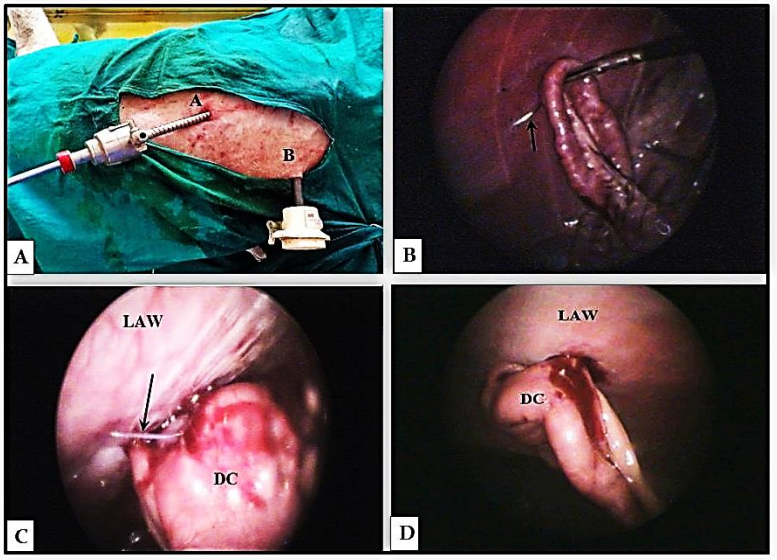

Fig. 1: Showed the position of the first port containing the telescope (A), and the position of the second port (B) **[A]**, transabdominal insertion of the needle (Black Arrow) **[B]**, suturing the antimesenteric border of DC to LAW (Black Arrow) **[C]** and descending colon (DC) after fixation to the left abdominal wall (LAW) (Black Arrow) **[D]** in a dog of group B.

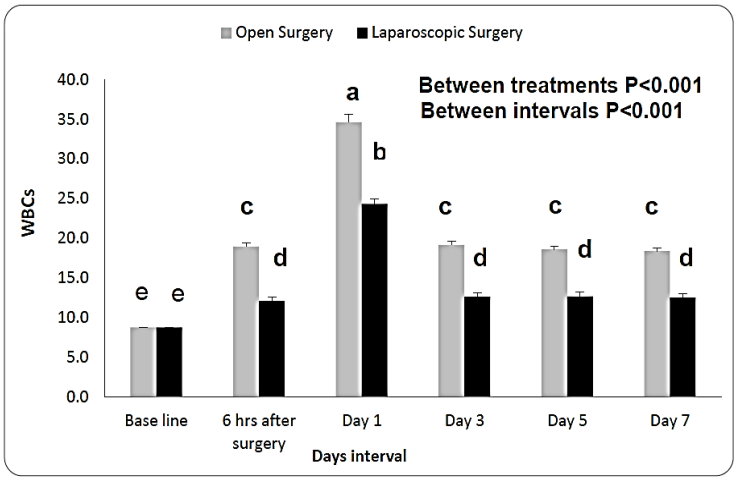

Fig. 2: Leucocytic count of the open and laparoscopic groups just before surgical operation, 6 hr. after surgery, at 1st, 3rd, 5th and 7th postoperative days.

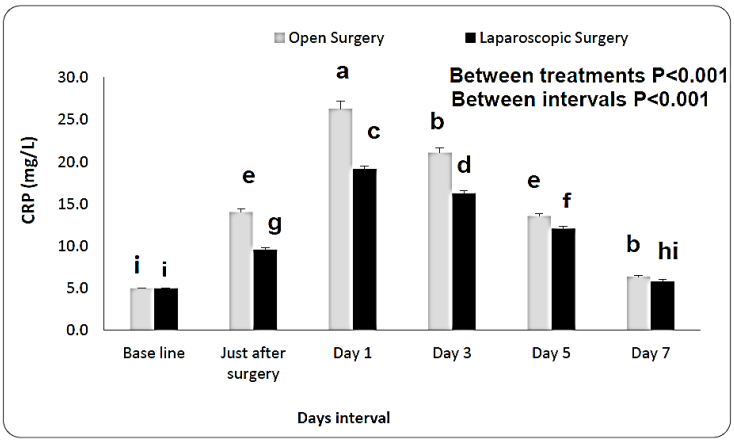

Fig. 3: C-reactive protein (mg/L) of the open and laparoscopic groups just before and just after surgery, at 1st, 3rd, 5th and 7th postoperative days.

