

## AORTIC LACERATION DURING VERESS NEEDLE INSERTION: A LAPAROSCOPIC DISASTER

### LACERAÇÃO DA ARTÉRIA AORTA DURANTE INSERÇÃO DA AGULHA DE VERESS: UM DESASTRE LAPAROSCÓPICO

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#### ABSTRACT

**Introduction:** Over 50% of complications related to laparoscopy occur during the entry phase for pneumoperitoneum and trocar insertion. Major vascular injuries, although infrequent (0.04–0.1% of laparoscopic procedures), can lead to significant morbidity and mortality, with 13%–50% going undetected immediately during surgery. Major vascular injuries rank as the second most common cause of death during laparoscopy, following anesthesia-related deaths, with a mortality rate of 6.37%. Immediate response to vascular injuries should prioritize assessment and potential control rather than immediate conversion to laparotomy. Recognized risk factors for entry phase injuries during laparoscopy include obesity, prior abdominal surgeries, surgical experience, inflammatory bowel disease, and pelvic inflammatory disease. **Clinical case:** A 47-year-old woman with a BMI of 42.2 kg/m<sup>2</sup>, no prior abdominal surgeries, and two recent episodes of diverticulitis within six months, was scheduled for an elective left hemicolectomy at a secondary hospital. During Veress needle insertion, blood was observed. Subsequently, upon placing the first trocar, a median retroperitoneal inframesogastric hematoma was identified, and attempts to control bleeding were unsuccessful, leading to conversion due to hemodynamic instability. An infrarenal aortic laceration was revealed, requiring clamping to halt bleeding. The patient was then transferred to a tertiary hospital for vascular surgery intervention, involving aortoplasty with a patch of the great saphenous vein and thrombectomy of the ilio-distal arteries. The time from injury to the start of vascular surgery was 2 hours. The patient was admitted to an Intensive Care Unit, receiving 15 red blood cell units (initial 2 without compatibility testing), 12 plasma units, 3 grams of fibrinogen, and 1 platelet pool. During the intensive care stay, the patient developed leg compartment syndrome, necessitating fasciectomy, and moderate ARDS, complicating disease management. **Conclusion:** While major vascular lesions in laparoscopic surgery are rare, they are linked to significant morbidity and mortality. A collaborative effort involving laparoscopic surgeons, anesthesiologists, vascular surgeons, and intensivists is essential to minimize damage and improve vascular repair outcomes. Strict action protocols are crucial to reducing morbidity and mortality associated with major vascular injuries during laparoscopic procedures.

**Keywords:** laparoscopy, iatrogenic disease, abdominal aorta.



## RESUMO

**Introdução:** Mais de 50% das complicações relacionadas à laparoscopia ocorrem durante a realização do pneumoperitônio e inserção de trocar. Lesões vasculares major, embora pouco frequentes (0,04–0,1% dos procedimentos laparoscópicos), podem levar a morbidade e mortalidade significativas, em 13% a 50% não são detetadas imediatamente durante a cirurgia. As lesões vasculares major são a segunda causa de morte durante a laparoscopia, depois das mortes relacionadas à anestesia, e representam uma taxa de mortalidade de 6,37%. A resposta imediata após a ocorrência de lesões vasculares deve priorizar a avaliação e o seu potencial controlo, em vez da conversão imediata para laparotomia. Os fatores de risco associados a lesões na fase inicial da cirurgia laparoscópica incluem obesidade, cirurgias abdominais prévias, experiência cirúrgica, doença inflamatória intestinal e doença inflamatória pélvica. **Caso clínico:** Mulher de 47 anos, IMC de 42,2 kg/m<sup>2</sup>, sem cirurgias abdominais prévias e com dois episódios recentes de diverticulite há seis meses, foi agendada hemicolectomia esquerda eletiva em hospital secundário. Durante a inserção da agulha de Veress, foi observado sangue. Posteriormente, ao colocar o primeiro trocar, foi identificado hematoma infragástrico retroperitoneal mediano, e as tentativas de controlo do sangramento foram infrutíferas, levando à conversão dada a instabilidade hemodinâmica. Foi observada uma laceração da artéria aorta infrarenal, necessitando de clampagem para controlar o sangramento. A doente foi transferida para um hospital terciário para intervenção de cirurgia vascular, que envolveu aortoplastia com retalho de veia safena e trombectomia das artérias ílio-distais. O tempo desde a lesão até o início da cirurgia vascular foi de 2 horas. A doente foi internada na unidade de cuidados Intensivos, recebendo 15 unidades de hemácias (2 iniciais sem teste de compatibilidade), 12 unidades de plasma, 3 gramas de fibrinogênio e 1 pool de plaquetas. Durante o internamento na UCI, a doente desenvolveu um síndrome de compartimento do membro inferior, necessitando de fasciotomia, e SDRA moderado que se associou a um pós-operatório complexo. **Conclusão:** Embora lesões vasculares significativas, em cirurgia laparoscópica, sejam raras, elas estão associadas a morbidade e mortalidade significativas. Um esforço colaborativo envolvendo cirurgiões laparoscópicos, anestesiólogos, cirurgiões vasculares e intensivistas é essencial para minimizar os danos e melhorar os resultados da reparação vascular. Protocolos de ação rigorosos, são cruciais, para reduzir a morbimortalidade associada a lesões vasculares major durante procedimentos laparoscópicos.

