

Veress Needle Versus Direct Trocar Insertion Techniques For Inducing Pneumoperitoneum In Laparoscopic Procedures

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ABSTRACT

Objective To compare the safety and complications of veress needle (VN) versus direct trocar insertion (DTI) techniques in laparoscopic procedures.

Study design Comparative study.

Place & Duration of study The study was conducted at three different hospitals in Karachi from October 2005 to May 2011.

Methodology A total of 1050 consecutive laparoscopic surgeries were done during the study period. Female to male ratio was 2.5:1. In 73% of the cases direct trocar placement was done while in 27% pneumoperitoneum was achieved with Veress needle. Variables noted included technique, complications, and duration of surgery. Data was analyzed statistically using SPSS version 16.

Results Female to male ratio was 2.5:1. Complications were more in direct trocar insertion method. Overall total complications were 3.4%. One percent in group I (VN technique) and 4% in group II (DTI technique) had complications ($p=0.017$). No visceral injuries were noted in either group, but pre-peritoneal insufflations found in 2 patients (0.25%) in group II. Late complications were more in group II. This include wound infection (1.5%), late wound bleeding (0.9%), port site hernia formation (0.9%) and chronic sinus formation (0.38%). All these were statistically insignificant except wound infection ($p 0.036$).

Conclusion Veress needle method is as safe as direct trocar insertion method in expert hands.

Key words Laparoscopy, Veress needle, Pneumoperitoneum, Direct trocar insertion.

INTRODUCTION:

Laparoscopic surgery was made possible in late twentieth century due to the successful abdominal distention by inducing pneumoperitoneum. Initially nitrous oxide was used for abdominal distension but later on it was replaced by carbon dioxide. Carbon dioxide is colourless, non-toxic and non-flammable thus allowing the use of diathermy and laser. It also has the greatest margin of safety in case of a venous embolus as it is highly soluble.¹

Diagnostic and therapeutic procedures have been carried out in the space created in abdomen by the

pneumoperitoneum. The initial penetration of the abdominal cavity to produce a pneumoperitoneum can be a hazardous task and insertion of instrument can lead to injury to underlying viscera therefore surgeons look for an expeditious, effective, reliable and safe technique to create pneumoperitoneum.²

Veress needle was introduced in 1938 by J Veress of Hungary and has been widely used by the general surgeons and gynecologists but its use was limited by the complications associated with its insertion, like failed attempts, multiple attempts, pre-peritoneal insufflations, long insufflation time and trauma to abdominal viscera and vessels.³ Direct trocar insertion replaced Veress needle insertion technique due to fewer complications.

In this study the safety and complications of veress needle and DTI techniques were compared.

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METHODOLOGY:

This is a comparative study conducted in three different hospitals of Karachi (Shaukat Omar Memorial Fauji Foundation Hospital, Al-Mumtaz Hospital and Star General Hospital) from October 2005 to May 2011. A total of 1050 consecutive cases operated by laparoscopy for different surgical procedures were included. The operations performed included cholecystectomy (n 622), appendicectomy (n 221), gynecological procedures (n 115) and tubal patency test (n 92).

There were 750 (71%) females and 300 (29%) males with a female to male ratio of 2.5:1. A complete history was taken and thorough physical examination carried out in all patients. Patients who had previous more than one abdominal operations and medically unfit, were excluded. Most of the surgeries were elective except acute appendicitis and ectopic pregnancy. Most of the cases were done by direct trocar insertion technique (n 770). Veress needle insertion technique was used in 280 cases. Patients who were operated by VN technique were placed in group I and those operated by DTI technique were placed in group II.

Variables studied included gender, previous surgery, type of surgery (elective or emergency), type of anesthesia, time interval between cutaneous incision and placement of laparoscope in abdominal cavity, duration of surgery. Complications evaluated included more than 3 attempts to enter peritoneal cavity, subcutaneous or omental insufflation, abdominal wall vessels laceration, intestinal injury, retroperitoneal vessel injury or injury to other organs. Data was entered into SPSS version 16 and analyzed. Pearsons Chi Square test was applied to calculate the p-value.

RESULTS:

Duration of surgery was 60 +10 minutes in both the techniques. Maximum time taken was 90 minutes in one case of direct trocar insertion. Frequency of procedures performed by either technique is shown

in table 1. Cholecystectomies done by VN technique were 9% and by DTI technique 50%, appendicectomies 7% and 14%, ovarian cystectomy / ectopic pregnancy 6% and 5% and tubal patency tests 5% and 4% respectively. Frequency of complication in both the groups is given in Table 2. Total complications in both groups were 34 (3.2%). Out of these 3 (0.3%) occurred in group I and 31 (2.9%) in group II. Group I had a total of 280 cases and total complications in this group was 1% whereas group II comprised of 770 cases and total complications in this group was 4% (p 0.017). Out of 12, four cases who developed wound infection and 3 cases with chronic sinus formation at port site were diabetic.

