

# Modified Open Technique: A Safe Approach for Laparoscopic Entry

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## ABSTRACT

**Objective:** To describe the safety of the modified open technique for accessing the abdominal cavity and creation of pneumoperitoneum in gynecologic laparoscopy.

**Methods:** A descriptive retrospective chart review of 100 patients who underwent gynecologic laparoscopy at the Jordanian Royal Medical Services Hospitals during the period from January 2008 to December 2009 was conducted. We used the modified open approach in all patients. This method consists of a 1-1.5cm vertical umbilical incision, dissection of the underlying structures to expose and incise the fascia. At this point, the peritoneum was opened and then a 10-mm trocar was introduced into the peritoneal cavity. Simple analytical method (frequency and percentage) was used to describe the complication rates.

**Results:** There were no reported major intra-operative vascular or bowel injuries related to entry. Three patients had minor intra-operative complications (two cases of pre-peritoneal trocar placement and one patient had omental bleeding). The recorded post-operative complications included two cases of port-site infection and two cases of port-site hematoma. No cases of non-cosmetic healing, incisional hernia or gas embolism were reported.

**Conclusion:** Our results suggest that the modified open technique is a safe approach for laparoscopic entry into the abdominal cavity with few minor intra-operative and post-operative complications.

**Key words:** Abdominal cavity, Complications, Laparoscopy, Modified open technique

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## Introduction

Minimal access surgery usually involves the use of multiple trocars and cannulas. The primary trocar is used to place a cannula, through which a laparoscope is inserted to view the internal structures.

The predominant method of entry in gynecologic surgery remains the closed technique. This technique may have the potential for visceral and vascular injury due to its blind insertion of Veress needle and trocars.<sup>(1)</sup> Although typically straightforward, initial entry

into the abdominal cavity is one of the most common causes of injury in laparoscopy.<sup>(1)</sup>

As most laparoscopic injury occurs at the time of Veress and trocar insertion.<sup>(2,3)</sup> Preventing the complications associated with initial entry is a prime concern for laparoscopic surgeons. Although the complications of operative laparoscopy are low, they can be severe and life-threatening. The mortality rate associated with laparoscopy-induced bowel injury is 3.6%.<sup>(3)</sup>

Over the past 50 years rapid advancement in technology in terms of electronics, optical

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equipments and other ancillary instruments, combined with improved surgical proficiency and expertise, laparoscopic surgery rapidly advanced from a gynecologic procedure for tubal sterilization to one used in performing most of the surgical procedures in all gynecological and surgical disciplines for a variety of indications.<sup>(2)</sup>

Techniques for the creation of pneumoperitoneum at laparoscopy include the standard technique of insufflation after insertion of the Veress needle via the umbilicus, open laparoscopy, optical trocar insertion and direct trocar insertion, as well as variation of these techniques.

Optical access trocars may be associated with significant injuries despite having the ability to visualize tissue layers during insertion.<sup>(4)</sup> The life-threatening complications include injury to the bowel, bladder, major abdominal vessels and anterior abdominal wall vessels. Less serious complications that can occur are post-operative infection, subcutaneous emphysema and extra-peritoneal insufflation.<sup>(3)</sup>

In 1971, Hasson<sup>(5)</sup> introduced the concept of open laparoscopy to eliminate the risks associated with blind insertion of the Veress needle and trocar. This technique requires a set of specifically designed equipment consisting of a cannula and trumpet valve fitted with a cone-shaped sleeve. A blunt obturator protrudes 1cm from the tip of the cannula, and the cone sleeve seals the peritoneal and fascial gap. The entry is essentially mini-laparotomy. The incision is long enough to be able to dissect down to the fascia, incise it, and enter the peritoneal cavity under direct vision.<sup>(5)</sup>

There is no clear consensus as to the optimal method of entry into the peritoneal cavity. Some authorities believe that Hasson open technique is superior to the classic closed entry technique, defending their views in that it is faster, eliminates the risk of gas embolism, and significantly reduces the risk of vascular and bowel injuries related to primary access. However there is conflicting evidence between different studies and there is no unified opinion regarding this issue.<sup>(6)</sup>

The purpose of this study was to describe the safety of the modified open technique for accessing the abdominal cavity and creation of pneumoperitoneum in gynecologic laparoscopy.

## Methods

This retrospective study was conducted at the Jordanian Royal Medical Services Hospitals, gynecology departments between January 2008 and December 2009. The medical records of 100 patients who underwent diagnostic and operative gynecologic laparoscopic operations using a modified open technique were analyzed. One third of the laparoscopies were performed for investigation in cases of infertility and pelvic pain, while the others were done for treatment of polycystic ovaries, endometriosis, ovarian cysts, adhesions and ectopic pregnancies. Maternal characteristics (age, BMI) and the number of previous laparotomies are shown in Table I.

