Original article:

Safety of Direct Trocar Entry in Laparoscopy in a Structured Fellowship Programme

Trehan N[1], Padiyath HR[2], Kaur A[3], Dhingra M [4], Shriya R[5] , Ahmad A[6]

Abstract:

Introduction:The best method of primary trocar insertion in laparoscopy remains controversial. There are advocates for both initial Veress needle insertion as well as direct trocar insertion. ***Aim of the study:*** This study was carried out to find out the complication rate of direct trocar insertion as a method of laparoscopic entry and find out the learning curve of trainees in a structured fellowship programme. ***Methodology:*** Retrospective analysis was done over period of 5 years with a sample size of 2053 subjects. ***Results:*** 2053 laparoscopic surgeries were examined. Overall complication rate was 0.38%; subjects with previous abdominal surgery were found to have higher complication rate as compared to ones with no history of prior surgery. [0.46% and 0.35% respectively]. All trainees gained reasonable degree of confidence within 6 months. ***Conclusion:*** Direct trocar insertion is a safe method of laparoscopic entry, which can be taught to trainees with no prior laparoscopic experience, without an increase in entry complications.

Keywords: Direct trocar insertion, Veress needle, primary trocar entry, Lee Huang's point, Palmer's point.

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Introduction

The most critical step in laparoscopy is primary trocar insertion with majority of complications related to primary port access.[1,2] The controversy over best method of entry remains unresolved, withVeress needle insertion [followed by primary trocar insertion] being the most widely accepted technique [VN].[3,4,5]

Numerous studies have shown that direct trocar insertion [DTI] is a safe method of laparoscopic entry and may infact have a lesser degree of complications when compared with VN.[6,7]

We have been practicing DTI as the preferred method of laparoscopic entry at Sunrise Hospital, Delhi and also running a fellowship programme which is training surgeons in laparoscopic techniques in gynecology. This study was conducted to assess the rate of complications with

1. Dr. Nikita Trehan. DNB [Obst. And Gynae], MNAMS, Diploma in Laparoscopic Surgery [Kochi, Germany]. Senior Consultant and Managing Director, Sunrise Hospital. F-1, Kalindi Colony, New Delhi, India. 110065. helpdesk@sunrisehospitals.in
2. Dr. Hafeez Rehman Padiyath. MS [Obst. And Gynae]. Senior Consultant and Chairman, Sunrise Hospital. Seaport Airport Road, Kakkanad, Ernakulam, India. 682030 www.sunrisehospitalcochin.com
3. Dr. Amanjot Kaur. MS [Obst. And Gynae], Fellow Advanced Gynaecology Laparoscopy, Assistant Professor, Dept. of Obst. And Gynae. Government Medical College, Patiala, Punjab, India. aman50055@yahoo.com
4. Dr. Mansi Dhingra. MS [Obst. And Gynae], MRCOG, Fellow Advanced Gynaeology Laparoscopy. Consultant, Vaga Hospital, KS 14, Aliganj Housing Scheme, Sitapur Road, Lucknow, Uttar Pradesh, India. drmansidhingra@gmail.com
5. Dr. Rashmi Shriya. MD, DNB [Obst. And Gynae], FMAS, DMAS [WALS], Fellow Advanced Gynaecology Laparoscopy. Consultant, Delhi, India. rashmishriya8@gmail.com
6. Dr. Ayesha Ahmad. DGO, DNB [Obst. And Gynae], MNAMS, MRCOG. Fellow Advanced Gynaeology Laparoscopy. Associate Professor, Era's Lucknow Medical College and Hospital, Sarfarazganj, Lucknow, Uttar Pradesh, India. docayeshaahmad@gmail.com

Correspondence to: Dr. Ayesha Ahmad, Associate Professor, Department of Obstetrics and Gynaecology, Era's Lucknow Medical College and Hospital, Sarfarazganj, Lucknow, Uttar Pradesh, India. **E-mail: docayeshaahmad@gmail.com**

DTI. We also assessed as a secondary outcome measure, the learning curve of students with this method of laparoscopic entry.

Aim of the study:

1. To study the rate of complications with DTI as a method of laparoscopic entry.
2. To compare the complication rates with DTI with the available literature on VN.
3. To determine the average learning curve of students with DTI.