**Palavras-chave:** laparoscopia, doença iatrogénica, aorta abdominal.

## INTRODUCTION

Laparoscopy has become a widespread therapeutic technique in the field of minimally invasive surgery, commonly utilized by general surgeons, urologists, and gynecologists. While considered safe and effective, laparoscopy is not without risks, and iatrogenic injuries can occur. Major vascular injuries, though infrequent, carry significant importance due to their associated morbidity, mortality, and potential legal implications. The majority of complications in laparoscopy, over 50%, occur during the entry phase for pneumoperitoneum and trocar insertion. Major vascular injuries related to blind entry techniques are rare, occurring in 0.04–0.1% of laparoscopic procedures. Alarming, a substantial percentage (13%–50%) of these injuries goes undetected

immediately during surgery, leading to elevated morbidity and mortality rates. Major vascular injuries rank as the second most common cause of death during laparoscopy, following anesthesia-related deaths, with a mortality rate of 6.37%. In the event of vascular injury, prompt assessment and potential control should be prioritized over immediate conversion to laparotomy. Known risk factors for injuries during the entry phase of laparoscopy include obesity, previous abdominal surgeries, surgical experience, inflammatory bowel disease, and pelvic inflammatory disease.

## CLINICAL CASE

AMVS, a 47-year-old female with a BMI of 42.2 Kg/m<sup>2</sup> and no prior abdominal surgeries, was



scheduled for a segmental colectomy following two acute diverticulitis episodes within a six-month period. The procedure was planned at a district hospital without vascular surgery support on March 17, 2021. During Veress needle insertion, immediate bleeding was observed. A trocar was periumbilically inserted, revealing an inframesocolic retroperitoneal hematoma. The surgeon attempted unsuccessfully to control the hemorrhage, leading to conversion to laparotomy. The aorta artery was clamped, and the patient was transferred to a tertiary hospital. Vascular surgery intervention included aortoplasty with a Saphenous Magna Vein patch and thrombectomy of the iliodistal arteries (Figure 1 depicts an Angio-CT after surgery). The time between the iatrogenic lesion and vascular intervention was 2 hours. Post-surgery, the patient was transferred to the intensive care unit and received transfusions of 15 red blood cell pools (initial 2 without compatibility available), 12 plasma pools, 3 grams of fibrinogen, and 1 platelet pool within the first 24 hours. Complications ensued, including compartment syndrome in both



FIGURE 1 – Angio-CT after surgery.

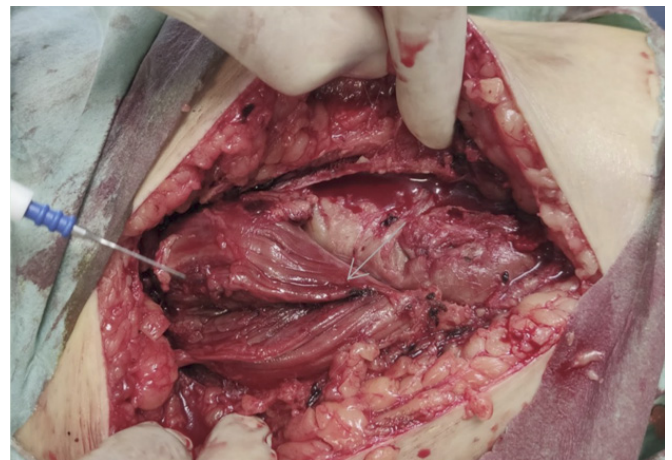


FIGURE 2 – Lower Limb fasciectomy with soleal muscle ischemia shown.

legs requiring multiple fasciectomies (Figure 2) and moderate acute respiratory distress syndrome. On the 8th postoperative day, exploratory laparotomy revealed suspected intestinal ischemia with an active hemorrhage from the jejunal branch of the mesenteric vein, addressed with a hemostatic isolated X stitch using prolene 5.0. Although no ischemia was observed, the abdominal wall was not closed for a second look, and it was revised and closed 48 hours later with no signs of ischemia. Throughout the hospital stay, the patient developed bilateral leg infections (*Enterobacter aerogenes* and *Stenotrophomonas Maltophilia* isolated) necessitating seven surgical debridement's. On the 64th day, a partial skin graft was performed on the fasciectomy area, and multiple antibiotics were administered. The patient spent a total of 51 days in the intensive care unit, 16 days in the vascular surgery unit, and 6 days in the plastic surgery unit before being transferred to a Continued Cares Unit.