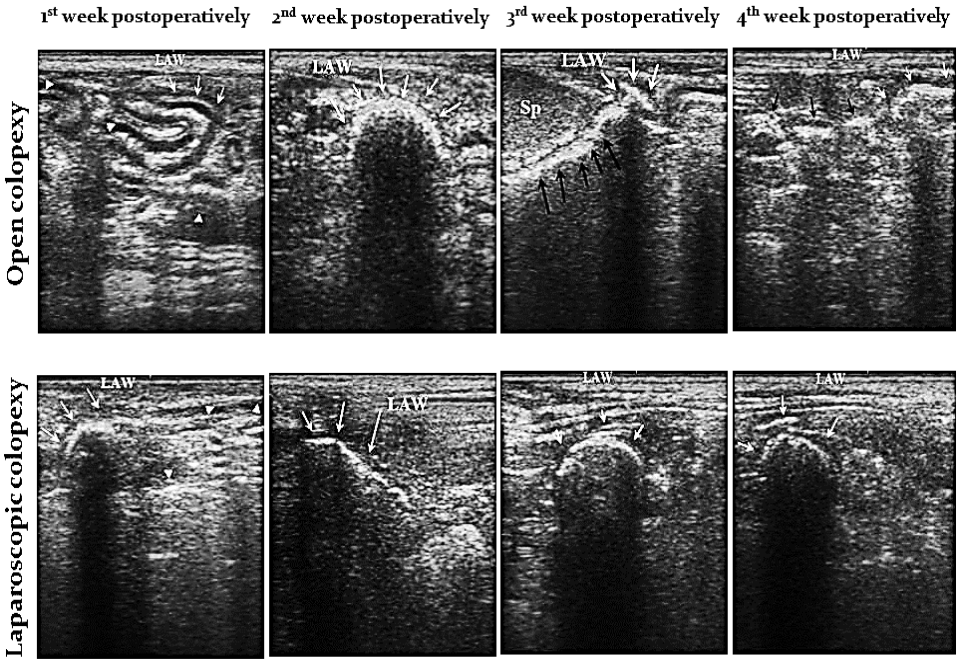

Fig. 4: Ultrasonographic picture showed the hyperechoic site (white arrows) between the left abdominal wall (LAW) and the descending colon in the open and laparoscopic groups at the 1st, 2nd, 3rd and 4th postoperative weeks. In the 1st week, the OC technique showed abundant anechoic fluids (white arrows heads) than LC technique. At the 2nd week, both groups revealed remarkable decrease in the fluids amount. At the 3rd week, OC group revealed hyperechoic sites between parts of omentm to the abdominal wall (LAW) and other parts to the spleen (sp) (black arrows). The 4th week showed the same previous findings in addition to, omental hyperechogenesity with the abdominal wall (black arrows). However, the LC technique showed no abnormalities in the 3rd and 4th postoperative weeks.

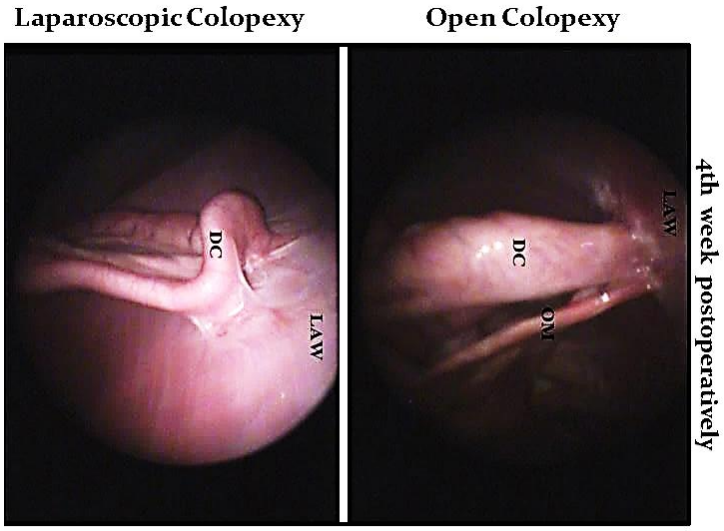

Fig. 5:
Laparoscopic look showed the adhesion between the descending colon (DC) and the left abdominal wall (LAW) in both groups as well as between part of omentum (OM) and the left abdominal wall in OC group.

