

Trans-Umbilical Open Port Placement During Laparoscopic Access: A Safe Technique

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Abstract

Introduction: Intra-peritoneal access and creation of pneumoperitoneum through a quick, safe and reliable technique is important for Laparoscopic Surgery. Specially in an resource constrained setting where there is paucity of needed equipment and cost is prohibitive, utilization of the fewer instruments available and accompanied by excellent functional and cosmetic outcomes should be the aim of a laparoscopic surgeon.

Objectives: To describe a modified method of primary trocar introduction that utilizes fewer available instruments.

Materials and Methods: A vertical incision is made in the trans-umbilical region at the base of to an everted umbilical scar. The linea alba is incised and the resultant opening bluntly developed after which the 1st port is inserted using trocar as an guide. The trocar is withdrawn while the canula is pushed in.

Results: We included total 124 patient (Male-44, Female-80) in the study period, from Jan 2017 to December 2018. In one single surgical unit, with the age limit 18-75 years, With no significant complications.

Conclusion: This modified open trans-umbilical approach is a simple, quick, and reliable way to primary port insertion. Access is gained easily in different age groups and umbilicus types, through a small congenital umbilical defect that is almost universally present. It is associated with minimum morbidity and has excellent outcome.

Key-words: Laparoscopic surgery, Trans-umbilical open port, Trocar.

Introduction

One of the most crucial moments of the laparoscopic surgery is the access to the peritoneal cavity¹. It require the safe insertion of the initial or primary port and the most feared complications that may occur during insertion of the first trocar are vascular and intestinal injuries^{2,3}. It is estimated that 50% of complications in laparoscopic surgery occur during the first port entry⁴. To address this issue, various techniques have developed to gain access to the peritoneal cavity; these are closed technique veress open technique (Hasson), direct trocar insertion, disposable shielded trocar, radially expanding trocar and optical trocars. Closed (Veress needle) access techniques could result in injury to major vessels bowels and bladder, open access techniques are thought

to be safer, then closed techniques but also associated with similar complications^{5,6}. Open access techniques usually requires for mini laparotomy. While Hasson's technique requires a special Hasson's port.

Laparoscopic surgery is technology dependent, and the required expensive equipments are usually lacking in resource constrained regions For the constrained surgeon with limited equipments and choice of instruments, a safe, rapid, and reliable method of laparoscopic entry that can utilize any available trocar will be welcome. This study describes a modified open method of primary port entry that has been used successfully in performing laparoscopic surgery with usually available trocars.

Materials and Methods

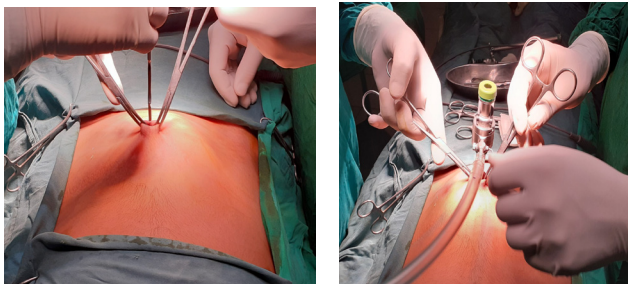
This retrospective study was conducted in the department of surgery in Border Guard Hospital, Dhaka on all patients who underwent Laparoscopic operation from January 2017 to December 2018. Inclusion criteria, included in all patients, who underwent laparoscopic procedure with our modified open technique for creating the pneumoperitoneum with a minimum follow up of 12 weeks. Exclusion criteria, Patients with para-umbilical hernia, history of upper abdominal surgery, and uncontrolled systemic illness like chronic liver failure, chronic renal failure and those refused to be a part of study were excluded from study. Retrospective analysis of all patients treated at our hospital. Electronic medical reports were reviewed and patients demographic, characteristics of the operations. Intra operative complications (bowel and vascular injury, failure to enter) postoperative complications (hernia, seroma, haematoma, cellulitis, abscess, cosmetic issues), body mass index (BMI), number of previous abdominal surgeries, time to access the peritoneal cavity, date of discharge from hospital and date of last follow up visit were recorded. Statistical analysis was performed using JMP 6.0 windows (SAS Institute, Cary, NC). The study was approved by the institutional review board.

