

## Evaluation of Direct Trocar Insertion Technique at Laparoscopic Surgery

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### ABSTRACT:

#### BACKGROUND:

Commonly we utilize Veress needle in laparoscopic surgery as usual to start with introduction of pneumoperitoneum in the abdomen (classic pneumoperitoneum), but there are alternatives to it for better and fast work even in obese patients.

#### OBJECTIVE:

The purpose of this study is to compare direct trocar (DT) to Veress needle (VN) entry for the creation of pneumoperitoneum during laparoscopy with regard to the duration of the procedure (trocar and Veress placement time), volume of gas used, ease of performance, and frequency of complications through a randomized clinical study in Al-Karama hospital and some other private Baghdad hospitals.

#### PATIENTS AND METHODS:

70 patients scheduled to undergo diagnostic and therapeutic laparoscopy (general surgery and gynecology cases), 40 cases divided into DT (group A = 20) and VN (group B = 20), the other 30 cases were obese patients BMI > 30, subdivided into two subgroups (1, 2) submitted for the study, they were randomly allocated to either DT or VN entry for pneumoperitoneum. The laparoscopic procedures performed by the same surgeon.

#### RESULTS:

The trocar and Veress placement time, volume of gas consumption, ease of performance and frequency of complications were analyzed. The mean trocar and Veress placement time was significantly shorter in group A and subgroup 1 than in group B and subgroup 2. The mean gas consumption was significantly less in group A (2-3 liters) and subgroup 1 than in group B and subgroup 2 (3-6 liters). No major complications (bowel, vessels injury) in both groups were encountered. Minor complications (failure pneumoperitoneum) were significantly less in group A and subgroup 1 than in group B and subgroup 2.

#### CONCLUSION:

DT entry is a safe alternative to the VN entry technique for the creation of pneumoperitoneum. This approach has further advantages with less cost and instrumentation along with rapid creation of pneumoperitoneum even in obese patients.

**KEYWORDS:** pneumoperitoneum, laparoscope.

### INTRODUCTION:

Creation of pneumoperitoneum is an important first step procedure in laparoscopic surgery, since it allows better traction on internal abdominal structures and better entrance of the other ports under direct vision through laparoscopes. The use of Veress needle was introduced since 1938 which is a significant development in laparoscopic technology occurred in when

Hungarian surgeon, Janos Veress described a spring loaded needle with an inner stylet that automatically converted the sharp cutting edge to a rounded end by incorporating a side hole for creation of pneumoperitoneum (1,2,3). Veress needle utilized till now to be pushed through abdominal wall (supraumbilical or infra umbilical incisions of abdominal wall) to achieve the classic pneumoperitoneum, for obese patients same needle utilized but with longer shaft are utilized, since obesity is one of the main challenges in our study which creates difficulty in insertion of needle and trocar due to thick

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abdominal wall, and failure pneumoperitoneum were a common problem encountered, the trocar part of laparoscope passes toward the abdomen for further port entry and complete laparoscopic procedure<sup>(1,2,3,4,5,6,7,8,9,10)</sup>.

Our purpose is to substitute the use Veress needle as first step and utilize the trocar directly with some precautions to be followed and done safely without causing any harmful effects to internal structures of the abdomen [bowel or vessels].

### PATIENTS AND METHODS:

70 cases (50 males, 20 females) were submitted to either DT or VN during the period from April 2010 to Aug. 2011. 10 cases were obese (all were females with B.M.I=30-35 kg/m<sup>2</sup>). In Alkarama hospital and some other private Baghdad hospitals.

Five of the above cases had previous history of laparotomy (four of them previous surgery for duodenal ulcer-upper midline old scar, one of them had appendectomy old scar).

