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REMEDIATION OF HEMORRHAGIC ACCIDENTS DURING LAPAROSCOPIC CASTRATION OF SOWS

Catalin MICSA, Dorin TOGOE, Andrei TANASE, Alexandru SONEA

Faculty of Veterinary Medicine Bucharest, 105 Splaiul Independenţei,
050097, Bucharest, Romania;
Corresponding author: tel +40721122908; email: mcscatalin@yahoo.com

Abstract

Laparoscopic surgery gained a lot of field in human and veterinary medicine, replacing succesfully many invasive surgical techniques. Laparoscopic surgery presents several medical advantages, but equally has a high risk of bleeding accidents (rupture of the vascular pedicle, incorrect ligation or application of vascular clamps). The aim of the study was to illustrate the way to remedy this intraoperatory accidents. Research was carried out on 5 sows that were ovariectomized laparoscopically as an experimental model for human medicine. For addressing these accidents, it can be intervened with lavage (irrigation-aspiration), individualization of the vascular pedicle, pressure and clamping with metal clips or external ligatures in order to completely stop the bleeding. Our study showed the real capacity of this methods to control small and medium intensity haemorrhages, without having a negative impact on surgery outcome and recovery period.

Key words: *laparoscopy, bleeding, ovariectomy.*

INTRODUCTION

Laparoscopic hysterectomy has been found in humans to reduce postoperative pain, blood loss, duration of hospital stay, time to return to normal gastric motility, and recovery times when compared to open hysterectomies. Minimally invasive surgical procedures are gaining favor based on their demonstrated advantages to open procedures.

As the benefits of minimally invasive surgery are more widely recognized by veterinarians and their clients, laparoscopic sterilization is growing in popularity. Laparoscopic ovariectomy and ovariohysterectomy procedures are associated with less postoperative pain and a faster return to normal activity versus open sterilization procedures. The advent of newer laparoscopic electrocoagulation devices has further increased the technical feasibility and popularity of these procedures.

With the developments achieved in recent years in laparoscopic surgery, the field has acquired a host of new techniques to achieve haemostasis, allowing the surgeon to approach complex procedures. These techniques include physical modalities (as simple as compression or suturing and as sophisticated as endovascular staples), or thermal modalities (such as bipolar coagulation, laser or ultrasonic dissectors). It is up to the laparoscopic surgeon to be familiar with all these different modalities and their proper use and limitations. It should also be kept in mind that the best approach to haemostasis in laparoscopy is prevention by thorough case preparation and meticulous dissection technique.

MATERIALS AND METHODS

The study we are presenting here was carried out at the Faculty of Veterinary
Medicine, in the clinic of Obstetrics and Gynaecology, Bucharest. Five female intact swine with body weight range from 30 to 100 kg were brought to the centre. Ages were approximated based on dental eruption and wear and ranged from 3 months to 12 months. The pigs were determined to be healthy by physical examination before surgery.

To minimise the stress, animals were premedicated with Ketamine and Xylazine administered intramuscular, prior to transfer to the operating room. Animals arrived in a somnolent condition and were carefully protected against hypothermia. Then were

intubated with an endotracheal tube and received Isoflurane (2%) for maintenance of anesthesia. All animals had an intravenous infusion of dextrose saline set up in the ear vein before starting surgery.

Following skin preparation, animals were immobilized in the dorsal decubits and with 25-30 degrees caudal cranium inclination, then the surgical site was prepared by depilation and isolated with a surgical site. Pneumoperitoneum was induced with CO2 at a pressure of 12 mmHg.5 by insertion of a Verres neddle below and to the left of the umbilicus . Then trocars were mounted so that there should be a triangle consisting of the two trocars for working instruments and an optic trocar for visualization.

The sows underwent laparoscopic ovariectomy and we tried to simulate intraoperatory accidents and how to remedy significant complications like hemorrhage and vessel and artery injuries.

Laparoscopic techniques described in this study, for ligation and hemostasis include sharp dissection and ligature placement, laser dissection and staple or clip placement, sequential electrocoagulation and sharp transection, use of a vessel sealing device and sharp transection and use of an ultrasonic cutting and coagulating device.

Ligating loops are the least expensive method of hemostasis during laparoscopic surgery. This is especially true when self-tied ligating loops are used. The challenge of using ligating loops is that it is more technically demanding than using some of the other methods of hemostasis.

Monopolar and bipolar electrosurgery provide opportunities for hemostasis in the abdominal cavity for removal of ovaries. Monopolar electrosurgery can be delivered via many configurations of laparoscopic instruments, while bipolar electrosurgery is delivered via an instrument that clamps the desired tissue between two jaws.

Vessel Sealing Devices use radio-frequency energy in a bipolar fashion to create sealed vessels as compared to a coagulum in other electrosurgical technique.