Technique: All patient underwent general anaesthesia and placed in a supine position. The technique used is described as follows:

- Traction is applied from the bottom of the umbilical scar with two Kocher's artery forceps and umbilicus is everted.
- The forceps are now held in sustained upward traction to lift up the abdominal wall.

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- A vertical trans-Umbilical incision of 10-mm is performed with No-11 blade.
- The fascia is divided under direct vision a few millimeters cephalad and a few millimeter caudal to achieve an incision so a 10 mm trocar can be introduced.
- The entry would be enlarged by introducing an artery forceps and opening its Jaw.
- The 10 mm cannula is then inserted with the trocar serving as a guide. The trocar with its cannula is inserted in to the elevated orifice created through umbilical scar. While the cannula is pushed in & the trocar is withdrawn.
- The trocar serves only as a guide to ensure that the cannula gets in to the peritoneal cavity and even if the trocar tip is sharp there is no risk of inadvertent injury to underlying tissues.
- The port is then connected to insufflation tube and insufflation is commenced, High flow at 4 litres/minute started straightaway. Insufflation should proceed easily except if the port is extraperitoneal. Laparoscope was inserted when the pressure was 14 mm Hg. Thorough inspection of the peritoneal cavity performed and any injury inflicted during creation of pneumoperitoneum was recorded. Time taken from incision to the insertion of laparoscope was calculated and recorded.
- In the event of any gas leak around the port (from a too large an incision) a towel clip is applied around the umbilicus to make the incision smaller.
- At the end of procedure after deflating the abdominal cavity gas. We expose the fascia using the Kocher's forceps and opening is closed with interrupted Sutures.
- The surgical wound is irrigated with saline solution & skin is closed in a subcuticular fashion.



Results

There were 124 patients who met the criteria with a mean age of 45 years (18-72 years) among them 80 were female. Who had no history of previous abdominal operation in that region but there was history of LUCS in 68 female patients. No complications occurred during insertion of the first trocar. Post-operative complications in the form of superficial surgical site (cellulitis) infection occurred in two patients (1.6%), and erythema in one patient (0.8%). The average time to access the peritoneal cavity was 3.5 min (2-7 minutes).

Table-I: Type of different laparoscopic operations (n=124)

Type of operations	Total	Percentage
Laparoscopic Cholecystectomy	83	66.95
Laparoscopic Appendicectomy	14	11.29
Laparoscopic Varicocelelectomy	07	5.56
Laparoscopic Herioplasty (TAPP)	18	14.52
Laparoscopic Ovarian Cystectomy	02	1.62

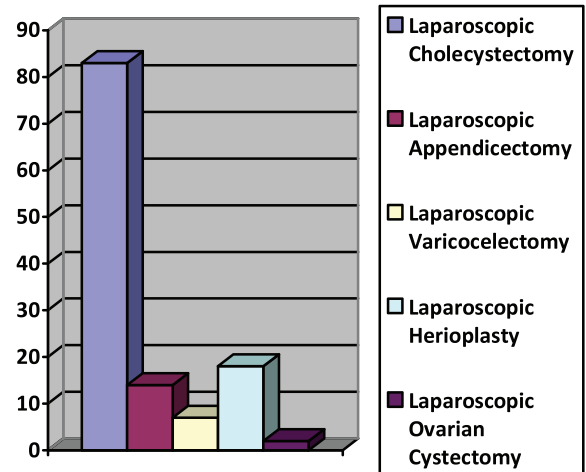


Figure-1: Type of laparoscopic operations

Table-II: Type of different laparoscopic operations (n=124)

Complications		Frequency	Percentage	
Per-operative	Related to entry	Failure to enter	0	0
		Intestinal injury	0	0
		Vascular injury	0	0
Postoperative	Port site	Infection	0	0
		Erythema	1	0.8
		Cellulitis/SSI	2	1.6
		Abscess requiring	0	0
	Hernia	Symptomatic	0	0
		Asymptomatic	0	0
		Pneumothorax	0	0
	Cosmetic issues	0	0	

