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Technical Note

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A safe method for trocar site bleeding; external cauterization under laparoscopic vision

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ABSTRACT

Trocar site bleeding is one of the unnoticeable complications of laparoscopic surgery that can lead to significant problems. With this method, we believe that we can simply and effectively stop trocar site bleeding, and this method can be a standard application.

In trocar site bleeding following laparoscopic surgery, the bleeding area is detected under laparoscopic vision. A standard cautery pen is passed into the skin to a sufficient extent. The cautery provides hemostasis in the bleeding area.

It has been demonstrated that trocar site bleeding is a preventable complication when appropriate methods are used. In preventing trocar site bleeding, certain methods are being used currently such as laparoscopic sealing devices, hemostasis with open surgery, and hemostatic patches. Hemostasis with cautery in our method was demonstrated to have an equivalent effect as open hemostasis. Hemostasis with cautery under laparoscopic vision provides a great advantage for the patient in terms of bleeding control, duration of surgery, and cost.

Keywords: Bleeding; laparoscopy; trocar.

Introduction

Laparoscopic techniques are used to a large extent in the abdominal surgery today. Laparoscopic surgery may be preferred rather than the open surgery for certain reasons such as less postoperative pain, faster mobilization and return to daily life, shorter hospitalization, and less wound infection. However, as with any surgical procedure, laparoscopic surgery also has some complications.[1,2] The incidence of major complications of laparoscopic surgery was reported as approximately 0.003%–6%. Among its complications, trocar site bleeding, bowel injuries, genitourinary injuries, major vascular injuries and organ injuries are the most common.[3]

It is known that trocar entry complications are increased in proportion to the trocar diameter. Bleeding at the trocar entry is a complication that often occurs in laparoscopic surgery; however, it is mostly ignored, as it is generally a minimal bleeding. Though rare, these ignored bleedings may further complicate the laparoscopic operation and may require a blood transfusion and a new operation. Sometimes it can even lead to death. Trocar site bleeding complications, which may sometimes be overlooked, can be prevented by simple measures. Planned and careful trocar entry reduces the likelihood of such complications. Placement of ports on the rectus lateralis and distinguishing the superficial and deep veins benefiting from the

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light of laparoscopy from the inside can reduce the risk of vascular injury. Today, certain methods are being used in preventing trocar site bleeding such as cauterization with open surgery, the use of hemostatic agents, and hemostasis with laparoscopic sealing tools.[4,5] But their use is negatively affected from the fact that these current methods require additional materials and time.

In our method, we argue that hemostasis can be performed, penetrating a cautery pen accompanied by laparoscopy without using any additional materials.

Technique

Through this method, it will be possible to perform hemostasis under direct vision to the bleeding area visible at the trocar site occurring after sleeve gastrectomy, gastric bypass, cholecystectomy and other laparoscopic surgeries. When the literature was examined, it was determined that there were no studies or methods similar to our method. This method is simply applicable in all operating rooms where laparoscopic surgery can be performed. The learning phase is very simple and no advanced training and additional materials are required. It only includes standard vascular and tissue cauterization. Cauterization stands out as a very effective method against bleedings that are observed when the trocar site is checked after the surgical operation or during laparoscopic surgery. When these bleedings are intervened, significant blood losses and other problems related to bleeding will be prevented.

Stages of the Technique

A suitable cautery pen that can be found in any operating room is penetrated from the trocar site on the skin and the penetration of the cautery through the abdomen is followed via the laparoscopic vision. If possible, the whole cautery should be seen, including the end point of its metal tip. This will prevent uncontrolled cauterization or unnecessary skin burns. Subsequently, considering the thickness of the tissue we want to have hemostasis in a controlled manner, metal end part contact is provided in the appropriate time and peritoneal, preperitoneal and novelistic tissue hemostasis is provided. Cauterization should be performed under laparoscopic vision without contact with other organs. If necessary, safer hemostasis can be achieved by placing a sponge in the abdomen to prevent contact with other organs. Convenient application of this method varies depending on the trocar site, the position of the patient, and the severity of bleeding. If necessary, the patient can be repositioned and the bleeding area can be taken under vision.