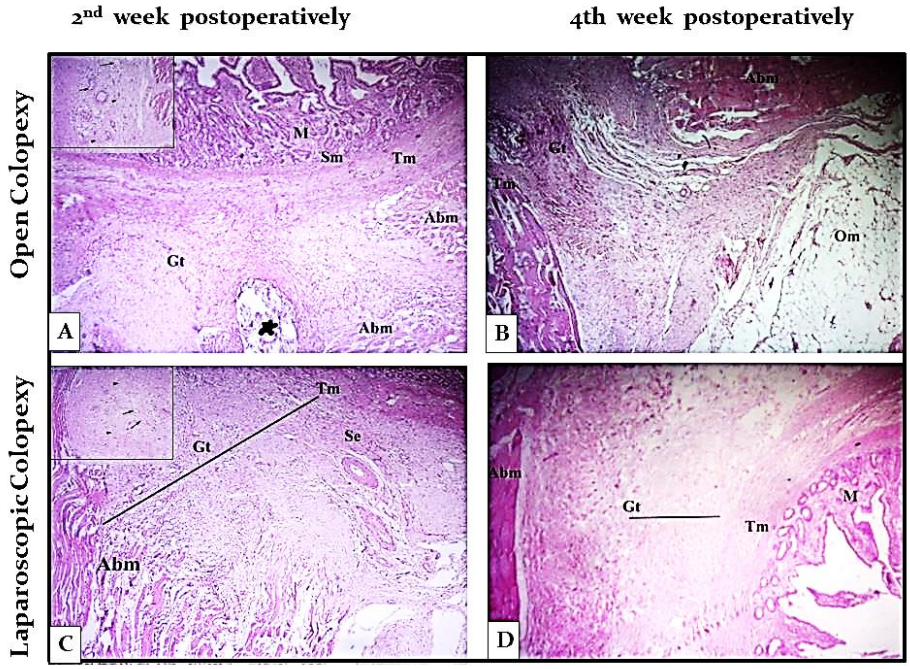

Fig. 6: In the 2nd week postoperatively, histological evaluation (H&E, X200) showed the granulation tissue (Gt) between the descending colon serosa (M: mucosa, Sm: submucosa, Tm: tunica musculosa) and the abdominal wall muscles (Abm). (Star) refers to the suture material. With further examination at X400, angioblasts (black arrows) and the fibroblasts (black arrow heads) were detected in OC group **[A]**. Same findings were detected in LC group but the granulation tissue (Gt) between the descending colon wall (Tm: tunica musculosa, Se: serosa) and the abdominal wall muscles (Abm) (H&E, X 100) was less than in OC group **[C]**.

In the 4th week postoperatively, histological evaluation showed the adhesion between the descending colon wall (Tm: tunica musculosa) and the abdominal wall muscles (Abm) with shrinkage of the granulation tissue (Gt) in-between. Moreover, there was adhesion between part of omentum (Om) and the abdominal wall (H&E, X 100) in OC group **[B]**. In LC group there was pronounced contraction of the granulation tissue with improvement of the adhesion site architecture (Gt) between the descending colon wall (M: mucosa, Tm: tunica musculosa) and the abdominal wall muscles (Abm) (H&E, X 100) **[D]**.

Discussion

Colopexy means creation a permanent adhesion between the serosal surface of the colon and the abdominal wall in order to prevent caudal movement of the colon and rectum. Moreover, it may be performed to prevent reoccurrence of volvulus or displacement of the colon ***(Hance, 1997).*** Therefore, the aim of this study is to compare between traditional open colopexy and a novel laparoscopic colopexy regarding postoperative leucocytic count, serum CRP, ultrasonographic, laparoscopic look and histopathological examinations.

In the present study, colopexy was performed using traditional open technique ***(Zhang et al., 2012)*** as well as a novel laparoscopic technique ***(Ko et al., 2019).*** However, open technique is less sterile, more traumatic, tremor amplified and increase the hospital stay of the patient ***(Duran et al., 2013).*** Hence, the use of laparoscopy is fundamental to overcome the complications of open technique. Laparoscopic surgery is able to decrease postoperative pain, shorten hospital staying period, fasten recovery period and preserve the immune function ***(Duran et al., 2013).***

In the current study, open colopexy was performed using incisional technique by making seromuscular incision in the descending colon wall then suturing it to the left abdominal wall. This technique was performed similarly by ***Zhang et al. (2012)*** in dogs. Additionally, ***Popovitch et al. (1994)*** followed both incisional and non-incisional colopexy techniques in cats and dogs.

