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Entry complications of laparoscopic surgery: A study in marks medical college & hospital, Dhaka, Bangladesh

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Abstract
Background: Access into the abdomen is the one challenge of laparoscopy (Gr: Laparo-abdomen, scopein-to examine) that is particular to the insertion of surgical instruments through small incisions. Abdominal access and the creation of a pneumoperitoneum in the initial stage of any laparoscopic surgery carry a significant risk of bowel and vascular injuries.
Objective: To find out the Entry Complications of Laparoscopic Surgery patients.
Methods: This study included 85 patients who underwent laparoscopic procedure in our Dept. Of Gastro Intestinal Laparoscopic Onco-Surgery, Marks Medical College & Hospital, Dhaka, Bangladesh hospital over a period of two years (2016-2018). Intraperitoneal access was through three different methods-closed method (veress needle), open (Hasson's) method and direct trocar entry method.
Results: Minor complications occurred in all three methods but no major complication was reported.
Conclusion: All the three methods are safe for intraperitoneal access. Direct trocar entry is faster than other methods. Hasson's technique maybe preferred over other two methods in patients with previous abdominal surgeries. There remains no clear consensus as an optimal method of entry into the peritoneal cavity. It mainly depends on surgeon's preference and expertise.

Keywords: veress needle, hasson's method, direct trocar entry, pneumoperitoneum

1. Introduction
Vascular injury is a major cause of death from laparoscopy, with a reported mortality rate of 15%. Major vascular injury can occur when the Veress needle is inserted prior to insufflation or when a trocar is inserted after insufflation. Access into the abdomen is a challenge of laparoscopy that is particular to the insertion of surgical instruments through small incisions. Access is associated with injuries to the gastrointestinal tract and major blood vessels and at least 50% of these major complications occur prior to commencement of the intended surgery [1]. Increased morbidity and mortality results when surgeons or patients do not recognise injuries early or do not address them quickly [2]. The postoperative rather than intraoperative recognition of these injuries increases the severity of the sequelae. Complications include major and minor vascular injuries, bowel injuries, urological injuries, co2 embolism (rare but lethal), omental injury, preperitoneal insufflations resulting in subcutaneous emphysema, abdominal wall contusions, trocar site herniations, port site infections [3, 5]. The number of vascular injuries is 2 in 10000 procedures. However, the overall incidence of complications is relatively low (about 2%) [6]. One of the difficulties associated with the entry is that the damage might not be identified immediately and then could necessitate major abdominal repair. Furthermore, the improvement of surgical instruments and techniques enables the surgeon to perform even major operations using the laparoscopic approach. This is associated with renewed learning curves and a high rate of complications due to vascular, bowel, uterine, or bladder damage. The improvement of surgical techniques must be accompanied by advancements in the management of complications.

2. Methods
This study included 85 patients who underwent laparoscopic procedure in our Dept. Of Gastro Intestinal Laparoscopic Onco-Surgery, Marks Medical College & Hospital, Dhaka, Bangladesh hospital over a period of two years (2016-2018). Intraperitoneal access was through three different methods-closed method (veress needle), open (Hasson's) method and direct trocar entry method. The Veress needle is the oldest method, developed by Dr. Veress in 1938 and it is the most used technique. Commercially available Veress needles vary from 12 to 15 cm in length, with an external diameter of 2 mm [7]. A shaped tip enables the needle to pierce the tissues of the abdominal wall. Upon entering the peritoneal cavity, the resistance generated from the abdominal wall is overcome, which permits the exposure of the