Discussion

In the literature, trocar entry site bleedings are most commonly observed in cholecystectomy. It is probably because of the numerical majority of cholecystectomy cases.[6] Most bleedings can be revealed in the perioperative stage, but overlooked bleedings can only be noticeable in the postoperative period. This can cause hepatization and swelling of the abdominal wall and low hemoglobin. Most postoperative bleedings are followed conservatively. But if the patient is not stable, the bleeding site should be explored. In postoperative bleeding, re-exposing the patient to surgical procedure adds difficult burdens to the surgical procedures.

Trocar entry site complications are classified as perioperative and postoperative. Trocar entry site complications can occur due to patient-oriented reasons or technical problems. In obese patients, trocar entry site bleedings can occur due to certain reasons such as thicker abdominal wall due to adipose tissue, shorter trocar compared to the abdominal wall, and less trocar mobility caused by excessive adipose tissue. Other causes of trocar site bleeding can be considered as incorrect angle of trocar entry, penetrating without viewing the veins, and large diameter of trocar.[7] In some cases, trocar site bleedings, subcutaneous and muscle bleedings may not be discerned until the end of the operation due to the compression property of trocar. Therefore, at the end of the operation, trocars should be removed and checked under laparoscopy. After the focus of bleeding is detected, it should be determined whether it is caused by major abdominal veins.[8]

In order for taking the bleeding under control, it is necessary to select the appropriate trocar, to place the trocar accurately, and to check the points where the trocar will be placed with laparoscopic vision. Other options for controlling bleeding include stopping bleeding by turning the end of the trocar towards the bleeding area, compressing the bleeding area with direct pressure. Compression can stop small skin bleedings and subcutaneous tissue bleedings, but cannot stop larger bleedings.[9]

In a study conducted by Deyo, foley catheter size 12 was inserted from the trocar to control bleeding and the balloon was inflated at the bleeding site and hemostasis was performed by providing compression. In the same study, hemostasis was achieved through a u-suture on the ab-

