

Aortic laceration during veress needle insertion: a laparoscopic disaster

Abstract

Introduction: More than 50% of all complications associated with laparoscopy occur during the entry phase for pneumoperitoneum and insertion of trocars. Major vascular injuries related to blind entry technique are infrequent, occurring in 0.04–0.1% of laparoscopic procedures. Nevertheless, 13%–50% of all vascular injuries are not detected immediately during the operation, resulting in correspondingly high morbidity and mortality rates. Major vascular injuries are the second most common cause of death during laparoscopy, after death from anesthesia, with a mortality rate of 6.37%. The first reaction after vascular injury should not be conversion to laparotomy, but instead assessment and possible control of the injury. Obesity, previous abdominal surgeries, surgical experience, inflammatory bowel disease and pelvic inflammatory disease are known risk factors to injuries during the entry phase in laparoscopy.

Clinical case: A 47 years old woman, BMI 42.2 kg/m², without any previous abdominal surgery, was proposed to an elective left hemicolectomy after 2 diverticulitis episodes in a 6 months period, at a secondary hospital. As soon as the Veress needle was inserted, blood was seen. After the first trocar was placed, a median retroperitoneal inframesogastric hematoma was seen and the surgeon did an unsuccessful attempt to control the bleeding. Since there was hemodynamic instability, a conversion was made. An infrarenal aortic laceration was seen and clamps were put in place to stop the bleeding. The patient was then transferred to a tertiary hospital to be intervened by vascular surgery. An aortoplasty with patch of the great saphenous vein and thrombectomy of the ilio-distal arteries was performed. The time occurred between the injury and the beginning of the vascular surgery was 2 hours. The patient went to an Intensive Care Unit. A total of 15 red blood cells pool (first 2 without compatibility test), 12 plasma units, 3 grams of fibrinogen and 1 pool of platelets were transfused. During the intensive care stay, the patient developed leg compartment syndrome, with the need of fasciectomy and a moderate ARDS, making it harder to manage the disease.

Conclusion: Major Vascular lesions in laparoscopy surgery are rare but are associated with great morbidity and mortality. A close cooperation between laparoscopic surgeons, anesthesiologists, vascular surgeons and intensivists is needed to minimize the damage and to improve the result of the vascular repair. The existence of strict action protocols is necessary to minimize morbidity and mortality.

Keywords: Laparoscopy, Iatrogenic Disease, abdominal aorta

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Introduction

Laparoscopy is an increasingly more common therapeutic technique used by general surgeons, urologists and gynecologists incorporated into what is known as minimally invasive surgery. It is a safe and effective procedure, well tolerated by patients and associated with a better quality of life in the short term. However, different iatrogenic lesions can occur during laparoscopy.

Vascular major lesions are infrequent but have great importance due to the associated morbidity and mortality and the consequent problems of medical litigation. More than 50% of all complications associated with laparoscopy occur during the entry phase for pneumoperitoneum and insertion of trocars. Major vascular injuries related to blind entry techniques are infrequent, occurring in 0.04–0.1% of laparoscopic procedures. Nevertheless, 13%–50% of all vascular injuries are not detected immediately during the operation, resulting in correspondingly high morbidity and mortality rates. Major vascular injuries are the second most common cause of death during laparoscopy, after death from anesthesia, with a mortality rate of 6.37%. The first reaction after vascular injury should not be conversion to laparotomy, but instead assessment and possible control of the injury. Obesity, previous abdominal surgeries, surgical experience,

inflammatory bowel disease and pelvic inflammatory disease are known risk factors to injuries during the entry phase in laparoscopy.