Materials and Methods

The present study is a retrospective evaluation of laparoscopic surgeries in gynecology, over a period of 5 years, from January 2014 to January 2019, at Sunrise Hospital, Delhi. A total of 2053 patients were studied who underwent laparoscopy in gynecology. Institutional ethical clearance was obtained for the present study.We evaluated the patients with respect to age, BMI, parity, any previous abdominal surgeries and complications as a result of DTI. Percentages were derived to calculate the incidence.

Procedure for Direct Trocar Insertion [DTI] Followed at Sunrise Hospital

The patient is put in supine position and abdomen is prepared. Primary stab incision is made of approximately 10mm. We prefer the Lee Huang's point or Palmer's point for entry. The anterior abdominal wall is elevated by the surgeon, using his left hand and also by an assistant. The trocar and cannula is held by the right hand of surgeon with the index finger serving as a guard. The trocar is put in the well of the incision before lifting the abdominal wall, and then the trocar is inserted perpendicular to the abdominal wall with linear penetration force and screwing movement. As soon as two clicks are felt/audible, the trocar is withdrawn and laparoscope [with light source] is inserted to confirm safe placement of the primary port.

Results

A total of 2053 surgeries were examined in the present study[see Table 1]. The overall complication rate was found to be extremely low with DTI [0.38%]; the rate was higher in subjects with previous abdominal surgery [0.46%] as compared to those who had no such history [0.35%][Table 2].

Figure 1 shows the learning curve of trainees. A total of 38 trainees were studied. We found that all the trainees gained reasonable degree of confidence within 6 months.

Discussion

Dingfender first described DTI of abdominal cavity in 1978.[8,9,10] It was introduced with the premise that eliminating the initial creation of pneumoperitoneum will help in avoiding the complications associated with VN. DTI allows the surgeon to elevate the abdominal wall with greater ease as compared to VN, which is the primary factor determining the falling off of viscera from the parietal peritoneum, prior to contact with the advancing trocar. As DTI does not involve usage of Veress needle, the entry is quicker and reduces the number of blind steps from three to one. This automatically reduces the complications related to blind air insufflations, risk of pre peritoneal insufflations, gas embolism, incidence of subcutaneous emphysema and needle-related vascular and visceral injuries.

Byron *et al.*[11] compared Veress needle and direct trocar entry in 252 women. They found a statistically significant increase in minor complications and longer insertion time in the Veress needle group. Gunenc *et al.*[12] conducted a randomized control trial in 578 subjects with a modification of DTI technique. They found a significant difference in complication rates of VN and DTI [15.7% vs. 3.3%, $p<0.05$] and concluded that DTI is easy, safe and effective. Choudhary *et al.*[13] conducted a study in 175 Indian women and did not experience any vascular or visceral injury with DTI.

In the present study, we found a complication rate of less than 1% with DTI.In one case, there was uterine injury after insertion of primary trocar. However, this was a case of twin pregnancy presenting at 16 weeks, for laparoscopic encirclage. The uterine size was around 24 weeks of gestation. Although the primary trocar was inserted at Lee Huang's point, it hit the uterine fundus. On insertion of laparoscope, profuse bleeding was observed from the site. We immediately inserted secondary ports and bleeding was controlled by bipolar coagulation. The surgery could be completed successfully and the pregnancy progressed uneventfully.

In our series of 1053 cases, 1 major bowel injury, 1 uterine injury and no major vascular injuries occurred. This is in line with the known low levels of complications as reported in other studies. Our study did not investigate the injury complications with different entry techniques because we use only DTI for primary entry. Given the low incidence of complications related to primary trocar injury,

it would require a prospective randomized control trial of a large number of patients to prove a statistically significant difference in entry techniques. A 33% reduction in incidence [with 80%power and 95% CI] would require a study of more than 800,000 cases.[14]

In 1999 March, at Middlesbourgh, UK, a special group of experts analyzed entry related complications in order to form an evidence based consensus opinion. The incidence of bowel and vascular injuries was reported as 0.4 per 1000 and 0.2 per 1000 respectively, based on a data of more than 350,000 closed laparoscopies. The group recommended VN as the preferred technique.[15]

However, in 2019, a large meta-analysis concluded that although major complications were extremely rare with any method of primary trocar entry, in terms of minor complications, DTI was the safest method.[16]

