

Original Research Article

Foley catheter tamponade-an effective and first line management of epigastric port site bleed in laparoscopic cholecystectomy: a study of 23 cases over 20 years

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ABSTRACT

Background: To study a simple yet effective surgical technique of management of epigastric port site bleed and how to prevent such an incidental surgical accident in patients undergoing laparoscopic cholecystectomy.

Methods: This is a prospective pilot study done during last 20 years in patients undergoing laparoscopic cholecystectomy, who accidentally developed epigastric port-side bleed. A 22 Fr inflated Foley catheter under traction was used to control the bleeding. After an average 24-48 hours of traction tamponade, the catheter was deflated and removed accordingly.

Results: The 23 patients had a complication of epigastric port bleeding, in which Foley's catheter tamponade was used. In 22 (99.65%) cases, bleeding was controlled effectively with Foley catheter tamponade. Only in 01 patient bleeding could not be controlled with the usually applied traction, so an enhanced traction was introduced, with our indigenously fabricated external contraption. No case required wound exploration or any other sophisticated means of controlling epigastric port site bleed. There was no mortality.

Conclusions: One of the most common complications of laparoscopic surgery is epigastric port site bleeding, which is an avoidable complication, provided proper procedure is followed in establishing this port.

Keywords: Laparoscopic, Cholecystectomy, Epigastric port bleed, Trocar, Tamponade, Foley's catheter

INTRODUCTION

Laparoscopic surgery is a modern technology and surgical innovation that aims to accomplish surgical therapeutic goals with minimal somatic and psychological trauma.¹ Laparoscopic techniques with higher and better optical resolution have revolutionized the field of surgery in the recent years with advantages such as less post-operative pain, early recovery after surgery, decrease in wound size, decreased wound trauma, decreased heat loss and reduction in wound infection.² However various complications at the port site are coming to light subsequently such as serious port site bleeding and hematoma, port-site infection, port-site

herniation, port site retention of stone and debris and so on. The principle of laparoscopy is introduction of a rigid endoscopy (Laparoscope) into the peritoneal cavity through a port and visualization of its contents, which help in the diagnosis as well as deliver therapeutic measures.²

Injuries to the unseen abdominal wall vessels during laparoscopic surgery are rare but do occur in up to 2% of cases.³ They may lead to significant morbidity and if ignored may end fatally. Bleeding from the port-site occurs due to the injury to the superior epigastric vessels. Epigastric vessel injuries are the most common vascular injury which occurs most commonly due to unmindful

insertion of the trocar cannula or lateral placement of epigastric port instead of midline. To prevent this, it is advisable for the camera assistant to bring the tip of the laparoscope near the area, the surgeon is expected to make an incision, the light from the tip delineates the vessels in the abdominal wall and they can be avoided- this is possible perhaps in very thin patients. It is also advisable for surgeon to insert an epigastric trocar in technically perfect 'umbilico-xiphoid midline'.^{4,5}

In case the superior epigastric vessel is damaged, the tamponade can be done by compressing the site with the trocar, this usually is enough, but if the bleeding still continues then a direct suture ligation may be tried. Stopping the bleeding from the port site is cumbersome because of the small size of the incision and of course of the fact that it is situated deep in the incision especially in obese patients. In patients on anti-platelet drugs, undergoing emergency surgery, in such circumstances, control of bleeding needs placement of deep sutures of the wound to achieve the objective. This results in large scar which is cosmetically unacceptable. However recently an innovative technique has been developed which involves plugging the port site with hemostatic agents such as surgicel or gel foam. Such as surgical and gel foam, which has shown excellent wound healing, with no complications in form of port site infection or hematoma. However, good surgical technique, awareness and early management of this complication is the key.^{2,6}

There are numerous manoeuvres to manage trocar-induced vessel injuries, such as intelligent use of laparoscopic port fascial closure suture passer (The laparoscopic surgeons' "special Awl")-to interrupt the injured superior epigastric vessels above and below the bleeding epigastric port bleeder using vicryl 2-0 suture and also Foley catheter tamponade. In Foley catheter tamponade of bleeding epigastric port, a 22 Fr Foley's catheter is threaded into the port, then inflated with saline and fixed with suture to the anterior abdominal wall with mild traction. After observing the Foley catheter balloon tamponade under traction for 24 hours for bleeding, the catheter is deflated and removed and port wound is closed with suture. There are a few complications of Foley catheter tamponade such as pressure necrosis of anterior abdominal wall, displacement of balloon causing re-bleeding at port-site.