Clinical case

AMVS, 47 years-old, female, BMI 42.2 Kg/m², without previous abdominal surgeries, proposed to be submitted to a segmentar colectomy after 2 acute diverticulitis episodes in a 6 months period, in a district hospital without vascular surgery support, on the 17/3/2021. As soon as the Veress needle was inserted, blood was immediately seen. A trocar was inserted periumbilically and an inframesocolic retroperitoneal hematoma was seen. The surgeon tried to control the hemorrhage unsuccessfully and had to convert to laparotomy. He then proceeded to clamp the aorta artery and transferred the patient to a tertiary hospital. The vascular surgery team who received the patient performed an aortoplasty with a Saphenous Magna Vein patch and thrombectomy of the iliodistal arteries (Figure 1 shows a CT reconstruction of the Aorta artery). The time between the iatrogenic lesion and the vascular intervention was 2 hours

After surgery, the patient was transferred to the intensive care unit. In the first 24 hours, the patient was transfused with 15 red blood cells pools (first 2 without compatibility available), 12 plasma

pools, 3 fibrinogen grams and 1 platelets pool. In the post-op period, the patient developed compartment syndrome in both legs, needing multiple fasciectomy (Figure 2), and also developed a moderate acute respiratory distress syndrome. On the 8th day post-operation, there was a suspected intestinal ischemia supported by CT scan so the patient was subjected to a exploratory laparotomy. It was seen a moderate hemoperitoneum with an active hemorrhage from the jejunal branch of the mesenteric vein and it was solved with a hemostatic isolated X stitch with prolene 5.0. Since it was not seen ischemia, the surgery team decided not to close the abdominal wall for a second look. They revised and closed the abdominal wall 48hours after and no ischemia was seen. During the hospital admission, the patient developed bilateral leg infections (*Enterobacter aerogenes* and *Stenotrophomonas maltophilia* were isolated) on the 13th day, having the need to do seven surgical debridements during the hospital stay.



Figure 1 Angio-CT after surgery.

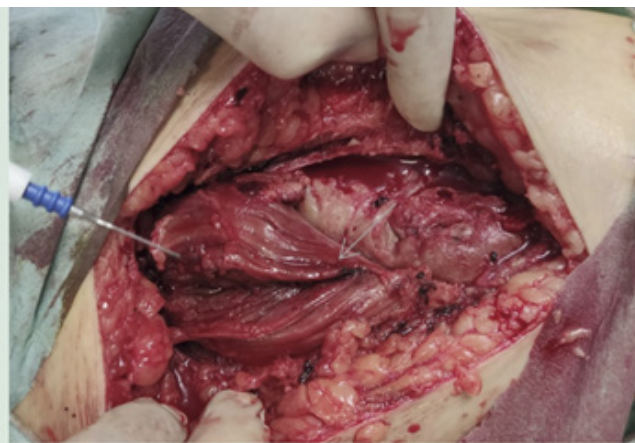


Figure 2 Lower Limb fasciectomy with soleal muscle ischemia shown.

On the 64th day, it was done a partial skin graft of the area of the fasciectomy. Multiple antibiotics were used in the course of the hospital stay. The stay prolonged for a total of 51 days in ICU, 16 days on the vascular surgery unit and 6 days on the plastic surgery unit. It was then transferred for a Continued Cares Unit.

Discussion

Iatrogenic major abdominopelvic vascular injuries can arise from open surgery, endovascular surgery or laparoscopic surgery. The incidence is generally low on laparoscopic surgery. Although uncommon, all surgeons must be aware of their existence, the problems involved and the best way to deal with this life-threatening situation.

Iatrogenic lesions are inextricably linked to laparoscopic surgery. The most common time for vascular lesions to occur is on insertion of the Veress needle, as in our case or in the placement of the umbilical trocar, however other causes during the procedure have been reported.¹⁻⁷ An estimated half of all laparoscopic complications can be attributed to the abdominal entry technique.^{3,8,9} Cornett B et al. say that, Compared to Veress, Hasson and direct entry technique have fewer minor complications and failures, but there is limited evidence regarding major complications. Radially expanded trocars reduced minor vascular complications when compared to bladed trocars. A pooled analysis of Veress technique needle when compared with direct trocar insertion (DTI) showed a borderline significant reduction for major complication and a reduction in minor complications in favor of DTI.¹⁰

