

TO DETERMINE THE EFFICACY OF FOLEY CATHETER TAMPONADE FOR CONTROLLING BLEEDING AT THE EPIGASTRIC PORT SITE DURING LAPAROSCOPIC CHOLECYSTECTOMY

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Abstract

Background: Acute bleeding and delayed blood clot development from laparoscopic incision sites are few but may be potentially serious consequences. The symptoms often appear between days 2 and 6 after the surgery. They may include noticeable bruising, severe pain, or a decrease in hematocrit levels without any accompanying symptoms. The occurrence of bleeding into the abdominal wall, resulting in a large hematoma that necessitates blood transfusion, extended hospital stays, and emergency surgeries, is rare. The aim is to determine the efficacy of Foley catheter tamponade for controlling bleeding at the epigastric port site during laparoscopic cholecystectomy. **Materials and Methods:** This research was conducted at the department of surgery and a total of 30 participants were included in the research. The research included all patients who had the complication of bleeding at the port site in the upper abdomen after undergoing laparoscopic cholecystectomy during a period of 18 years. **Result:** This research assessed a group of 30 patients who had port-site bleeding as a complication after laparoscopic cholecystectomy. Among the 30 patients, 20 (66.67%) were female and 10 (33.33%) were male. This surgery was performed on a total of 30 individuals. A total of 29 patients, accounting for 96.67% of the sample, had a positive response to this intervention, resulting in a favorable outcome. There was a single failure with this intervention, namely the displacement of the Foley balloon. To address this issue, external traction was applied using an intra-venous set. There were no adverse effects or difficulties caused by the use of a Foley catheter for tamponade. None of the patients had pressure necrosis of the front abdominal wall. Every patient was released from the hospital on the 6th day after surgery, with a wound that had healed properly and vital signs that had returned to normal. **Conclusion:** It is essential to provide comprehensive surgical training for the proper insertion of a port and to take preventive steps to avoid vascular damage while inserting a trocar in every laparoscopic operation. The occurrence of bleeding from the epigastric vessels caused by the insertion of a trocar during the placement of an epigastric port may be successfully controlled by using a Foley catheter to provide pressure, as long as it is done in a thoughtful manner.

INTRODUCTION

Abdominal surgery extensively utilizes laparoscopic procedures nowadays. Laparoscopic surgery is often favored over open surgery due to many advantages, including less postoperative discomfort, quicker recovery and return to normal activities, shorter hospital stays, and lower risk of wound infection.

Nevertheless, like other surgical procedures, laparoscopic surgery is not without its complications.^[1,2]

The prevalence of significant problems in laparoscopic surgery was shown to be from 0.003%–6%. The most common consequences of this procedure are trocar site hemorrhage, intestinal injuries, genitourinary injuries, severe vascular

injuries, and organ damage.^[3] However, some issues at the port site are emerging afterward, including significant port site bleeding and hematoma, port-site infection, port-site herniation, and port site retention of stone and debris, among others. Laparoscopy involves the insertion of a rigid endoscope (laparoscope) into the peritoneal cavity via a port, allowing for the inspection and diagnosis of its contents. This procedure also enables the implementation of therapeutic interventions.^[4,5] Trocar damage to the arteries of the abdominal wall is a rare but possible complication, with an occurrence rate ranging from 0.2% to 2% in laparoscopic surgeries. Without a doubt, the most frequent abdominal wall damage caused by a trocar is a hemorrhage of the epigastric arteries. This is a severe and avoidable consequence.^[6]

Uncommon but potentially dangerous problems arising from trocar damage include immediate bleeding and delayed hematoma from the port sites. These complications may be averted. Although uncommon, the secondary puncture sites might cause vascular damage to the inferior epigastric artery (IEA), especially in the anterior abdominal wall. Often, these injuries go unnoticed during laparoscopy because the cannula and the pneumoperitoneum create a tamponade effect, and the patient's venous return is reduced owing to the steep Trendelenburg position they are put in. The symptoms often manifest between days 2 and 6 after the surgery, and may be seen as noticeable bruises, intense pain, or a decrease in hematocrit levels without any accompanying symptoms. The occurrence of bleeding into the abdominal wall resulting in a large hematoma that necessitates blood transfusion, extended hospital stay, and emergency surgical interventions is rare.