Aim

The aim of the study is to evaluate the effectiveness of Foley's catheter tamponade to control epigastric laparoscopic port-side bleeding.

METHODS

Study design

The study design was of retrospective pilot study.

Study duration

The study duration was from May 2003 to July 2022.

Sample size

Total 23 patients were included in the study.

Study place

This study is done at 5 different hospitals where method of Foley catheter tamponade for control of epigastric port site bleed was observed (Army hospital, Delhi-Cantt.; INHS-Ashwini, Colaba, Mumbai; command hospital, Eastern command, Kolkata; military hospital, Jalandhar; SGT medical college, Gurugram).

The ethical approval is taken from the SGT university, ethical committee.

Statistical analysis

No statistical analysis done in study as it is pilot study.

Inclusion criteria

All patients developing complication of epigastric port-site bleeding (Figure 1) in case of laparoscopic cholecystectomy done over 20 years included in study.

Exclusion criteria

Cases in which spontaneous control of bleeding occurred from port-site without any intervention were excluded from this study.

Steps of procedure

In cases of epigastric port-site bleeding, a sterile 22 Fr Foley catheter (usually 03-way of Romson's catheter- priced Rs. 155) is inserted in the peritoneal cavity through the bleeding port (Figure 2). Then balloon is inflated with 25-30 ml of saline (Figure 3). Once balloon is inflated, the catheter is pulled up (Figure 4) and is suture anchored to the skin using "Roman sandal pattern" of catheter fixing (Figure 5). The anchored Foley catheter is next pulled over a roll of abdominal sponge and suture tacked to the abdominal skin in a circular concentric ring or a lazy 'S' loop (Figure 6) to avoid accidental catheter removal by patient handlers.

The Foley catheter is kept in place for average 24-48 hours checking for any on-going bleeding as will be indicated by the 32 Fr abdominal drain placed in hepatorenal pouch and taken out from the lateral laparoscopic port wound into an urobag. Once the output in the urobag is less than 05 ml and not bloody, then the bulb is deflated and removed. Patient is kept under observation for a few hours more to monitor vitals and DTH (discharged to home) the next day.

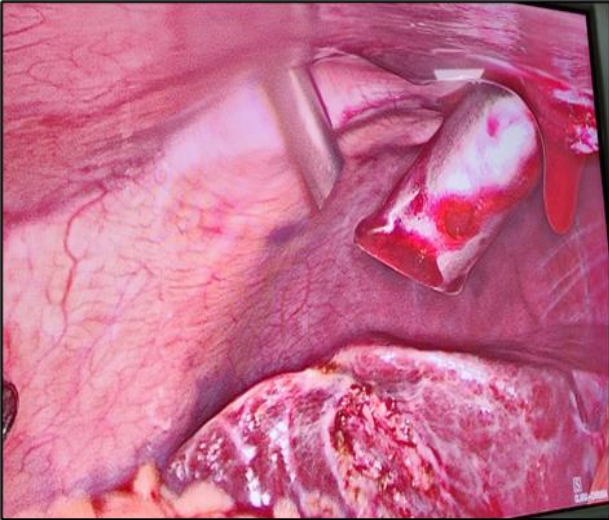


Figure 1: Bleeding at epgastric port.



Figure 4: Inflated Foley catheter balloon wedged into the epigastric port wound on application of traction outside.