Ultrasonic Cutting and Coagulating Devices are designed to coagulate vessels up to 3 mm in diameter.

Surgical stapling devices have been developed to allow easy and safe hemostasis and amputation of abdominal structures.

RESULTS AND DISCUSSIONS

Despite adequate technical skills and careful dissection, serious hemorrhage can suddenly occur, especially during dissection of the lateral pelvic walls and around the sacrum. Hemorrhage in the pelvis is a difficult problem to manage. It may be arterial or venous in origin. In one case we tried to simulate a hemorrhage that occured because of the laceration of the deep pelvic veins . Pelvic veins may be fragile, tortuous, hidden from view and sometimes not available to ligation. Placing clamps using a stapling device with metal or plastic clips, and sutures blindly should never be attempted because it results in an even larger hole that may be even more difficult to manage. Digital pressure is the best choice in such cases as it prevents further tearing and trauma to the veins and also takes advantage of the fact that the pressure in the pelvic veins is low (Fig.1).

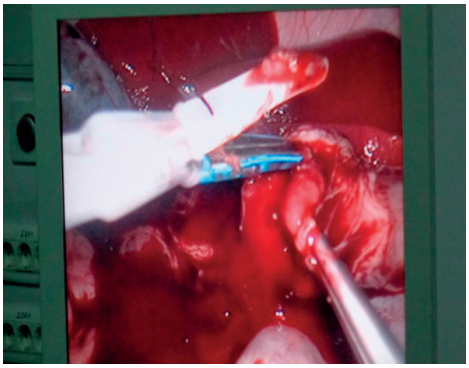

Fig.1 Hemostasis using a stapling device

Next, we simulated an injury to abdominal wall vessels, though avoidable, either the superficial or deep vessels of the anterior abdominal wall can cause bleeding and hematoma during or after laparocopy. Rupture of vessels may result from increasing use of multiple sites. Management depends on whatever the injury is arterial or venous, the amount of bleeding as well the location of the injury. We managed to do a laparoscopic placement of a suture around the bleeding site.(Fig.2)

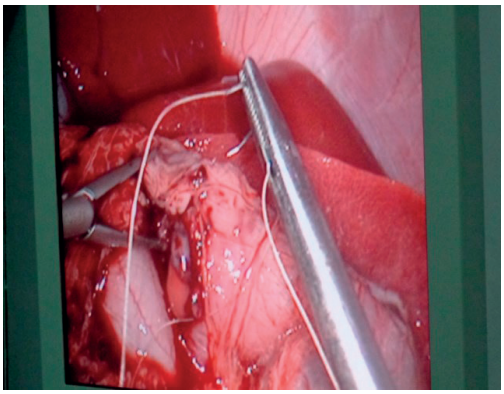

Fig.2: Hemostasis using a suture or Ligating loops.

In one case, we had an arterial bleeding from the ovarian artery. In this case we applied a pressure pack to tamponade the bleeding and then slowly remove the pack, visualize it, catch it and ligate the individual vessels. It could have been also usefull the use of surgical clips with metal or plastic clips, or a coagulation device. (Fig.3-4)

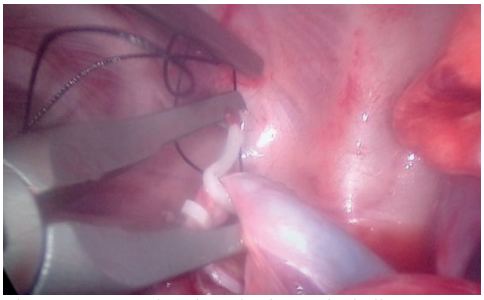

Fig. 3 : Hemostasis using plastic surgical clips.