interior needle with its blunt atraumatic mandril. The classic location of the Veress needle puncture is the midline of the abdomen umbilical scar. Due to the short distance between the anterior abdominal wall and the retroperitoneal vascular structures in this region, less than two centimetres in thin people, puncture poses risks of injury to these large vessels. The abdominal aorta, the inferior vena cava, and the common iliac vessels are especially vulnerable to lesions during puncture with the Veress needle in proximity of the umbilical scar. The needle relies on the ability of the blunt outer sheath to retract while passing through tissue and to spring forward in order to cover the sharp needle tip when tissue resistance diminishes. After the institution of general anesthesia, the patient was prepped and draped in the usual fashion. Patient was placed in steep Trendelenburg's position. The Veress needle was inserted in the umbilical area, in the midsagittal plane, with stabilizing or lifting the anterior abdominal wall. The angle of the Veress needle insertion was accordingly from 45degrees in non-obese women to 90degrees in very obese women. The following tests was done to confirm the presence of the needle in the peritoneum and not in a visceral organ-Needle movement test once the veress needle is inside the abdominal cavity, the tip of veress needle should be free and no resistance felt. Hissing sound test involves turning the valve to the off position after it has been properly positioned. The abdomen is elevated and the valve opened, creating a hissing sound. Aspiration test involves attaching a syringe filled with saline to the Veress needle and attempting to aspirate any material. If material is aspirated such as bowel contents or urine, the Veress needle should be removed. If blood is aspirated, the needle is left in place and preparation for exploratory laparotomy is made for a presumed vascular injury. If no material is aspirated, 5 mL of saline is inserted and a reattempt to aspirate is made. If no fluid can be aspirated, entry into the peritoneal cavity is confirmed. If the saline is aspirated, an enclosed space was probably entered such as the preperitoneal space and the needle should be repositioned. Hanging drop test Involves placing a drop of water on the open end of the Veress needle and the abdominal wall is elevated. If the needle is correctly positioned, the water should disappear down the shaft. Until confirmation of proper position of the needle, insufflation should be low at a rate of 1 L/min. Finally, the needle is attached to an insufflator that measures the pressure at the tip. The pressure will be low (5 mm Hg) if it is appropriately placed. Insufflation to 12-15 mm Hg with carbon dioxide gas follows [8, 9].

Hasson's Technique (CLOSED)

Hasson first described open laparoscopy in 1971. The open laparoscopic entry is considered particularly safe in patients with previous abdominal surgery, especially midline incisions. It involves direct open visualization of the tissues at every layer until the peritoneum is opened, followed by placement of anchoring sutures in the fascia to secure a conical collar. The trocar was then placed through the collar to establish pneumoperitoneum and access. Disadvantages included persistent uncontrolled co2 leakage in many cases, increased incision size and increased time for placement.

Direct Trocar Entry

Ding elder in 1978 was the first to advocate this technique in which where the abdomen is entered with a trocar without prior Veress needle entry and pneumoinsufflation [6]. The direct entry method was faster than any other method of entry. After the institution of general anesthesia, the patient was placed in the dorsal supine position. The umbilical skin was elevated with a skin hook and a 1-cm intraumbilical incision was made sharply with a scalpel. The anterior abdominal wall was then elevated by pulling on 2 towel clips placed 3 cm on either side of the umbilicus [11,12]. While elevating the anterior abdominal wall away from the underlying viscera, the surgeon held a 10-mm trocar with his index finger positioned 3 cm away from the trocar tip to guard against sudden uncontrolled entry into the abdomen [10]. The trocar was inserted at a 90-degree angle and advanced in a controlled fashion into the peritoneal cavity with a twisting semicircular motion. The laparoscope was then introduced, proper intraperitoneal placement ascertained, and a pneumoperitoneum created with high-flow insufflation. The underlying structures were then carefully inspected for injury.

3. Results

Eighty-five patients were included in this study over a span of two years. There were 52 females and 33 males with mean age of 34.8±9.2 years. Laparoscopic cholecystectomy was performed in 60 patients and laparoscopic appendecectomy in 25 patients. In 32 patients veress needle access was used, in other 28 patient's direct trocar entry method was used and in 25 patients Hasson's open method was used.

Table 1: Methods of Intraperitoneal Access (N=85)

Methods	Number of Patients (N=85)
Veress Needle Entry (Closed Method)	32
Direct Trocar Entry	28
Hasson's Open Method	25

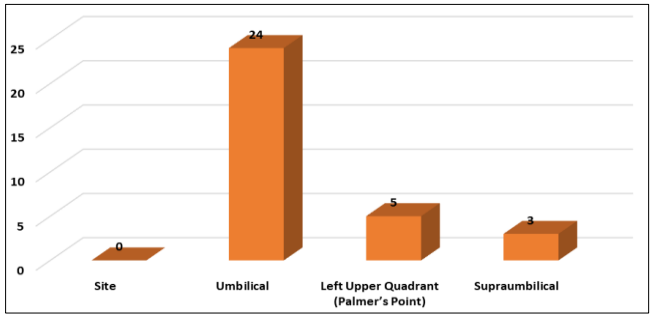

Fig 1: Site of Veress Needle.

