

# Trocar Site Hernia

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## Abstract

*Aims and objectives:* The aim of the study was to review relationship of pathogenesis and clinical manifestations of the hernias at the trocar site, for confirmation of the definition by classification of hernia at trocar site. The following parameters were evaluated.

The operations were limited to cholecystectomy, rectal and colon surgery fundoplication and gastric surgery; getting 44 reports. Of these 18 original articles, 19 case report and 7 how to do it technical notes were gathered. We also obtained 19 additional references. Thus we reviewed a total of 63 reports.

*Material and methods:* Material search was performed using Google, Medline-Highwire press, and also Springer link. The following terms were used *hernia, trocar, laparoscopy, complication* and *Port*. 1000 citations were found in all. The selected papers were screened for further reference. Selection criteria of literature were the number of cases (excluded if less than 20), analysis method (statistical or nonstatistical), operative procedure (only universally accepted procedures were taken into consideration) and the institution where the study was conducted (Specialized laparoscopy institute).

*Conclusion:* This is useful to classify clearly the trocar site hernias and to improve the management of laparoscopic procedures.

**Keywords:** Hernia, trocar, laparoscopy, complication, port.

## INTRODUCTION

As reported by Rosen and Ponsky.<sup>1</sup> Mourat did the first laparoscopy cholecystectomy change the surgical practice dramatically. Abdominal laparoscopy surgery increased and spread wide by 1990's.<sup>2</sup> This resulted in emergence of new technique with new specific complications due to surgery. Trocar site hernia becomes serious complication as most of these need further surgery.

Fear,<sup>5</sup> reported trocar site hernia in a series of gynecological diagnostic laparoscopy. Many recognize this as first report of trocar site hernia.<sup>2,6,8</sup> Maio and Ruchman's reported,<sup>9</sup> trocar site hernia with obstruction of small bowel immediately after cholecystectomy. This is report in digestive surgery. Many

reports are published about cholecystectomy since then and recently on gastrointestinal surgery. In all this published reports there is wide variation in the clinical aspect of hernia and trocar site, so much that we became concerned about the meaning of medical term trocar site hernia, as it was not defined.

## CONTENTS

Trocar site hernias were classified into three different types:

1. Early onset type, which occurred immediately following operation, having small bowel obstruction like the Richter hernia (Figs 1A and B).
2. Late onset type, which occurred several months after surgery, with local abdominal bulge and no bowel obstruction (Fig. 1C).
3. Special type, which occur with the protrusion of omentum and/or intestine (Fig. 1D).

Trocar site with 10 mm fascial defect or bigger should be closed, with peritoneum. The opinion differed if the 5 mm trocar defect needs to be closed.