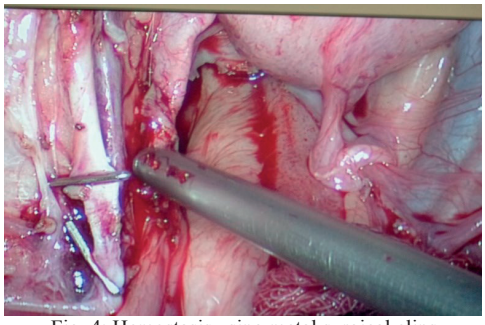

Fig. 4: Hemostasis using metal surgical clips

In our study we used monopolar and bipolar electro-coagulation or endo-loop ligatures to prevent hemorrhage and bleeding of ovarian vessels. The ovary was located and lifted using the grasper and the forceps. The ovarian vessel bed including the middle uterine artery was electro-cauterized using under water 240 W current initially to avoid bleeding during resection. Then the proper and suspensory ligament of the ovary were dissecting using electrocoagulation by forceps. The extraction of the ovarian parenchyma was further carried out using laparoscopic scissor or the forceps provided with the cautery attachment for electro-desiccation. A special attention was given to minimize the internal burn to the abdominal wall. For the other ovary we used a endo-loop ligature. The initial procedure for expose of the ovary was similar as described earlier. Then after loop of black breaded silk no. 1-0 was pushed in after application of lubricant for better sliding. The outer end of the loop was kept long enough and was held with a regular needle holder. The loop was inserted through the post-umbilical port by securing it properly in between the serrated margin of the grasper. The loop was placed over the dissected ovarian parenchyma with help of the forceps and the grasper. Once the loop was placed around the ovary, it was held high against the abdominal wall with the grasper and the knot was slide by means of the forceps. The loop was tighten using the forceps and the pulling the longer strand of the thread held in the needle holder simultaneously.

We used the vessel-sealing device in our study to achieve haemostasis of the ovarian pedicle and for resection of the ovarian ligaments during laparoscopic ovariectomy.

In the case of the bladder or small bowel injuries, the hemorrhage or the laceration can be easily repaired with one or two layered (in the case of the bladder) or single layered (in the case of the bowel) using continuous or interrupted 3-0 polyglycolic or absorbable suture.(Fig.5)

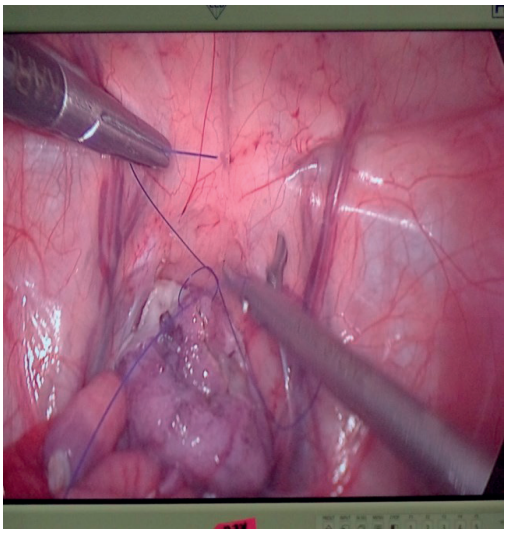

Fig.5: Hemostatis using absorbable suture.

We also had a hemorrhagy of a large vessel and we performed immediate laparotomy to repair the vascular defect.

CONCLUSIONS

Bleeding can be a complication of laparoscopic procedures and there are specific strategies for the management of these injuries.

No major operative or postoperative complications were encountered. Complete hemostasis was accomplished.

All methods of hemostasis were safe. A learning curve exists for clip and suture methods.

Use of a vessel-sealing device significantly shortens surgical time and provides excellent hemostasis during laparoscopic ovariectomy.

Adequate haemostasis is essential for advanced laparoscopic procedures since uncontrolled bleeding may cause significant complications and even required converting to laparotomy to obtain sufficient haemostasis.

Laparoscopic clip appliers, laparoscopic staplers, laparoscopic suturing, various energy sources (monopolar and bipolar electrocautery, laser, ultrasonic dissectors, and argon beam coagulators can be used to obtain hemostasis. Converting to laparotomy to obtain hemostasis may be necessary in some cases.

Depending on the amount and rate of hemorrhage, direct application of electrical and ultrasonic energy has also been advocated. Additionally, although mechanical clips are generally secure, if you expect to perform multiple manipulations near the area of clip placement, the clips could be inadvertently knocked off. In these situations, it may be necessary to consider a suture ligature or a pre-tied suture loop.

Although laparoscopic hysterectomy is not without complications, the incidence is low and many intra- and postoperative complications can be managed laparoscopically. Many complications associated with laparoscopic hysterectomy may be easily corrected if recognized promptly. The wide range of complications include bleeding, penetrating injuries of intra-abdominal organs or vessels, urinary tract injuries and hematomas. The laparoscopic surgeons should be aware of the risks and how to minimize them and how to repair them laparoscopically, when they occur. The ability to suture laparoscopically greatly enhances the surgeons's ability to repair visceral injury. Laparoscopic staplers are presently too bulky for uterine vessel ligation. Stents are not protective, as they frequently cannot be seen in the cardinal ligaments.

The advantage of the vessel-sealing device compared with other haemostatic techniques is the minimal thermal widespread to surrounding tissue. Due to less thermal injury at the surgical site postoperative pain can be reduced.

Laparoscopic complications have several major parts: those which have occurred during inserting veress and inserting trocar and in pneumoperitoneum stage, as well as vascular complications which are developed by applying some surgical instruments and those complications occurred at the stage of trocar extraction which include vascular. The familiarity with the technique and accurate consideration to preventive measures are the best ways of preventing complications and decreasing them in laparoscopic procedures (as in open surgeries). Even though if any complication occurs, timely diagnosis and treatment would be of great importance.

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