DISCUSSION:

Laparoscopic surgery was initially started as laparoscopic cholecystectomy but later on laparoscopic appendicectomy, ovarian cystectomy, ectopic pregnancy, and patency of fallopian tube checking were added to the list. Initially all cases were done with DTI technique but later on VN technique was also used and last 270 cases were done with VN technique only. Raoul Palmer in 1944 performed laparoscopic gynecological examination in Trendelenberg position so that air filled the pelvis.⁴ Patrick Steptoe learned laparoscopy from Raoul Palmer and started to perform laparoscopic procedures in late 1950s and first video-laparoscopic cholecystectomy was performed in 1987 by Philip Mouret of France.^{5,6}

VN technique is considered to be the pioneer of therapeutic and diagnostic laparoscopy. Veress needle is inserted through umbilicus to induce pneumoperitoneum and then trocar is inserted blindly in abdominal cavity to perform laparoscopy.⁷ Because of initial high rate of complications a search for alternate methods of inducing pneumoperitoneum resulted in Hassan's open method and direct trocar insertion techniques but these also had fair number of complications.^{8,9} Other techniques,

Procedures	Veress Needle	Direct Trocar Insertion
Cholecystectomy	95 (9%)	527 (50%)
Appendicectomy	72 (7%)	149 (14%)
Ovarian cystectomy/ ectopic pregnancy	60 (6%)	55 (5%)
Tubal patency test	53 (5%)	39 (4%)
Total (1050)	280 (27%)	770 (73%)

Table II: Complications

	Complications	VN (n 280)	DTI (n 770)	p- value
EARLY	More Than 3 Attempts	Nil (0%)	Nil (0%)	-
	Subcutaneous Or Omental Insufflations	Nil (0%)	2 (0.25%)	0.393
	Intestinal Injury	Nil (0%)	Nil (0%)	-
	Retroperitoneal Vessel Injury	Nil (0%)	Nil (0%)	-
	Injury To Other Organs	Nil (0%)	Nil (0%)	-
	Bleeding	1 (0.35%)	NIL (0%)	0.097
	LATE	Wound Infection	Nil (0%)	12 (1.5%)
Late Wound Bleeding		1 (0.35%)	7 (0.9%)	0.363
Port Site Hernia		Nil (0%)	7 (0.9%)	0.109
Chronic Sinus		Nil (0%)	3 (0.38%)	0.296
Stitch Abscess		1 (0.35%)	NIL (0%)	0.097
Total Complications		3 (1%)	31 (4%)	0.017

approaches and instruments introduced to minimize the entry related injuries included shielded disposable trocars, optical Veress needle, optical trocars, radially expanding trocars and trocarless re-usable visual access cannula.¹⁰⁻¹⁴

In our study overall complications in direct trocar insertion method were more than the Veress needle method (p 0.09). Most of the complications in both groups were negligible and statistically insignificant while wound infection was statistically significant in direct trocar insertion method (p 0.036). Sajid et al in their series of 5244 cases have concluded that close primary access is as safe as open access.⁶ According to him it is not only the method of entry that matters, proper selection of patients, site of entry, history of previous abdominal surgeries, obesity, expertise of surgeon and the factors which determine the increase or decrease in primary access related complications in laparoscopic surgery also matter. Other studies have also reported no significant difference regarding safety and complications in VN or DTI techniques.^{15,16}

International data shows vascular injuries ranging from 0.11% to 0.75% in some studies and in others figures up to 4-5% have been reported¹⁷ while we encountered no vascular injury in our study. Most of the gynecologists still prefer to use Veress needle.^{18,19} In a Canadian survey of 407 (51% responding) Obstetricians and Gynecologists, 96.3% reported always using Veress needle to induce pneumoperitoneum.²⁰ Theodoropoulou K et al also

confirmed that there was no difference in major complications in two techniques in experienced hands.²¹ Chitre VV and Studley JGN in an audit of methods of laparoscopy have shown that there was no uniform approach and only 30.8% surgeon use open technique.²² Harvey S et al²³ in their study found no significant difference in complications, operating time or other parameters i.e. post-operative stay and return to work.

CONCLUSIONS:

Veress needle technique is as safe as DTI technique. Both the techniques have minimal complications with statistically insignificant difference in both the groups. It is therefore recommended that Veress needle technique should not be abandoned totally due to the fear of complications and should be used more often.

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