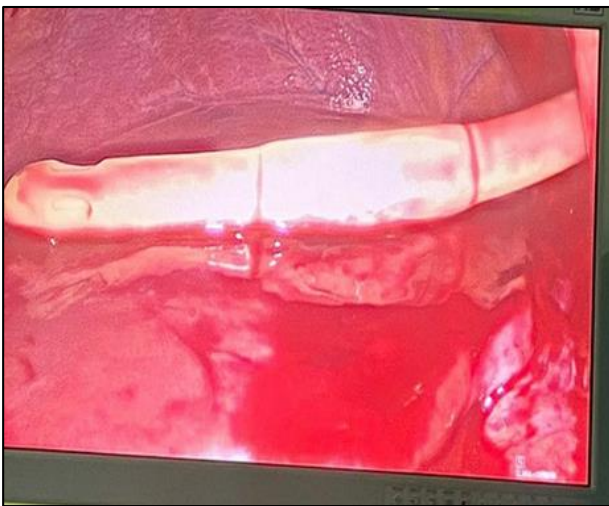


Figure 2: Foley catheter inserted through epigastric port wound into the peritoneal cavity.



Figure 5: Roman sandal pattern of fixing Foley catheter on the abdominal skin.



Figure 3: Saline inflated Foley catheter balloon.



Figure 6: Loop fixation of Foley catheter under traction over a rolled up abdominal sponge.

RESULTS

In this study, a total 23 patients evaluated who had complication of port-site bleeding during laparoscopic cholecystectomy. Out of 23 patients, 16 were females and 07 were male. The data related to the study is mentioned in the Table 1.

Table 1: Demographic data of patients.

Patient details	No. of patients
Total cases with epigastric port site bleed	23
Age of the patients (years)	
20-35	12
35-50	07
>50	04
Sex of the patients	
Male	07
Female	16
Co-morbidities	
DM-2	02
Hypertension	03
Hypothyroidism	01
Successful Foley catheter tamponade	22 (99.64%)
Failure of Foley catheter tamponade	01
Average duration of tamponade given	24-48 hours
Number of days of hospital stay	05
Complication related to Foley catheter tamponade	
Pressure necrosis of abdominal wall	None
Re-bleeding	01
Blood transfusion requirement	01
Mortality	None

This procedure was done in 23 patients. 22 (99.65%) patients responded to this intervention with favourable outcome. There was only 01 failure in this intervention in which there was displacement of Foley balloon hence external traction with the help of intra-venous set was given (Figure 8). This particular patient (01 out of 23 cases), in the sub-hepatic 32 French drain collected 400 ml of blood within 04 hours of post-operative period (Figure 7), despite our usual Foley catheter tamponade. This necessitated to introduce enhanced mechanical traction with us on the spot, indigenously fabricated external traction contraption, where with the help of a repurposed, used intra-venous line was used to apply effective tamponade with favourable outcome. That patient also required 02 units of whole blood transfusion post-operatively.

External traction was applied for 48 hours post-operatively, then external traction released but Foley catheter bulb was left inflated for another 24 hours. After 24 hours, there was only 05 ml sero-sanguinous collection in the urobag, so the Foley catheter was

removed on post-operative day-05. Patient was then discharged on post-operative day-07 with normal vitals and healthy wound.



Figure 7: Sub-hepatic drain showing 400 ml of bloody collection within 04 hours of post-operative period.



Figure 8: Enhanced external traction was established by attaching an intravenous line to the Foley catheter and pulled up the line over a bedside intravenous stand.

There were no complications of Foley catheter tamponade. No patient developed pressure necrosis of anterior abdominal wall. All the patients (except one)

were discharged on post-operative day 05 with healthy wound and normalised vitals.