**Table I:** Patients characteristics and number of previous laparotomies

Age (mean, range)	32(19-45)
BMI (mean, range)	25.6(18.9–44.1)
No. of previous laparotomies	No. of patients
0	84
1-2	12
>2	4

The patients were placed in the dorsal supine position with their legs in Allen stirrups and prepped and draped in the usual sterile fashion. The operating table was lowered at or below the level of the surgeon's waist. Foley's catheter was placed for bladder drainage.

The modified Open approach was started with a 1-1.5 cm midline vertical incision at the deepest part of the umbilicus. While applying two Allis clamps on its lateral border to maintain skin tension, the underlying fascia was grasped upwards and retracted laterally with two Kocher clamps and then incised 0.5 cm transversely between the clamps. The peritoneum was usually entered at this time. If the peritoneum was still intact, it was grasped with Allis forceps and entered by spreading a hemostat inside it and then a 10 mm trocar was inserted through the opened incision without resistance. A 0-polyglactin suture was used for closure of fascial layer.

Data regarding intra-operative and post-operative complications were extracted and recorded. Simple descriptive analytical method (frequency and percentage) was used to describe the complication rate.

## Results

During the study period, 100 patients underwent gynecologic laparoscopy. There were no instances of major intra-operative vascular or bowel injuries related to entry. The total number of minor intraoperative and postoperative complications was seven cases (7%) Table II.

Three patients had minor operative complications; two cases of pre-peritoneal placement of trocar, which were recognized immediately and one had omental bleeding (Table II). Omental bleeding was laparoscopically diathermized without further consequence.

Four patients had post-operative complications related to primary access (two cases of port-site infections and two cases of port-site hematoma). Port-site infection was treated with antibiotics and hematoma was treated conservatively (Table II). There were no reported cases of non-cosmetic healing, incisional hernia or other late complications.

**Table II.** Laparoscopic entry-related intra-operative and post-operative complications

Complication	No.	%
Preperitoneal trocar placement	1	1
Omental bleeding	2	2
Port-site infection	2	2
Port-site hematoma	2	2
Total	7	7

## Discussion

Over the past 50 years, many techniques, technologies and guidelines have been introduced to eliminate the risks associated with laparoscopic entry. No single technique or instrument has been proved to eliminate laparoscopic entry associated injury.<sup>(6)</sup>

Besides the classic blind Veress technique, there are open laparoscopy (Hasson type), direct trocar insertion, use of disposable shielded trocars, radially expanding and optical trocars. The advantage of Hasson technique is that peritoneal cavity access is gained under direct vision, preventing most severe injuries. The open technique with radially expanding trocars is recommended for secure access to the abdominal cavity in video-laparoscopy.<sup>(7)</sup>

Injury to intra-abdominal structures continues to be a common, yet potentially avoidable

complication of laparoscopy.<sup>(3)</sup> Many of these injuries are related to the blind placement of the Veress needle or sharp primary trocar into the abdomen when performing a technique referred as (closed laparoscopy). Most gynecologic laparoscopists still feel it safer to use classic blind Veress needle entry to create pneumoperitoneum first before inserting the trocar as routine laparoscopic approach.

Open laparoscopy introduced by Hasson in 1971 requires a set of specifically designed instruments, which must be fixed after the umbilicus, is cut open. This technique proves to be time consuming and it takes about 10-15 minutes longer than closed laparoscopy performed by operators with comparable expertise.<sup>(5)</sup>

In our study we used the modified open technique for laparoscopic entry into the abdominal cavity in all cases which were performed during the study period. This technique not only obviates the tedious and elaborates steps of Hasson's open laparoscopy, but also diminishes the resistance of penetration, thus ensuring more safety and simplifying the laparoscopic entry process. Surgeons preferring the closed technique usually argue that open technique was time-consuming and it was frustrating to be lost in pre-peritoneal space. A learning curve clearly exists during which surgeons gain a systemic approach to the procedure. Open entry technique is easily mastered and may be converted to a standard Veress needle technique if peritoneal entry is not achieved.<sup>(8)</sup> Once the technique is mastered, rapid access is achieved as in our cases.

In our study there were no cases of major visceral or vascular injury. However with open technique, inadvertent injury to the bowel had been reported. This can happen if there is an area adherent to the abdominal wall from previous operations. However, with open technique it would be easier to diagnose and manage the resulting injury immediately and without delay.

To reduce the risk of bowel laceration, the surgeon should use a focus spotlight, work with an experienced assistant, make a vertical incision to facilitate exposure, grasp and elevate the fascia with two small Kocher clamps, and cut between them.

Compared with the traditional Veress needle

puncture, the modified open method is easier to follow, especially for learners. In addition, it can avoid the possible Veress needle-associated injuries.<sup>(9)</sup>

The disadvantage of the open technique is more tissue dissection on the port-site. This can result in minor risks of local hematoma and infection.