The current LC procedure was performed using only two ports (2-3 cm) and the colon was transabdominally fixed to the left abdominal wall compared to OC procedure (8-10 cm). This technique was similar to that of ***Ko et al. (2019)*** who performed the previous laparoscopic colopexy technique in human. ***Ko et al. (2019)*** recommended the two ports in the laparoscopic colopexy for its minimal invasion. On the other side, ***Zhang et al. (2013)*** performed the laparoscopic colopexy in dogs using three ports technique.

The current data showed a significant elevation in the leucocytic count of OC group rather than LC group. The WBCs count started to upgrade than base line after 6 hours postoperatively and reached the highest levels at the first day postoperatively, then downgraded in the subsequent days. These results were in agreement with ***Salehi et al. (2016)*** who stated a positive correlation between WBC count and injury severity. This elevation

could be related to the induced surgical trauma caused by more invasion in OC than LC. Moreover, ***Salehi et al. (2016) e***xplained that the increase in WBCs count might be due to the elevation in the level of cortisol and catecholamines during stress caused by trauma. Cortisol acts via releasing neutrophils from bone marrow and preventing their egression from circulation, while catecholamines proceeds through releasing marginated cells cause an increase in WBC count following trauma. On the other hand, these results disagreed with the findings of ***Santucci et al. (2008)*** who stated a poor correlation between WBC count and injury severity.

Serum CRP is a fundamental acute phase protein that can be utilized to monitor recovery after surgical interferences ***(Kanno et al., 2019)***. Once inflammation occurs, CRP is released quickly in the circulation as an acute phase response ***(Mathon et al., 2011)***. In the present study, the serum CRP levels started to increase just after surgery, reaching its peak at the first day after surgery, then declined to its baseline levels by the 7th day postoperatively in OC and LC groups. These findings indicated that tissue inflammation accompanied with the overall surgical procedure was short-termed as reported by ***Mathon et al. (2009)*** in other laparoscopic techniques of dogs.

Serum CRP levels were significantly (P<0.001) greater in OC group than LC group. This elevation in CRP level in OC group was due to the more surgical trauma associated with the OC group than LC group ***(Neumaier et al., 2006).*** These results was in accordance with ***Zhang et al. (2013).***

In the current study, ultrasonographic examination revealed hyperechoic area between the descending colon and the left abdominal wall along postoperative period (4 weeks) in both groups. Furthermore, OC group showed more anechoic fluids than LC group at the 1st postoperative week that diminished at the 2nd postoperative week. At the 3rd and 4th postoperative weeks, no complications were declared in LC group however, OC group showed hyperechoic area between omentum and spleen. Additionally, ***Matthews et al. (2008*)** noticed the presence of the peritoneal exudation postoperatively in dogs. **M*attoon and Nyland (2002*)** attributed the existence of exudate to peritonitis or haemoabdomen. In accordance with ***Salehi et al. (2016),*** the excessive fluids in OC group could be attributed to the extensive invasion and tissue trauma in OC

than LC which in turn led to more inflammatory reaction and exudate formation. Therefore, the current ultrasonographic examination confirmed the laboratory findings regarding the elevation in WBCs and serum CRP of OC than LC.

Postoperative laparoscopic look was performed to make evaluation to the abdominal cavity through a non-invasive technique. Laparoscopy offers the advantages of direct visualization of the abdominal cavity via only one port at the umbilicus. Laparoscopic look revealed an adhesion between the descending colon and the left abdominal wall in all cases. In OC there was omental adhesions with the left abdominal wall in two cases and other adhesions with the spleen in one case. Similar method of evaluation was performed by ***(Ezzeldein, 2016; Hand et al., 2002; Rodgerson et al., 2001)*** in equines.

In the 2nd postoperative week, histopathological examination of the pexy site of OC group showed massive granulation tissue formation with presence of remnants of suture materials accompanied by massive tissue destruction as well as congestion of the peritoneal blood vessels and inflammatory cells. On the other hand, the amount of granulation tissue, congestion of the peritoneal blood vessels, inflammatory cells and tissue destruction was less in LC than OC group. Histopathological examination revealed shrinkage of the granulation tissue in both groups at the 4th postoperative week. ***Zhang et al. (2013)*** confirmed these histopathological findings concerning the colopexy site. Further histopathological examination to the splenic adhesions showed granulation tissue between the splenic capsule and part of omentum with presence of inflammatory cells, angioblasts and fibroblasts. Moreover, other adhesions were detected with the abdominal wall in two cases. These results were in contrast to the findings of ***Zhang et al. (2013)*** who recorded no complications following open colopexy.