Discussion

Primary port placement is a crucial step in laparoscopic surgery^{7,8} and many methods have been developed. Popular methods are currently divided into open and closed methods largely exemplified by Hasson's technique (as devised by Harrith Hasson in 1971) and use of Veress needle respectively. The Hasson's method basically involves creating access to the peritoneal cavity through a minilaparotomy and insertion of a special cannula with a cone that prevents gas leakage from pneumoperitoneum⁹. The Hasson's method is considered to be a safe method of creating pneumoperitoneum especially in patients with adhesions. The use of a Veress needle is essentially a blind technique and is thus considered a potential cause of injury. Relatively newer devices

such as optical trocars can also cause entry complications^{10,11}. However, no method of entry is without complications. Azevedo et al¹² in a cohort of in 6,96,502 patients who underwent a laparoscopic procedure using the closed technique (Veress needle) to enter the abdominal cavity have reported an incidence rate of vascular and visceral injuries of 0.018% and 0.0024%, respectively. In a meta-analysis by Bonjer et al¹³ vascular injuries occurred in 0.083% of patients using the closed technique and in 0.075% of patients using the open technique, while visceral injuries occurred in 0.048% of patients using closed technique and in 0.0% using the open technique. The meta-analysis shows a tendency to eliminate visceral injuries and reduce the risk of major complications with the open technique.

Apart from safety, another challenge faced in the developing world is the high cost and unavailability of laparoscopic equipments. The combinations of poverty, the high cost of equipment like trocars (disposable and reusable) make laparoscopic surgery more expensive than traditional surgery. Thus establishing pneumo-peritoneum through the commonly described techniques may not always be feasible. Even where equipment and funds are available, with increasing health-care costs, efficient utilization of available equipment is desirable. Therefore, a reliable method that is safe and easy to perform with readily available instruments is essential for wider utilization of laparoscopic surgery. The most important finding of this study was that a safe, open and reliable method of primary port insertion with any available trocar and cannula could be used for patients undergoing laparoscopic surgery. Our method does not require much ancillary equipment; what is needed include two Kocher's forceps and a medium-sized artery forcep along with the trocar and cannula. The primary port placement was with reusable or disposable trocars, and these were placed without difficulty. We could also achieve primary port access in patients undergoing laparoscopic surgery who had uncomplicated umbilical hernias.

Laparoscopic access to the abdomen could be obtained through the umbilical tube or stalk has been recognized by other investigators. Lal et al¹⁴ described a method using an Allis tissue forceps or a towel clip to elevate the umbilical tube through a supra or infraumbilical incision but required two Allis forceps, artery forceps, and a small Lagenbeck retractor Moberg et al¹⁵ described a method similar to Lal's but used a towel clip instead of Allis forceps, passed a blunt reusable trocar and utilized S-shaped retractors in obese patients. Our technique is similar to that described by Sadhu et al¹⁶. but while a blunt trocar was required initially in their description, ours used any available trocar and cannula with the trocar serving as a guide for the cannula. Our method ensures that the cannula fits snugly to the incision with no gas leaks. Sadhu et al, also insist on an infraumbilical skin incision while our technique is more versatile permitting access by trans-umbilical incision.

The utilization of any available trocar and cannula for primary port placement in laparoscopic surgery confers a number of advantages. First, the number of instruments required for access is reduced. This makes the procedure cheaper, less cumbersome to perform, and reduces the number of instruments to be cleaned or sterilized (for reusable instruments). Secondly, It also ensures that any trocar and

cannula available can be utilized for primary open port placement. This is an important factor in resource poor settings where specific or special trocars may be unavailable. Although it was not part of the objectives of this study to determine the time taken for primary port insertion, we noticed that this method was faster compared to other methods like use of Verres needle or Hasson's method. Surgical trainees also found it easier to perform compared to the older more established methods. This is in keeping with the findings by Moberg et al. in their study¹⁵ who found that using the umbilical tube; Initial port placement is a rapid and easily learned technique. Thus, it could reduce the time required for initial port placement a follow-up prospective study may be necessary to validate this.

The wide age range (18–75 years) of patients in whom this method was successfully employed without complications suggests that our method is suitable for all age groups. There were few limitations in our study. We did not assess the amount of time it took to insert the port utilizing our method. A follow-up randomized control trial comparing this method with established techniques is desirable.

Conclusion

We have described a simple, modified open method of laparoscopic primary port insertion through the umbilical scar, which utilizes any available trocar and cannula. This technique is quick, safe, reliable, simple and easy to learn. It is associated with minimal morbidity and has excellent cosmetic results. Based on our experience, we believe that this method provides surgeons with an effective and safe means to insert the first trocar.

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