A metanalysis published by Labrobina M et al of DTI versus Hasson method shows that DTI eliminates major vascular injury risk and reduces the chances of major visceral injury. Open laparoscopy with the Hasson cannula is the preferred method.¹¹ Contradicting reports from the Australian Safety and Efficacy Register for New interventions and Procedures (ASERNIP-S) and the Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) major vascular and visceral injuries related to open laparoscopy versus closed laparoscopy, there is insufficient evidence on the safety of open versus closed laparoscopy. In a review of 408 trocar related major vascular injuries notified to FDA by the medical device industry between 1993 and 1996, a mortality rate of 6,37% is referred. In another study of major injuries of the aorta, vena cava or iliac vessels a mortality rate of 10,81% was reported.¹² There is an association between arterial and venous lesions in 10% of cases, and most injury sites are located on the terminal aorta and iliac vessels.^{1,4,6,13}

Patient-related risk factors for abdominal vascular or visceral lesions are previous laparotomy surgical scars, history of generalized peritonitis, bowel surgery of any kind, inflammatory bowel disease, very obese or anorectic patients, pregnancy and large intraabdominal masses.¹⁴ Since many laparoscopy surgeries are performed in small hospitals or in an outpatient surgery department, a well-known protocol of action for major vascular lesions must be implemented.¹⁵ The main role is played by the endoscopic surgeon who is doing the procedure that needs to have an early recognition of the injury and provide a rapid and efficient hemostatic control. If The diagnosis is late, a mortality up to 33% is reported.

Injuries of major vessels normally requires team work between the anesthesiologist, to hemodynamically stabilize the patient, and the surgeon, to control the bleeding. Against small hemorrhages that can be controlled laparoscopically, hemorrhages from abdominal major vessels requires a quick conversion to open surgery, with the favorite incision being the median/externopubic incision, and manual or clamping control of the vessel. If the endoscopic surgeon as experience in vascular surgery, he can perform a complete vascular repair. If he has no experience in vascular trauma, a vascular surgeon must be called or, if there are none, transfer to another hospital with vascular support must be carried out to complete the vascular repair

(arteriorrhaphy, patch arterioplasty- as done in our case-, section of the arterial lesion and primary anastomoses or implantation of autologous or syntectic grafts (Figure 3). The treatment of the venous lesion should favor venous reconstruction and avoid ligation, which should only be performed in extreme situations to avoid future sequelae. After the repair is done, the treatment continues in an intensive care unit to correct the sequelae of bleeding, the transfusions if needed, and detect and prevent complications and promote their correction.

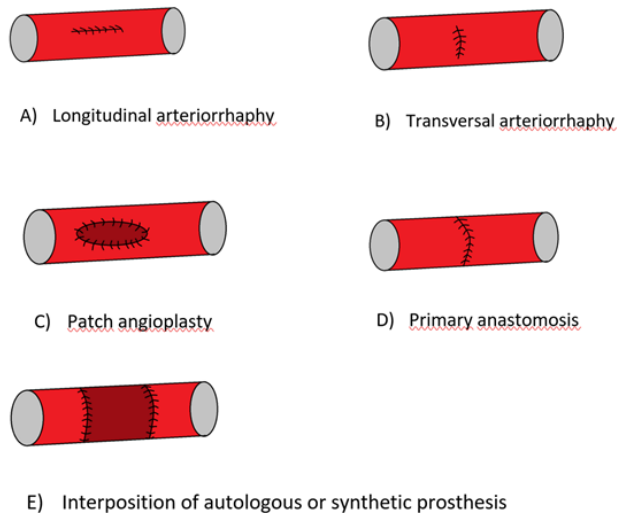


Figure 3 Possible surgery technics to repair an arterial lesion.

Conclusion

Major Vascular lesions in laparoscopy surgery are rare but are associated with great morbidity and mortality. A close cooperation between laparoscopic surgeons, anesthesiologists, vascular surgeons and intensivists is needed to minimize the damage and the improve the result of the vascular repair. The existence of strict action protocols is necessary to minimize morbidity and mortality.

Acknowledgments

None.

Conflicts of interest

None.

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