The technique of DTI as described in the methodology is followed in all cases in order to standardize the technique and minimize any variations that might increase the likelihood of injury. This becomes more relevant in any training institute where the risks of complications are inherently increased. The decision to use which site of entry is based on the surgeon's assessment of the clinical situation, especially the risk of adhesions being present. Brill *et al.*[17]found adhesions between previous abdominal scar and omentum or bowel in 36% of patients with previous laparotomy. The risk of adhesions is related to previous medical and surgical history and should be evaluated on an individual basis. Patients who have undergone prior laparotomy with a midline incision extending above umbilicus are more likely to have bowel adhesions as compared to those who had a lower midline or Pfannenstiel incision.[18]

Our primary objective was to evaluate the safety of DTI in laparoscopy in gynecology. An important corollary that emerged from the study was the feasibility and safety of the technique as a method of learning for doctors with no prior experience in laparoscopy. Despite the fact that all surgeries were mentored by senior consultants, it stands out that novices can be taught the technique easily and the learning curve is attainable within a span of six months. One of the important fear factors with DTI is the apprehension of injury due to absence of pneumoperitoneum especially at the hands of novices. Till date, 38 trainees have graduated from Sunrise Hospital and at the end of the fellowship programme, all of them are capable of performing DTI with ease and are comfortable with the technique.

Conclusion

- DTI is a safe method of laparoscopic entry, with a low complication rate.
- DTI can be taught to surgeons with no prior laparoscopic experience, without an increase in entry complications.

Conflict of Interest: None

Financial Disclosures: None

Table 1: Laparoscopic surgeries evaluated for the present study

Type of surgery	Number of subjects
Total laparoscopic hysterectomy	1005
Laparoscopic cystectomy	204
Laparoscopic Myomectomy	667
Laparoscopic vault suspension	37
Diagnostic laparoscopy	140
Total number of surgeries examined	2053

Table 2: Complication rates with DTI

	Previous abdominal surgeries [n = 640]	No previous abdominal surgeries [n=1413]
Trocar site bleeding	00	00
Extra peritoneal insufflations	01	03
Omental injury	00	00
Major vessel injury	01	00
Intestinal injury	01	01
Solid organ injury	00	01
Need for laparatomy	00	00
Total	03	05
Incidence of complications	0.46%	0.35%

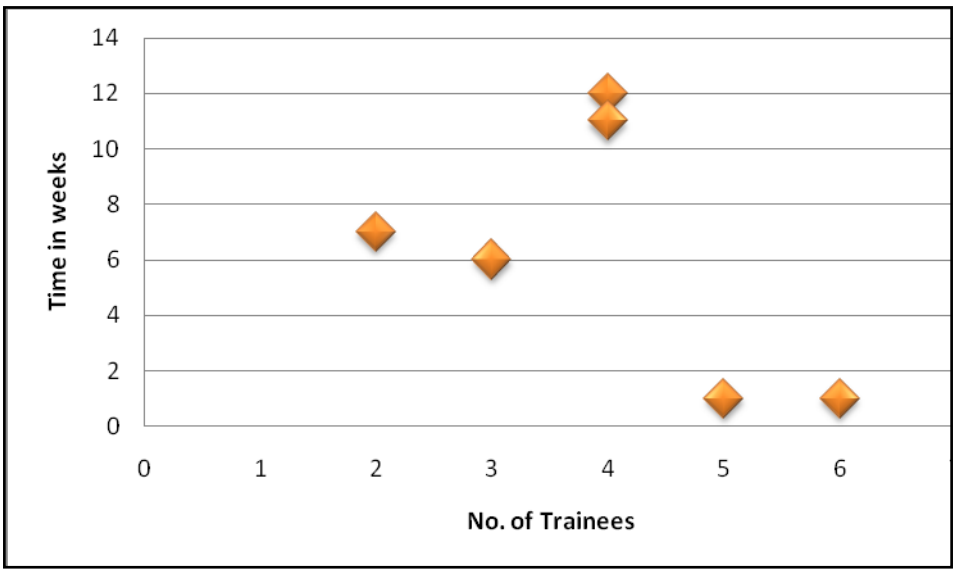

Figure 1: Average time required by trainee for independent DTI

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