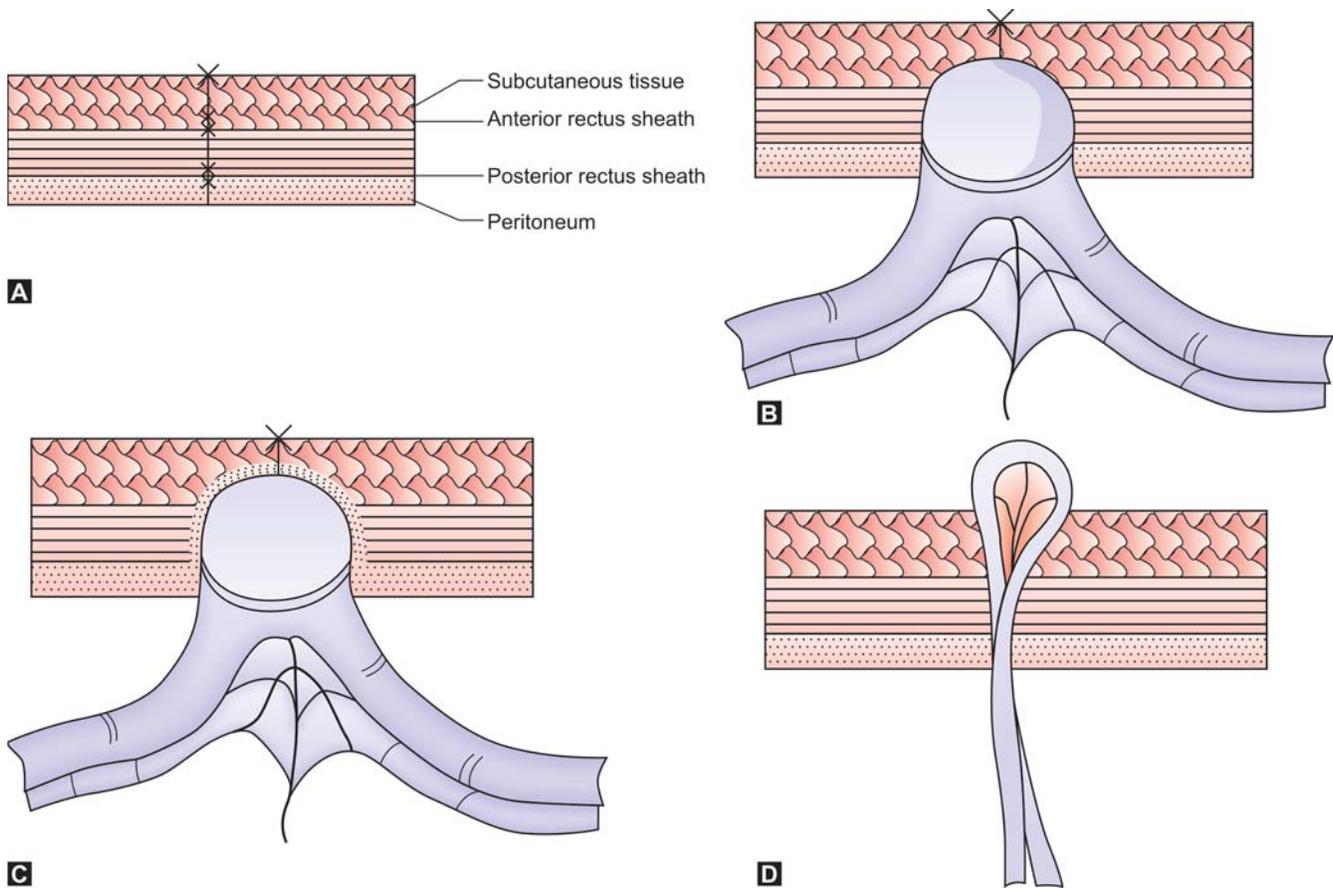
It is helpful to classify clearly the trocar site hernias for better management of laparoscopic procedures.

## INCIDENCE

Large series are reported related to complication of laparoscopic cholecystectomy where incidence of trocar site hernia was 1 in 500 cases, 3 in 1983 cases, 1 in 800, 11 in 1300 cases, and 10 in 1453 cases. Callery et al.<sup>3</sup> stated that overall incidence is very low. Mayol et al, stated that the figure only represent the early results of gynecological laparoscopy. Moreover the actual incidence may be much high then the reported figures as the unknown percentage of patients who are asymptomatic may not seek medical advice.<sup>6,8</sup> Coda et al noticed that onset trocar site hernia is rather late then immediately after surgery in many surveys recently the incidence of trocar site hernia is written

Clinical character according to classification

Classification	Interval between the laparoscopic surgery and the onset of trocar site hernia	Main manifestation	Incidence of Richter hernia
Early onset type	A few days	SBO	Frequent
Late onset type	Several months	Hernia without SBO	Rare
Special type	A few days to 10 days	Protrusion of intestine/omentum	None



**Figs 1A to D:** Classification of the 3 trocar site hernias. (A) Normal stab wound of trocar site. (B) Early-onset type: dehiscence of anterior and posterior fascial plane and peritoneum. (C) Late-onset type: dehiscence of anterior and posterior fascial plane. Peritoneum constitutes hernia sac. (D) Special type: dehiscence of whole abdominal wall. Protrusion on intestine and/or omentum

about postoperative complication in GI surgery. The incidence of trocar site hernia is shown to be 0.65 to 2.80%, Mayol et al, and Nassar et al, studied based on data collected prospectively and follow of patient for minimum of several months. So it is supposed that the report made by them of the incidence (1.50 to 1.80%) could be standard reasonably.