DISCUSSION

Trocar injury to the abdominal wall vessels is an infrequent complication but does occur in 0.2% to 2% of laparoscopic procedures.³ Undoubtedly, the most common trocar-induced abdominal wall injury is a haemorrhage of the epigastric vessels, a serious and potentially preventable complication.³

The senior author of this study chanced upon this Foley catheter tamponade technique to control the epigastric port site bleeding, more than two decades ago, when internet was in its infancy and utterly inefficient in disseminating the latest surgical progress the world over! He used the common sense in aviation parlance the-test Pilot's Motto- "Learn to test and test to learn". He learnt and tested this technique and used it in every epigastric port site bleeding situation; then after to test further learning!

The presented study underscores the importance of planned and careful trocar placement-a measured engineering surgical exercise indeed! A thorough anatomical understanding of the anterior abdominal wall is crucial, but due to anatomical variations, strategies for managing trocar injuries are equally important. Superficial vessels may be detected by transillumination of the skin, whereas deep vessels are commonly identified by direct laparoscopic inspection through the umbilical trocar -which is possible in very thin patients only.⁷

Gaining control of trocar-induced vessel injuries is critical to prevent significant blood loss and to avoid serious morbidity that may end fatally! Several methods of treatment exist such as conservative management, suturing- (for instance with a Reverdin or Stamey needle and laparoscopic port fascial closure suture passer), electrocautery and Foley catheter tamponade.⁸⁻¹⁰ However, an enlargement of the incision and placement of sutures is still widely considered the classical method.¹¹ However, the Foley catheter is a cheap and readily available effective tool to control abdominal wall bleeding with multiple advantages, they are: It allows the haemorrhage to be controlled by creating counter pressure, against which the vessel can be compressed, the placement of a Foley catheter is time-efficient procedure as compared to suturing and any other known technique, a study reports that the placement of a Foley catheter may be associated with lower postoperative pain. Conservative treatment of hematomas, on the other hand, has been linked to an increase in pain, also because the hematomas may expand and become infected.¹²

In our study, the use of a Foley catheter tamponade resulted in a slightly prolonged hospital stay and the

patients got discharged by 05th to 07th post-operative day. In fact, the patients were clinically stable following the procedure, had no unusual pain and vitals were normal. The aim of our team had been that in extreme and desperate situation, it's better to "over-treat" the Devil than "under-treat" and repent! Out of 23 patients, 22 patients responded to the procedure without any procedure related complications.

Only in 01 patient, there was displacement of Foley balloon which resulted in re-bleeding. Hence the patient required 02 units of blood transfusion. In addition, patient also required an enhanced external traction, to achieve effective tamponade to compress the bleeding vessels.

The Foley catheter tamponade may be an effective alternative for neutralizing alarmingly bleeding epigastric port, especially in obese patients, in remote surgical units, handled by young surgeons, climbing the essential "Learning curve" of laparoscopic surgery. There are accounts of this technique in obstetrics and gynecology, bariatric surgery, and orthopaedic surgery.^{11,13,4} The authors of one of the studies from literature considered the placement of a Foley catheter tamponade as an easy, superior, cheap and hassle-free technique of controlling epigastric port site bleed as compared with suturing of the injured epigastric vessel with special instruments like Reverdin or Stamey needle.⁹

The limitation of study is that the occurrence of this complication in our study was 23 cases over 20 years- out which maximum number of cases were experienced by the lead author of the study when he was serving as an army surgeon on transferable job. This particular complication is quite uncommon hence a large volume study is not possible. Of course, there are different modalities available for the the management of this complication of epigastric port site bleed, but in this study, we have not compared the efficacy of all other modalities; instead, we resorted to the cheapest, most effective and readily available crisis management modality i.e., Foley catheter tamponade.

CONCLUSION

Proper surgical training for insertion of port and precautionary measures to prevent vessel injury during trocar insertion should be implemented during every laparoscopic surgery. Trocar induced haemorrhage of the epigastric vessels during epigastric port insertion can be effectively managed by Foley catheter tamponade in most patients, if used intelligently. It is an efficient method to control the epigastric port site bleeding in remote surgical units, dogged by absolute resource poverty!

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Ethical approval: The study was approved by the Institutional Ethics Committee

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