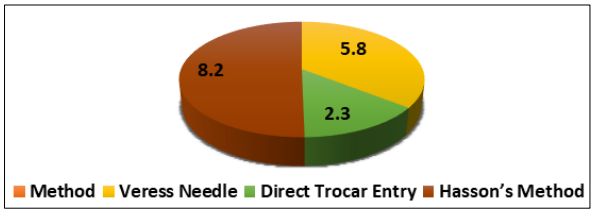

Fig 2: Average Duration.

Table 2: Complications: Immediate Entry Complications (N=13)

Complications	Veress Needle (N=32)	Direct Trocar Entry (N=28)	Hasson's Method (N=25)
Preperitoneal Placement/Subcutaneous Emphysema	4(12.5%)	3(10.7%)	0
Omental Injury	1(3.1%)	1(3.5%)	0
Gas Leakage	0	0	4(16%)
Vascular Injury	0	0	0
Bowel Injury	0	0	0
Urological Injury	0	0	0
Co2 Embolism	0	0	0

Table 3: Late Complications (N=9)

Complications	Veress Needle (N=32)	Direct Trocar Entry (N=28)	Hasson's Method (N=25)
Wound Infection	0	2(7.1%)	3(12%)
Granulation Tissue Formation	2(6.2%)	0	0
Incisional Hernia (Umbilical Port)	0	1(3.5%)	0
Abdominal Wall Ecchymosis	0	1(3.5%)	0
Delayed Healing	0	0	0

Complications

No major complications occurred such as co2 embolism, vascular injury, bowel injury. But minor complications occurred with all three methods. Complications were categorized as major or minor, immediate (right after trocar entry) or late (during first 6 weeks postoperation). Immediate complications were preperitoneal placement leading to subcutaneous emphysema, omental injury, vascular injury, bowel injury, urological injury, co2 embolism, gas leakage. Late complications included abdominal wall ecchymosis, wound infection or discharge, granulation tissue formation, trocar site hernia and delayed healing.

4. Discussion

With all three methods no major complication occurred such as vascular injury, bowel injury, urological injury and co2 embolism [13, 14, 15, 16]. Preperitoneal placement/subcutaneous emphysema is one of the most common immediate complication encountered [17, 18, 19, 20]. In our study, it was seen in 4 patients of veress group and 3 patients of direct trocar entry group. Omental injury was seen in 1patient from both groups. Hasson's technique was free from these complications but gas leakage was frequently seen with this method. Post-operative wound infection occurred in 2(7.1%) patients of direct trocar entry group and in 3(12%) patients of Hasson's method group. Granuloma incidence was more with veress needle whereas incisional hernia and ecchymosis was seen in direct trocar entry group. Fascial closure is more secure with Hasson's method hence these complications were not observed. Complications were categorized as major or minor, immediate (right after trocar entry) or late (during first 6 weeks postoperation). Immediate complications were preperitoneal placement leading to subcutaneous emphysema, omental injury, vascular injury, bowel injury, urological injury, co2 embolism, gas leakage. Late complications included abdominal wall ecchymosis, wound infection or discharge, granulation tissue formation, trocar site hernia and delayed healing. Much of the literature discussing the complications associated with laparoscopic surgery is drawn from the gynecologic literature, which has provided the most comprehensive study of these injuries [21]. It is presumed that results from these studies can be generalized to other abdominal and retroperitoneal surgeries, but wherever possible, outcomes of laparoscopic surgery in gynecology, general surgery, and urology are distinguished. Surgical complications unique to a laparoscopic approach are discussed here. Surgical techniques and their specific complications are discussed in individual topic reviews. Other general issues relating to laparoscopic surgery, including abdominal access and instrumentation, are reviewed elsewhere.

5. Conclusion

There is no single safe technique that reduces laparoscopic surgery entry complications in low risk patients. The surgeon should select the technique which he feels most comfortable with. The open (Hasson's) technique and Palmer's point pneumoperitoneum should be considered in the obese patient and those with suspected peri-umbilical adhesions. Although the open trocar technique with a Hasson cannula is considered a safe alternative, it is not complication free and its time-consuming nature and cost have made many laparoscopic surgeons use it very selectively. Open laparoscopy does not reduce the risk of major complications during laparoscopic access. There is no evidence to support abandoning the closed entry technique in laparoscopy. Preference should be given to the method with which the surgeon is most comfortable, or with which he or she has the most experience.