## DISCUSSION

Iatrogenic major abdominopelvic vascular injuries can arise from open surgery, endovascular surgery, or laparoscopic surgery. Although the incidence



is generally low in laparoscopic surgery, surgeons must be aware of their existence, the associated problems, and the best approaches to manage this life-threatening situation. Iatrogenic lesions are intricately linked to laparoscopic surgery, with the most common occurrence during the insertion of the Veress needle or the placement of the umbilical trocar, although other causes during the procedure have been reported<sup>1-7</sup>. Approximately half of all laparoscopic complications are attributed to the abdominal entry technique<sup>3,8,9</sup>.

Studies, such as those by Cornett B et al, suggest that compared to the Veress needle, Hasson and direct entry techniques have fewer minor complications and failures. Radially expanded trocars have shown reduced minor vascular complications compared to bladed trocars<sup>10</sup>. A meta-analysis by Labrobina M et al comparing direct trocar insertion (DTI) versus the Hasson method indicates that DTI eliminates the risk of major vascular injury and reduces the chances of major visceral injury. Open laparoscopy with the Hasson cannula is considered the preferred method<sup>11</sup>.

Contradictory reports from ASERNIP-S and RANZCOG suggest insufficient evidence on the safety of open versus closed laparoscopy regarding major vascular and visceral injuries.

In a review of 408 trocar-related major vascular injuries reported to the FDA between 1993 and 1996, a mortality rate of 6.37% was noted. Another study on major injuries to the aorta, vena cava, or iliac vessels reported a mortality rate of 10.81%<sup>12</sup>. There is an association between arterial and venous lesions in 10% of cases, with most injuries located on the terminal aorta and iliac vessels<sup>1,4,6,13</sup>.

Patient-related risk factors for abdominal vascular or visceral lesions include previous laparotomy surgical scars, a history of generalized peritonitis, any type of bowel surgery, inflammatory bowel disease, obesity, anorexia, pregnancy, and large intraabdominal masses<sup>14</sup>.

Given that many laparoscopic surgeries are performed in small hospitals or outpatient surgery

departments, implementing a well-known protocol of action for major vascular lesions is crucial<sup>15</sup>. The endoscopic surgeon performing the procedure plays a key role, requiring early recognition of the injury and providing rapid and efficient hemostatic control. Delayed diagnosis has been associated with a mortality rate of up to 33%.

For major vessel injuries, teamwork between the anesthesiologist and the surgeon is essential. Small laparoscopically controlled haemorrhages can be managed laparoscopically, while haemorrhages from major abdominal vessels necessitate a quick conversion to open surgery. The preferred incision is the median/externopubic incision, with manual or clamping control of the vessel.

If the endoscopic surgeon has experience in vascular surgery, complete vascular repair can be performed. In the absence of such experience, a vascular surgeon must be called in, or if unavailable, transfer to another hospital with vascular support is warranted to complete the vascular repair, including arteriorrhaphy, patch arterioplasty (as in our case), section of the arterial lesion, and primary anastomoses or implantation of autologous or synthetic grafts (see Figure 3).

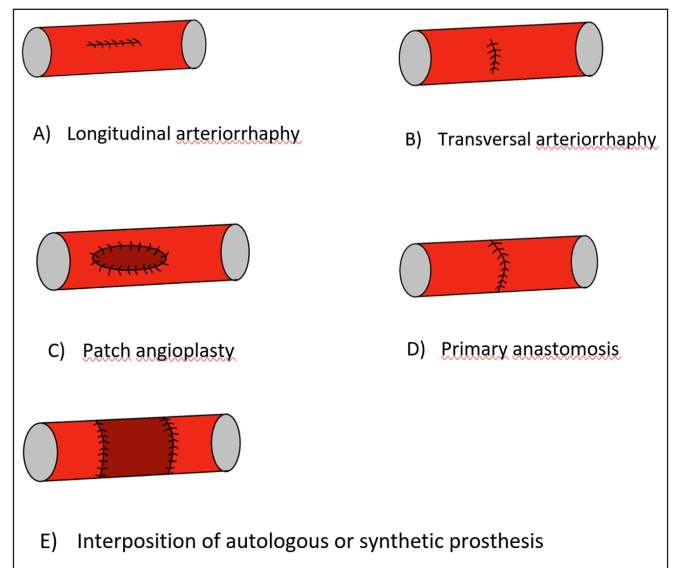


FIGURE 3 – Possible surgery technics to repair an arterial lesion.



The treatment of venous lesions should prioritize venous reconstruction and avoid ligation, reserving it for extreme situations to prevent future sequelae. Following the repair, intensive care unit management is essential to address bleeding sequelae, administer transfusions if necessary, detect and prevent complications, and promote their correction.

## CONCLUSION

Major vascular lesions in laparoscopy surgery, while rare, are associated with significant morbidity and mortality. Effective collaboration among laparoscopic surgeons, anesthesiologists, vascular surgeons, and intensivists is imperative to minimize damage and enhance the outcomes of vascular repair. The implementation of strict action protocols is necessary to reduce morbidity and mortality.

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