Conclusion

The current study concluded that both open and laparoscopic techniques were successful for colopexy in dogs. Laparoscopic colopexy had many advantages over open technique as minimal surgical invasion and stress, minimized postoperative pain, rapid restoration of function, direct visualization and lowered incidence of complications that makes laparoscopic colopexy more recommendable than traditional open colopexy.

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الملخص العربي
دراسة علي استخدام المنظار في تثبيت القولون في الكلاب

محمد عبدالتواب عوض[1]، محسن محمد حسن زغلول[1]، سعد لطفي سعد ابراهيم[1]*، و شيماء أحمد محمد عزالدين[2]

[1] قسم الجراحة والتخدير والأشعة، كليه الطب البيطري، جامعه قناه السويس

[2] قسم الجراحة والتخدير والأشعة، كليه الطب البيطري، جامعه الزقازيق

أجريت الدراسة الحالية على عدد 20 كلب هجين ذكور. تراوحت اعمارهم بين سنة و سنتين ووزنهم يتراوح بين 15-25 كجم. في هذه الدراسة ، تم إجراء طريقتين جراحيتين لتثبيت القولون : الطريقة الأولى كانت باستخدام الجراحة التقليدية (OC) بينما كانت الطريقة الثانية باستخدام بالمنظار (LC) .

كانت أهداف الدراسة الحالية موجهة إلى:

1- المقارنة بين تثبيت القولون باستخدام الجراحة التقليدية والجراحة بالمنظار في الكلاب من حيث النتائج المعملية (كرات الدم البيضاء ومستوى بروتين سي التفاعلي في الدم) والفحص بالموجات فوق الصوتية ، وفحص بالمنظار ، ونتائج الهستوباثولوجي.

يمكن تلخيص النتائج التي تم الحصول عليها في النقاط التالية:

وقد أظهرت النتائج المعملية (كرات الدم البيضاء و ومستوى بروتين سي التفاعلي في الدم) ، كان هناك ارتفاع في عدد كرات الدم البيضاء لمجموعة الجراحة التقليدية (19.75 ± 1.01) عن مجموعة الجراحة بالمنظار (13.84 ± 0.66). علاوة على ذلك ، كانت مستويات بروتين سي التفاعلي في الدم أكبر في مجموعة الجراحة التقليدية (14.40 ± 0.99 مجم / لتر) من مجموعة الجراحة بالمنظار (11.32 ± 0.68 مجم / لتر) في الايام التي بعد اجراء العملية.

تم إجراء الفحص بالموجات فوق الصوتية بعد الجراحة في الأسبوع الأول والثاني والثالث والرابع بعد الجراحة. أظهر التصوير بالموجات فوق الصوتية التصاق بين القولون النازل وجدار البطن الأيسر في كلا المجموعتين. بالإضافة إلى ذلك ، كشفت مجموعة الجراحة التقليدية عن كمية أكبر من السوائل في الأسبوع الأول بعد الجراحة عن مجموعة الجراحة بالمنظار. ثم انخفضت كمية هذا الإفراز في الأسبوع الثاني في كلا المجموعتين. كانت هناك العديد من المضاعفات في مجموعة الجراحة التقليدية التي ظهرت بالموجات فوق الصوتية بما في ذلك التصاقات بين أجزاء من الثرب في جدار البطن في حالتين وأجزاء أخرى مع الطحال في حالة أخري. على الجانب الآخر ، لم تكن هناك مضاعفات في مجموعة الجراحة بالمنظار.

كما دل الفحص بالمنظار علي التصاق قوي بين القولون النازل وجدار البطن الأيسر في كلا المجموعتين. كما لوحظ التصاقات أخرى بين الثرب وجدار البطن وكذلك الطحال في مجموعة الجراحة التقليدية عند الاسبوع الرابع.

وكانت نتائج الهستوباثولوجي تشير الي وجود التصاق محكم بين القولون النازل وجدار البطن الأيسر. بالإضافة إلى ذلك ، أظهرت الكلاب التي في مجموعة الجراحة التقليدية العديد من التصاقات بين الثرب وأجزاء الجسم الأخرى مثل جدار البطن والطحال بالفحص العيني. كما بين الفحص النسيجي باستخدام صبغة H&E أن الأنسجة الحبيبية والخلايا الالتهابية في مجموعة الجراحة التقليدية أكثر وضوحًا منها في مجموعة الجراحة بالمنظارعند الاسبوع الثاني والرابع من اجراء العملية.