They may result in substantial illness and, if neglected, can ultimately lead to death. Hemorrhaging from the port-site is a result of damage to the superior epigastric vessels. Epigastric vessel injuries are often seen vascular injuries that mostly result from inadvertent insertion of the trocar cannula or improper positioning of the epigastric port away from the midline. In order to prevent this, it is recommended for the camera assistant to position the tip of the laparoscope close to the intended incision site, allowing the light emitted from the tip to clearly outline the blood arteries in the abdomen wall. By doing so, the surgeon may avoid damaging these veins; however this technique may only be feasible in patients with very little body fat. Surgeons should consider inserting an epigastric trocar precisely in the 'umbilico-xiphoid midline' for optimal results.^[7,8]

If the superior epigastric artery is injured, tamponade may be achieved by applying pressure to the location with a trocar. This is often effective, but if bleeding persists, direct suture ligation may be attempted. Controlling the bleeding from the port site is challenging due to the tiny size of the incision, as well as its deep location inside the

incision, particularly in obese individuals. When patients who are using anti-platelet medicines require emergency surgery, the bleeding may be controlled by placing deep sutures in the wound. This leads to the formation of a significant scar that is aesthetically unacceptable. Recently, a novel approach has been developed that includes using hemostatic agents like surgical or gel foam to block the port site. Examples of effective wound healing materials are surgical foam and gel foam, which have shown great results without any consequences such as port site infection or hematoma. Nevertheless, the crucial factor in dealing with this complication is the use of proficient surgical technique, awareness, and prompt management.^[9]

There are several techniques available to handle vessel injuries caused by trocar insertion. One method involves using a laparoscopic port fascial closure suture passer, also known as the "special Awl" among laparoscopic surgeons, to stop bleeding from the superior epigastric vessels. This is done by suturing the vessels above and below the bleeding area with vicryl 2-0 suture. Another technique involves using a Foley catheter to apply pressure and stop the bleeding.

In the procedure of using a Foley catheter to stop bleeding from the epigastric port, a 22 Fr Foley's catheter is inserted into the port, filled with saline solution to expand it, and secured to the front wall of the abdomen using sutures and gentle pulling. Following a 24-hour period of examining the Foley catheter balloon tamponade under traction to control bleeding, the catheter is deflated, removed, and the port incision is repaired using sutures.

Complications of Foley catheter tamponade include pressure necrosis of the anterior abdominal wall and displacement of the balloon, which may lead to re-bleeding at the port-site. Various established procedures exist for halting bleeding. The procedures used include deep sutures, application of hemostatic agents at the port site (such as Surgical), and utilization of a Foley catheter.^[10,11] These procedures may be necessary to halt PSB, particularly in obese individuals and those on anticoagulants and/or antiplatelet medications. Inserting the Foley catheter is a straightforward procedure.

MATERIALS AND METHODS

This research was conducted at the department of surgery and a total of 30 participants were included in the research. The research included all patients who had the complication of bleeding at the port site in the upper abdomen after undergoing laparoscopic cholecystectomy during a period of 18 years. This research eliminated cases when bleeding from the port-site stopped on its own without any intervention.

Methodology: For instances of bleeding at the epigastric port-site, a sterile 22 Fr Foley catheter

(often a 03-way Romson's catheter) is introduced into the peritoneal cavity via the bleeding port. Next, the balloon is filled with 25-30 milliliters of saline solution. After the balloon is filled with air, the catheter is raised and secured to the skin using a suturing technique called the "Roman sandal pattern" for catheter fixation. The secured Foley catheter is then drawn across a roll of abdominal sponge and affixed to the abdomen skin using sutures in a circular concentric ring or a lazy 'S' loop, in order to prevent inadvertent removal of the catheter by anybody assisting the patient. The Foley catheter is left in place for an average duration of 24-48 hours to monitor for any continuing bleeding. This will be assessed by seeing the 32 Fr abdominal drains that is inserted into the hepato-renal pouch and removed from the lateral laparoscopic port site, leading to a urobag. Once the amount of output in the urobag is less than 05 ml and there is no presence of blood, the bulb is deflated and taken out. The patient is being closely monitored for a few further hours to observe vital signs, and will be released to their home the following day.