## **PATHOGENESIS**

### **Trocar Size**

Crist and Gadacz, regarded large trocar used as predisposing factor for development of hernia.

### **Closing Fascial Defects or Leaving them Open**

Duoron et al<sup>2</sup> said that fascia closer of trocar site may preclude or decrease the incidence of obstructions. And indicate that adhesions can occur after fascial closure. Incomplete closure may lead to trocar site hernia. Many surgeons advised fascial closure.<sup>3,4</sup>

We think fascial defect open can be clearly correlated with the trocar site hernia. Insufficient closure will also increase the trocar site hernia risks.

### **Open/Closed Laparoscopy**

Pneumoperitoneum is established by Veress needle or by Hasson trocar. Trocar site hernia in closed method by Veress needle was more than in open method by Hasson trocar. Mayol et al commented that in infection of wound may be more common in close type which in turn increases the incidence of trocar site hernia. Wallace and O'Dwyer 52 did open laparoscopy in 568 patients where no hernia was reported.

### **Location**

Many authors stated that most hernia occurred at midland trocar and umbilical sites were more common.<sup>2,4,6,8</sup> In American association of gynecological laparoscopists, umbilical hernia was found to be more common (75.70%), lateral hernias were 23.70% of 152 trocar site hernias.

## Stretching the Port Site for Retrieval

Enlargement of umbilical wound for retrieving this specimen may be the cause of trocar site hernia. It is certain that forced dilation of fascial layer is considered to be cause for herniation.

## Effects of CO<sub>2</sub>

CO<sub>2</sub> may push the omentum/intestine through the insertion point in the fascia. These structures may be trapped by abdominal contractions.<sup>6,8</sup> Duron et al<sup>2</sup> stated that partial vacuum is created with the withdrawal of port, thus drawing intestine/omentum in the fascial defect.

## Host Problem

Azurin et al,<sup>4,7</sup> stated that trocar site hernia occur in patient with comorbidity as wound infection, obesity, diabetics mellitus, although these did not reach statistical significance with obesity and nutrition was also one of the factor of trocar site hernia.

## Infection

Port site infection is the predisposing factor for the development of the hernia. Callery et al,<sup>3</sup> reported that often umbilical insertion gets infected. Late onset hernia may be related to infection from stab wound.

## DISCUSSION

Laparoscopic surgery has gained a lot of attention around the world. However this is associated with few of the postoperative complication. The goal of this review was to ascertain the classification of trocar site hernia and to know the cause, predisposing factor and to enable more clinical identification and thus improving the care of patient.

Three types of trocar hernia were reported:

1. Early onset type, which occurred immediately following operation, having small bowel obstruction like the Richter hernia. This indicates anterior fascial plane, posterior fascial plane and peritoneum dehiscence.
2. Late onset type, which occurred several months after surgery, with local abdominal bulge and no bowel obstruction. This indicates anterior fascial plane, and posterior fascial plane dehiscence. The hernia sac here is the peritoneum. It is related in many cases to the complication of trocar insertion.
3. Special type indicates whole abdominal wall dehiscence, which occur with the protrusion of omentum and/or intestine. The first case was of special type reported by Fear<sup>5</sup> in which a loop of bowel herniated through the defect when the scope and sheath were taken out.

*Following were the predisposing factors affecting the trocar site hernia:*

1. Trocar size: Bigger the size of trocar more the chance of trocar site hernia.
2. Closing trocar site/leaving open: Hernia was reported more when the trocar site was left open.
3. Open/closed laparoscopy: Open method by Hasson's trocar has shown less chance of trocar site hernia when compare to closed method by Veress needle, by Mayol, et al.<sup>22</sup>
4. Location: Most hernia appeared at midline trocar and umbilical sites were found to be commonest.
5. Stretching portsite for retrieval of tissue was another cause for trocar site hernia.
6. Effect of compressed CO<sub>2</sub>.
7. Obesity and nutrition.
8. Infection of port site was the important predisposing factor for development of trocar site hernia.

## CONCLUSION

In this review article, classification of trocar site hernia was done by various study reports. We believe that a more clinical accurate identification is available from this classification. This may be useful for preventing complications in laparoscopy surgery if the surgeon is aware of the correlation between the types of trocar site hernia and clinical manifestation before the surgery.

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