The mean age of patients is 40 years (range 20-70), divided into two groups;

- 50 patients had DT, Group A.
- Other 20 patients had; VN, Group B
- Obese patients(10 cases) were subdivided into two subgroups:

1. Seven cases had DT

2. Eight cases had VN

All patients had full history and were examined clinically, biochemically and radiologically (ultrasound, CT-scan) to exclude any contraindication for laparoscopic surgery (aortic aneurism, distended loops of bowel due to intestinal obstruction, tumors, and coagulopathy), They were undergoing different laparoscopic surgery accordingly (General surgery;

laparoscopic cholecystectomy, diagnostic etc., Gynecology; cases for infertility, ovarian cyst etc...). In our study we depend on the trocar and Veress placement time defined as the time to place the trocar or veress needle into the peritoneal cavity, volume of gas consumption, and frequency of complications (failed pneumoperitoneum, preperitoneal insufflations, and omental injury) were analyzed using instruments available for laparoscopic surgery in Al-Karama hospital and some other private Baghdad hospitals.

In classic pneumoperitoneum; The patient is placed in a supine position without any tilt Veress needle utilized to be pushed through abdominal wall (supra-umbilical or infraumbilical incisions which is 10mm in length in abdominal wall) as a first procedure for achieving pneumoperitoneum with a pressure of about 12-14mmHg of CO<sub>2</sub>, usually identified through insufflators within laparoscopic trolley instrument, after that we introduce first trocar through same incisions to complete the stage of pneumoperitoneum with a pressure of about 10-12mmHg inside the abdomen. For obese patients long type of veress needle used. Sometimes catheterization of urinary bladder done to avoid bladder injury especially in gynecological cases<sup>(11,12,13,14)</sup>.

Direct trocar entry in our study depends on penetrating the trocar through specific sites within the abdominal wall, which are the safe sites, and they are avascular areas in addition to supraumbilical and infra umbilical areas. The landmarks are identified as shown in figure 1. The anterior iliac spines, lateral borders of the rectus muscles and subcostal margin along with epigastric vessels<sup>(15,16,17,18,19,20,21)</sup>.

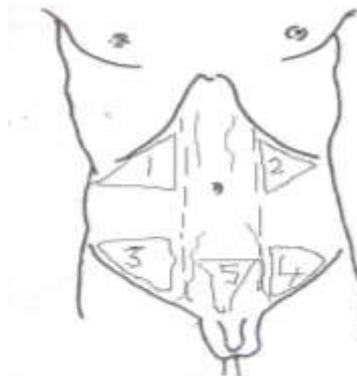


Figure 1: Safe sites for trocar placement.

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The two lateral triangles are between the lateral border of the rectus sheath and the iliac spines. This is the site for the lateral ports. The third triangle is in the suprapubic region between the two umbilical arteries and the base of the bladder. The epigastric vessels (superior and inferior) are shown in figure 1 remain medial to the lateral triangles), the other two triangles are between subcostal margin and edge of rectus muscle.

The first trocar is placed at 90 degrees to the abdominal wall through either infraumbilical or supraumbilical incision (for patients with previous laparotomies we were utilized area No. 1 (right hypochondrial region) for first trocar entry. Assistant and the surgeon elevate the abdominal wall but do not lift up the skin completely. Now the surgeon drives the trocar firmly towards the rectus sheath. Once the rectus sheath is reached, the abdominal skin is lifted up so that a flap is formed that is 90 degrees to the abdominal wall. By keeping the trocar fixed on the rectus sheath, the trocar is now driven through the rectus sheath in a slow and firm twisting motion. The trocar's orientation is at 90 degrees to the flap of skin, which will be in the direction of the pelvis, once you feel the resistance of the rectus sheath giving way do not accelerate but continue with the same speed until you feel entry of the peritoneum. The

Trocar needs to go in only by about 3 cm to enter the peritoneal cavity. The position of the scope must be checked first before starting insufflations (we were utilizing laparoscopes in DT after introduction of port into the abdomen before insufflations to look for possible wrong entrance through continuous elevation of the abdominal wall) when insufflations started you obtain good view very quickly.

### RESULTS:

The mean trocar and veress placement time was significantly shorter in group A (1-3 min) than in group B (3-4 min), and it indicate the time consumed to achieve complete pneumoperitoneum enough to do laparoscopic surgery. The mean gas consumption was significantly less in group A (3-4 liters) than in group B (4-5 liters) as seen in table 1.