6. References

1. Krishnakumar S, Tambe P. "Entry complications in laparoscopic surgery," Journal of Gynecological Endoscopy and Surgery. 2009; 1(1):4-11.
2. Direct trocar insertion: A Safe Laparoscopic Access N Mahajan, N Gaikwad. Direct Trocar Insertion: A Safe Laparoscopic Access. The Internet Journal of Gynecology and Obstetrics, 2006, 8(2).
3. Pneumoperitoneum by Direct Trocar Insertion: Safe Laparoscopic Access Rajneesh Kumar, Ankur Hastir, M. K. Bandlish. "Pneumoperitoneum by Direct Trocar Insertion: Safe Laparoscopic Access". Journal of Evolution of Medical and Dental Sciences. 2015; 4(15):2432-2437. DOI: 10.14260/jemds/2015/352.
4. Palmer R. Safety in laparoscopy. J Reprod Med. 1974; 13:1-5.

5. Hasson HM. A modified instrument and method for laparoscopy. Am J Obstet Gynecol. 1971; 110:886-7.
6. Dingfelder JR. Direct laparoscope trocar insertion without prior pneumoperitoneum. J Reprod Med. 1978; 21:45-7.
7. Comparison of Two Entry Methods for Laparoscopic Port Entry: Technical Point of View Adriana Toro, Maurizio Mannino, Giovanni Cappello, Andrea Di Stefano, andIsidoro Di Carlo Department of Surgical Sciences, Organ Transplantation, and Advanced Technologies, University of Catania, Cannizzaro Hospital, Via Messina 829, 95126 Catania, Italy.
8. Chandler JG, Corson SL, Way LW. Three spectra of laparoscopic entry access injuries. J Am Coll Surg. 2001; 192:478-91.
9. Neudecker J, Sauerland S, Neugebauer E, Bergamaschi R, Bonjer HJ, Cuschieri A, *et al*. The European Association for Surgery Clinical Practice Guideline on the pneumoperitoneum for laparoscopic surgery. Surg Endosc. 2002; 16:1121-43.
10. Trocars: safety and selection. Emergency Care Research Institute. Health Devices. 1998; 27:376-98.
11. Bhoyrul S, Vierra MA, Nezhat CR, Nezhat CH, Krummel TM, Way LW. Trocar injuries in laparoscopic surgery. J Am Coll Surg. 2001; 192:677-683.
12. Nezhat CR, Nezhat F, Luciano AA, Siegler AM. Metzger Techniques. New York, NY: McGraw-Hill Inc, 2000, 91-110.
13. Varma R, Gupta JK. "Laparoscopic entry techniques: clinical guideline, national survey, and medicolegal ramifications," Surgical Endoscopy and Other Interventional Techniques. 2008; 22(12):2686-2697.
14. Chandler JG, Corson SL, Way LW. "Three spectra of laparoscopic entry access injuries," Journal of the American College of Surgeons. 2001; 192(4):478-491.
15. Schäfer M, Lauper M, Krähenbühl L. "Trocar and Veress needle injuries during laparoscopy," Surgical Endoscopy. 2001; 15(3):275-280.
16. Reich H, Ribeiro SC, Rasmussen C, Rosenberg J, Vidali A. "High-pressure trocar insertion technique," Journal of the Society of Laparoendoscopic Surgeons. 1999; 3(1):45-48.
17. OHM Hypólito, JLMC Azevedo, FMS De Lima Alvarenga Caldeira *et al*., "Creation of pneumoperitoneum: noninvasive monitoring of clinical effects of elevated intraperitoneal pressure for the insertion of the first trocar," Surgical Endoscopy and Other Interventional Techniques. 2010; 24(7):1663-1669.
18. Azevedo JLMC, Azevedo OC, Miyahira SA, *et al*., "Injuries caused by Veress needle insertion for creation of pneumoperitoneum: a systematic literature review," Surgical Endoscopy and Other Interventional Techniques. 2009; 23(7):1428-1432.
19. Merlin TL, Hiller JE, Maddern GJ, Jamieson GG, Brown AR, Kolbe A. "Systematic review of the safety and effectiveness of methods used to establish pneumoperitoneum in laparoscopic surgery," British Journal of Surgery. 2003; 90(6):668-679.
20. Catarci M, Carlini M, Gentileschi P, Santoro E. "Major and minor injuries during the creation of pneumoperitoneum: a multicenter study on 12,919 cases," Surgical Endoscopy. 2001; 15(6):566-569.
21. Philips PA, Amaral JF. Abdominal access complications in laparoscopic surgery. J Am Coll Surg, 2001, 192:525.