RESULTS

This research assessed a group of 30 patients who had port-site bleeding as a complication after laparoscopic cholecystectomy. Among the 30 patients, 20 (66.67%) were female and 10 (33.33%) were male. The data pertaining to the research is shown in [Table 1]. This surgery was performed on a total of 30 individuals. A total of 29 patients, accounting for 96.67% of the sample, had a positive

response to this intervention, resulting in a favorable outcome. There was a single failure with this intervention, namely the displacement of the Foley balloon. To address this issue, external traction was applied using an intra-venous set [Table 2].

Out of a total of 30 instances, this specific patient experienced the collection of 400 ml of blood within 5 hours after surgery in the sub-hepatic 32 French drain, despite our typical use of a Foley catheter tamponade. In order to address this issue, we used an improved mechanical traction system that we had developed ourselves. We employed a specially made external traction device, and applied it via a repurposed intravenous line. This resulted in a successful conclusion.

The patient additionally needs 03 units of whole blood transfusion after the operation. External traction was used for 48 hours after the surgery, after which the external traction was removed. However, the Foley catheter bulb remained inflated for an additional 24 hours. After duration of 24 hours, there was a mere 05 ml of sero-sanguinous collection seen in the urobag. Consequently, the Foley catheter was extracted on post-operative day-6. The patient was then released on the eighth day after the surgery, with stable vital signs and a well-healed incision.

There were no adverse effects or difficulties caused by the use of a Foley catheter for tamponade. None of the patients had pressure necrosis of the front abdominal wall. Every patient was released from the hospital on the 6TH day after surgery, with a wound that had healed. properly and vital signs that had returned to normal

Table 1: Demographic profile of patients

Age in years	Number	percentage
Below 30	15	50
30-50	9	30
Above 50	6	20
Gender		
Male	10	33.33
Female	20	66.67
Co-morbidities		
DM-2	3	10
Hypertension	4	13.33
Hypothyroidism	2	6.67

Table 2: Rate of successful

Rate of successful	Number	Percentage
Successful Foley catheter tamponade	29	96.67
Failure of Foley catheter tamponade	1	3.33
Average duration of tamponade given	24-48 hours	
Mean of days of hospital stay	5.54±0.67	

Table 3: Complication related to Foley catheter tamponade

Complication	Number	Percentage
Pressure necrosis of abdominal wall	0	0
Re-bleeding	1	3.33
Blood transfusion requirement	1	3.33
Mortality	0	0

DISCUSSION

Port-site hemorrhage caused by damage to the inferior epigastric artery has been seen in 0.2-2% of patients. Hemorrhaging from the trocar site resulting from vascular injury may be identified immediately upon insertion of the trocars. Hemorrhage may occur in the vicinity of the port site or blood may be seen trickling up the shaft of the cannula. Various techniques may be applied to reduce bleeding, including the use of direct electrocoagulation, tamponade using an inflated balloon of the Foley catheter via the trocar site, or sutures that go through the complete thickness of the abdominal wall. At times, a rupture in a blood artery may not be immediately seen due to the pressure exerted by the cannula. This rip may only be identified when the cannula is removed at the end of the procedure. Hemorrhaging often occurs when the furthest outward port is inserted. The insertion of this port is usually done with direct visualization, while the overhead lights are turned off. Applying strong pressure to the light source on the side of the abdomen from the inside, in order to highlight the area where the port will be inserted on the outside, will help to clearly see the important blood arteries under the skin and prevent any harm. However, this may not be feasible in people who are obese. This simple but crucial approach significantly decreases the likelihood of bleeding at the port site. To minimize harm to the IEA, it is important to avoid entering obliquely and have a clear awareness of the course of the IEA in respect to clearly recognizable bone surface landmarks. Upon reviewing the video recording of the index patient, it was found that the lower lateral accessory port was positioned directly next to the inferior epigastric vessels. These vessels were damaged during manipulation, but there was no immediate bleeding upon insertion at that moment.^[12-14]