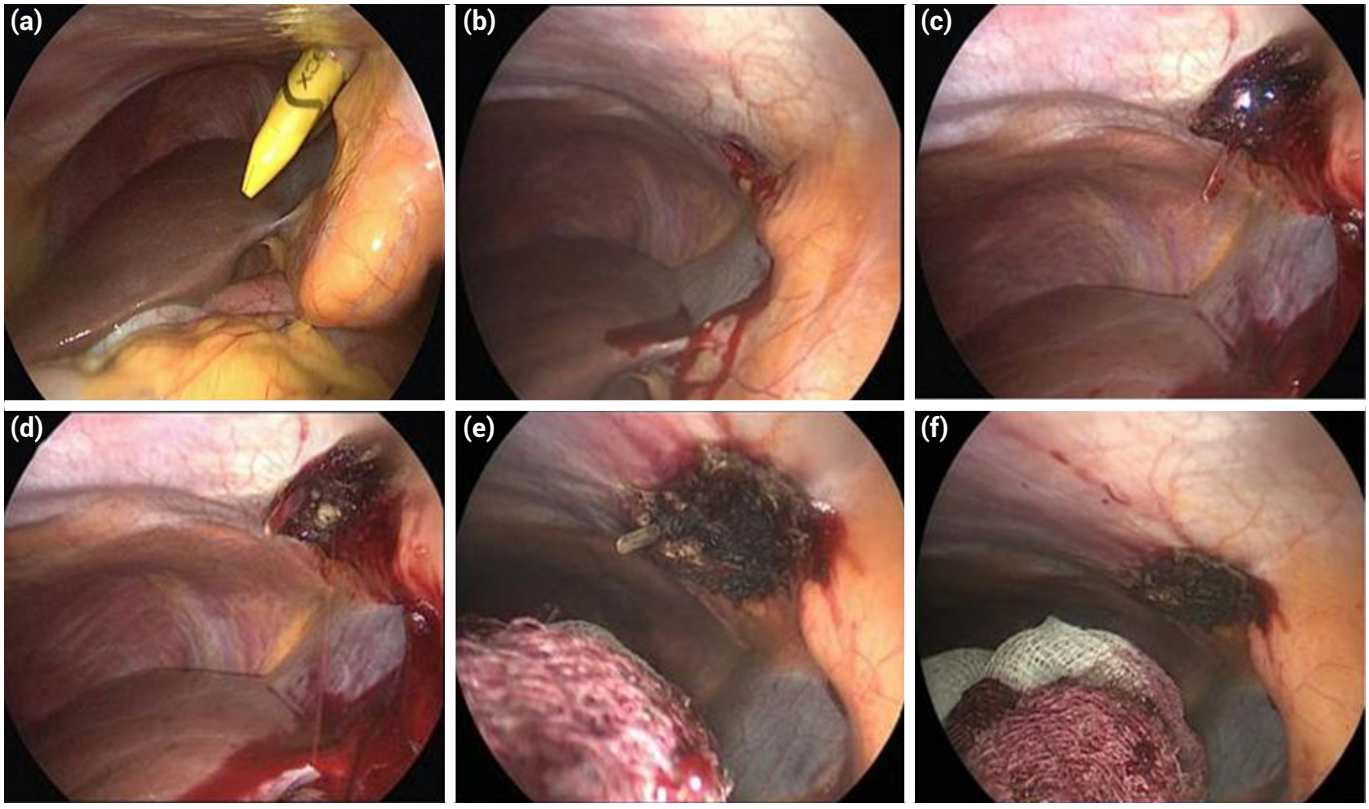

Figure 1. External cauterization of trocar site bleeding. **(a)** Trocar entry, **(b)** Bleeding after trocar entry, **(c)** Providing hemostasis by penetrating the cautery pen, **(d)** Seeing the pulsatile bleeding focus during hemostasis, **(e)** Hemostasis of the bleeding focus, **(f)** Completing the hemostasis stage.

dominal wall.[10,11] There are other studies, in which absorbable u-sutures were applied on the abdominal walls through laparoscopic vision in trocar site bleeding. Similarly, endo-sutures that were developed to close the fascia in the trocar site are also used to control the bleeding. However, transmural sutures, which completely cover the skin and tissues, can cause skin necrosis. In order to prevent this condition, it may be necessary to remove the sutures early.[12,13] In another study, the trocar site bleeding rate was 3.8%, and in order to control the bleeding, they compressed it with a foley catheter as was in the study of Deyo, and in contrast, they provided hemostasis through the open method by enlarging the skin incision.[14] It is observed that providing hemostasis with foley catheter application prolong the operation time. In a study conducted by Vazquez et al, it was mentioned that, for the bleedings in obese patients, incisions were enlarged by open surgery and hemostasis was achieved in this way. [15] In order for compression mechanisms such as foley catheter application to be effective, hemostasis time must be expected. If it is not active, bleeding may occur again. However, as was reported in previous studies in the literature, this clearly extends the duration of the operation. In our method, the duration of the operation is less influenced because there is no additional time such as placing and holding the foley catheter.

In a study conducted by Malik et al, open surgery was applied due to unstoppable bleeding in 1.2% of patients, who developed abdominal wall bleeding due to trocar. In all patients, it was reported that the incision was enlarged and explored, and thus, the hemostasis was achieved.[16] However, in open surgeries, enlarging the incision causes larger scars and wound healing problems. Since it doesn't necessitate enlarging the skin incision, our method is superior than the other methods because it causes less number of scar and wound problems compared to open surgeries.

There are previous studies in the literature in which hemostatic agents were used as tampons in trocar bleeding.[16] Similarly, it was observed in some other studies that hemostatic agents were wrapped around the trocar, benefiting from both compression and hemostatic properties.[5] However, it is known that the use of hemostatic agents causes infection due to the presence of a foreign body.[15] When hemostatic agents are used from outside to prevent trocar site bleedings, adverse effects (in terms of wound healing and infection) restrict the use of the method. Since there

are no foreign bodies in our method, such problems will be less common. Compared to the methods that use special materials such as endo-suture, hemostatic patches or plugs, this method does not require any additional costs because no special materials are needed. Therefore, it can be mentioned that this method is superior to the others in this sense as well.

Our method allows to intervene in all small and medium-sized bleedings with cautery penetrated through the skin opening under laparoscopic vision. In this way, it provides advantages over other methods owing to its many positive features such as causing less scars and other wound problems, being a cost-free method, and not prolonging the duration of surgery.

Disclosures

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

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