Complications happened include failed pneumoperitoneum, preperitoneal insufflations, and omental injury occur in group B (table) and in obese patients (subgroup 2/ table; 3) than group A or subgroup 1 (obese patients / DT) where no complication encountered. Direct entry technique is associated with a significantly reduced major injury (vascular, bowel) incidence when compared to Veress entry, as shown below.

Table 1: Changes happened according to special parameters listed below.

Groups	Trocar and veress placement time	1st A Complications	Amount of gas
group a	1-3 min-	nil	3-4
group b	3-4 min.	3 cases: failure (preperitoneal nsuf.)	4-5

For obese patients undergoing different laparoscopic surgery (general and gynecology surgery), in such

cases long type of Veress needle used DT entry safer than VN entry as shown in table 2.

Table 2: Reveal changes happen in obese patients .

Subgroup	Trocar and veress placement time	1st A Complications	Amount of gas
Subgroup 1	3-4 min.	Nil	3-4
Subgroup 2	4-5 min.	2 cases: failure 4 cases: preperitoneal, one omental inj.	4-5

### DISCUSSION:

DT insertion was first reported in the literature by Dingfelden in 1978.

In a randomized study the complications of (VN) insertion were compared with that of DT

insertion of conventional reusable and disposable shielded trocars for obtaining pneumoperitoneum in sixty patients.

The decision to use alternative entry technique was based on the surgeon's assessment of the patient's likelihood of having adhesions to the anterior abdominal wall.

The risk of the adhesions has been shown to be directly related to patients' past medical and surgical history.

Specifically patients with a midline incision extending above the umbilicus were more likely with either panniculus or lower midline incisions.

One of the advantages of the DT is the reduced number of blind insertions required to gain abdominal access.

Subcutaneous emphysema one of the main complications is reduced in DTI. DTI also reduces the operations time

Trocar use requires considerable training, practice, skill, manual dexterity, adequate muscular strength, knowledge of the associated risks and careful patient's selection

There are many studies about this subject and one of these studies is published in JSLS Journal of the Society laparoscopic surgery a study at 2008 April-June at UK at Princess Alexandria Hospital/Harlow/London by Dr. Lethaby, H.A. Bradpiece FRCS, a study of: <sup>(10)</sup>

Direct trocar insertion technique an alternative for creation of pneumoperitoneum.

A retrospective study for 196 patients (146 women and 50 men) & mean age was 37 years.

The procedure included 186 laparoscopic cholecystectomies, 3 laparoscopic appendectomies, 1 laparoscopic nissen, 0 laparoscopic groin hernia repairs, and 1 conversion to open surgery.

The conclusion of this study shows the direct trocar insertion technique is a safe and effective alternative for creation of pneumoperitoneum

### CONCLUSION:

DT entry is a safe alternative to the VN entry technique for the creation of pneumoperitoneum. Such an approach has further advantages as less cost and less instrumentation with rapid creation of pneumoperitoneum in low risk and obese patients. Although this way of entry is not popular, our study shows that there were no differences in terms of safety for a way of entry (i.e., Veress needle, direct entry) when compared to another. However no clear evidence as to obtain the optimal form laparoscopic entry in the low-risk and obese patient. Direct entry may remain an under-utilized and safe alternative to the Veress needle <sup>(11,12,13,14)</sup>.