We discovered this Foley catheter tamponade approach for controlling epigastric port site bleeding over twenty years ago, at a time when the internet was just beginning and not very effective at spreading the newest surgical advancements worldwide. He used practical reasoning in the language of aviation, known as the-test. The pilot's motto is "Acquire knowledge through testing and use testing as a means of learning." He acquired and evaluated this approach and used it in every instance of bleeding at the epigastric port site; subsequently, he conducted further tests to further enhance his knowledge. The research emphasizes the significance of deliberate and meticulous trocar placement, which might be considered a calculated engineering approach to surgery. A comprehensive knowledge of the structure of the front part of the abdominal wall is essential. However, considering the variances in anatomy, it is as vital to have effective procedures for dealing with trocar injuries. Transillumination of the skin may be used to

discover superficial vessels, whereas direct laparoscopic examination via the umbilical trocar is often used to identify deep veins. However, this method is only feasible in extremely thin individuals.^[15] It is crucial to gain control over vascular damage caused by trocars in order to minimize substantial blood loss and avoid potentially catastrophic morbidity. Various therapeutic approaches are available, including conservative care, suturing (with tools such as Reverdin or Stamey needle and a laparoscopic port fascial closure suture passer), electrocautery, and Foley catheter tamponade.^[16-18] Nevertheless, the traditional approach of increasing the size of the cut and securing it with stitches is still largely regarded as the conventional method.^[19] Nevertheless, the Foley catheter is an inexpensive and easily accessible technique that effectively manages abdominal wall hemorrhage, offering many benefits: The placement of a Foley catheter is a time-efficient procedure that can control haemorrhage by applying counter pressure to compress the vessel. It has been reported in a study that the placement of a Foley catheter may result in reduced postoperative pain compared to suturing and other techniques. On the contrary, opting for conservative treatment of hematomas has been associated with a rise in discomfort, mostly due to the potential expansion and infection of the hematomas.^[20]

Our research found that the use of a Foley catheter tamponade led to a somewhat longer hospital stay, with patients being released between the 6th and 8th day after surgery. Indeed, the patients exhibited clinical stability after the surgery, with no abnormal discomfort and normal vital signs. The objective of our team was to prioritize excessive treatment of the Devil in dire and desperate circumstances, rather than providing insufficient treatment and thereafter regretting it. Among the total of 30 patients, 29 individuals had a positive response to the surgery, and no problems were seen that were directly caused by the procedure. Displacement of the Foley balloon occurred in just one case, leading to re-bleeding. Therefore, the patient necessitated a total of 3 units of blood transfusion. Furthermore, the patient necessitated an intensified external tension in order to perform a successful tamponade and effectively compress the bleeding arteries. The use of a Foley catheter tamponade may be a viable option for controlling excessive bleeding from the epigastric port, particularly in obese patients, in isolated surgical units, managed by inexperienced surgeons who are still gaining proficiency in laparoscopic surgery. This approach has been documented in the fields of obstetrics and gynecology, bariatric surgery, and orthopaedic surgery.^[19,21] According to one study in the literature, the authors found that using a Foley catheter tamponade is a simple, effective, inexpensive, and convenient method for controlling bleeding at the epigastric port site. This method was compared to suturing the injured

epigastric vessel using specialized instruments like the Reverdin or Stamey needle.^[17]

CONCLUSION

It is essential to provide comprehensive surgical training for the proper insertion of a port and to take preventive steps to avoid vascular damage while inserting a trocar in every laparoscopic operation. The occurrence of bleeding from the epigastric vessels caused by the insertion of a trocar during the placement of an epigastric port may be successfully controlled by using a Foley catheter to provide pressure, as long as it is done in a thoughtful manner. Controlling bleeding at the epigastric port site in distant surgical facilities with limited resources is an effective strategy.

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