In our experience, four patients had had post-operative complications related to primary access (two cases of port-site infections and two cases of port-site hematoma). Infection of trocar wound is well known and is usually limited and is easily treated by antibiotics and drainage. Other minor complications include subcutaneous emphysema, incisional hernia, and omental or abdominal wall bleeding. As in our experience, two cases of pre-peritoneal placements of cannula and one case of omental bleeding had occurred at the beginning of the series.

In a study by Inan *et al.*<sup>(10)</sup> the complication rate while performing pneumoperitoneum by direct entrance method was less than in Veress needle usage. Direct trocar insertion without creating a pneumoperitoneum initially reduces the number of preliminary procedures, saving operative time and preventing potential complications. Altun *et al.*<sup>(11)</sup> found that the direct trocar entry technique is a safe and rapid method of accessing the peritoneal cavity and all the complications occurred using this method were minor.

In the clinical practice guideline on the pneumoperitoneum for laparoscopic surgery, the European Association for Endoscopic Surgery states that insertion of the first trocar with open technique is faster as compared to the Veress needle and there is no evidence that open entry technique is superior or inferior to the other entry technique currently available.<sup>(12)</sup> Despite widespread awareness of laparoscopic entry guidelines, there remains considerable variation in the techniques adopted in clinical practice.<sup>(11,13,14)</sup> Unless practice concurs with recommended guidance, women undergoing laparoscopy will be exposed to increased unnecessary operative risk.<sup>(15)</sup>

### Limitation of the study

Future randomized, controlled, well-matched studies to compare the modified open technique with other methods of laparoscopic entry are needed.

## Conclusion

Our results suggest that the modified open technique is a safe approach for laparoscopic entry into the abdominal cavity with few minor intra-operative and post-operative complications.

## References

1. Long JB, Giles DL, Carnella JL, *et al.* Open laparoscopic access technique: review of 2010 patients. *JSLS* 2008; 12: 372-375.
2. Jacobson MT, Osias J, Bizhang R, *et al.* The Direct trocar technique: an alternative approach to abdominal entry for laparoscopy. *JSLS* 2002; 6: 169-174.
3. Voort MV, Heijnsdijk E, Gouma DJ. Bowel injury as a complication of laparoscopy. *Br J Surg* 2004; 91: 1253-1258.
4. Sharp HT, Dodson MK, Draper ML, *et al.* Complications Associated with optical-access laparoscopic trocars. *Obstet Gynecol* 2002; 99: 553-555.
5. Hasson HM, Rotman C, Rana N, Kumari NA. Open Laparoscopy: 29-year Experience. *Obstet Gynecol* 2006. 96(5): 763-766.
6. Krishnakumar S, Tamble P. Entry Complications in Laparoscopic Surgery. *J Gynec Endosc Surgery* 2009; 1: 4-11.
7. Geraci G, Sciume C, Pisello F, *et al.* Trocar-related abdominal wall bleeding in 200 patients after laparoscopic cholecystectomy: personal experience. *Ward J Gastroenterol* 2006; 12(44): 7165-7167.
8. Keltz MD, Lang J, Berin I. A 5-mm Open-entry Technique Achieves Safe, Single-step, Cosmetic Laparoscopic Entry. *JSIS* 2007; 11: 195-197.
9. Liu HF, Chen X, Liu Y. A multi-center study of a modified open trocar first puncture approach in 17350 patients for laparoscopic entry. *Chinese Medical Journal* 2009; 122(22): 2733-2736.
10. Inan A, Sen M, Bozer M. Comparison of Direct and Veress Needle Insertion in Performance of Pneumoperitoneum in Laparoscopic Cholecystectomy. *Acta Chir Belg* 2005; 105: 515-518.
11. Altun H, Banli O, Karakoyun R, *et al.* Direct Insertion Technique for Initial Access in Morbid Obesity Surgery: Technique and Results. *Laparoscopy and Endoscopy* 2010; 20(4): 228-230.
12. Vilos GA, Temamian A, Dempster J, Laberge PY. Laparoscopic entry: a review of techniques, technologies, and complications. *J Obstet Gynecol* 2007; 29(5): 433-465.
13. Burke C, Nathan K, Garry R. Laparoscopic entry- The experience of a range of gynecological surgeons. *Gynecol Surg* 2009; 6: 125-133.

14. **Theodoropoulou K, Lethaby DR, Bradpiece HA, Parihar A.** Direct Trocar Insertion Technique: An Alternative for Creation of Pneumoperitoneum. *JSLs* 2008; 12: 156-158.

15. **Varma R, Gupta JK.** Laparoscopic entry techniques: clinical guideline, national survey, and medicolegal ramifications. *Surg Endosc* 2008; 22: 2686-2697.