### REFERENCES:

1. Ahmad, G, Duffy, JM, Phillips, K, Watson A Laparoscopic entry techniques AU Cochrane Database Syst Rev. 2008; CD007083.
2. Hasson HM. Open laparoscopy as a method of access in laparoscopic surgery. Gynaecol Endosc 2009; 8: 303.
3. Jansen FW, Kolkman W, Bakkum EA, de Kroon CD, Trimbo-Kemper TC, Trimbo JB. Complications of laparoscopy: an inquiry about closed- versus open-entry technique. Am J Obstet Gynecol. 2010; 190: 634.
4. Varma R, Gupta JK. Laparoscopic entry techniques: clinical guideline, national survey, and medicolegal ramifications. Surg Endosc 2008; 22: 2687-97.
5. Rosen DM, Lam AM, Chapman M, et al: Methods of creating pneumoperitoneum: a review of techniques and complications. Obstet Gynecol Surv 2008; 53: 167-74.
6. McKiernan JB, Finley CR. Experience with optical trocar in performing laparoscopic procedures. Surg Laparosc Endosc Percutan Tech 2010; 12: 96-99.
7. Hashizume M, Sugimachi K. Needle and trocar injury during laparoscopic surgery in Japan. Surg Endosc 2011; 11: 1198-201.
8. Vilos GA. Litigation of laparoscopic major vessel injuries in Canada. Am Assoc Gynecol Laparosc 2009; 7: 503-9.
9. Champault G, Cazacu F, Taffinder N. Serious trocar accidents in laparoscopic surgery: a French survey of 102,802 operations. Surg Laparosc Endosc 2010; 7: 377-70.
10. Chapron CM, Pierre F, Lacroix S, et al. Major vascular injuries during gynecologic laparoscopy. J Am Coll Surg 2011; 180: 461-70.
11. Cordick CM, Lecuru F, Robin F, et al. Morbidity in laparoscopic gynecological surgery: results of a prospective single-center study. Surg Endosc 2009; 13: 57-61.
12. Corson SL, Chandler JG, Way LW. Survey of laparoscopic entry injuries provoking litigation. J Am Assoc Gynecol Laparosc 2008; 8: 341-47.
13. Ohlgisser M, Sorokin Y, Heifetz M: Gynecologic laparoscopy. A review article. Obstet Gynecol Surv 2011; 40: 380-96.
14. Dingfelder JR. Direct laparoscope trocar insertion without prior pneumoperitoneum. J Reprod Med 2010; 21: 40-47.
15. Copeland C, Wing R, Hulka JF. Direct trocar insertion at laparoscopy. An evaluation. Obstet Gynecol. 2009; 72: 600-09.

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١٦. Byron JW, Fujiyoshi CA, Miyazawa K. Evaluation of direct trocar insertion technique at laparoscopy. *Obstet Gynecol* ٢٠١١;٧٤:٤٢٣-٢٥.
١٧. Nezhat FR, Silfen SL, Evans D, Nezhat C. Comparison of direct insertion of disposable and standard reusable laparoscopic trocars and previous pneumoperitoneum with Veress needle. *Obstet Gynecol* ٢٠١٠;٧٨:١٤٨-٥٠.
١٨. Gunenc MZ, Yesildaglar N, Bingol B, et al. The safety and efficacy of direct trocar insertion with elevation of the rectus sheath instead of the skin for pneumoperitoneum. *Surg Laparosc Endosc Percutan Tech* ٢٠١٠;١٥:٨٠-٨١.
١٩. Woolcott R. The safety of laparoscopy performed by direct trocar insertion and carbon dioxide insufflation under vision. *Aust NZ j Obstet Gynaecol* ٢٠٠٩; ٣٧:٢١٦-١٩.
٢٠. Jacobson MT, Osias J, Bizhang R, et al. The direct trocar technique: an alternative approach to abdominal entry for laparoscopy. *JSLs* ٢٠١٠; ٦:١٦٩-٧٤.
٢١. Rahman MM, Marmin AA. Direct trocar insertion: alternative abdominal entry technique for laparoscopic surgery. *Mymensingh Med J* ٢٠٠٣; ١٢:٤٥-٤٧.
٢٢. Vilos GA, Ternamian A, Dempster J, et al. Laparoscopic entry: a review of techniques, technologies, and complications. *J Obstet Gynaecol Can* ٢٠١١;٢٩:٤٣٣-٤٧.
٢٣. Brill AJ, Cohen BM. Fundamentals of peritoneal access. *J Am Assoc Gynecol Laparosc* ٢٠١٠; ١٠:٢٨٧-٩٧.
٢٤. Hill DJ, Maher PJ. Direct cannula entry for laparoscopy. *J Am Assoc Gynecol Laparosc* ٢٠١١; ٤:٧٧-٧٩.
٢٥. Direct trocar insertion technique: an alternative for creation of pneumoperitoneum. Lethaby, Bradpiece HA, parithara. *Jsls* ٢٠٠٨; ١٢:١٥٦-٥٨.