

Direct Trocar Insertion Versus Veress Needle Insertion in Laparoscopic Cholecystectomy

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BACKGROUND: Direct insertion of the trocar is an alternative method to Veress needle insertion for the creation of pneumoperitoneum. The safety of direct disposable shielded trocar insertion for the creation of pneumoperitoneum was assessed by comparing with Veress needle insertion during laparoscopic cholecystectomy (LC).

METHODS: One thousand five hundred patients undergoing LC with pneumoperitoneum were included in this study. In 470 patients the Veress needle insertion technique was used, and in 1,030 patients direct trocar insertion technique was used. Patients having indications for open trocar insertion were excluded from the study.

RESULTS: Complication rate was significantly higher in the Veress needle group (14% versus 0.9%; $P < 0.01$), and the two major complications, gastric perforation and iliac artery laceration, were also encountered in this group.

CONCLUSIONS: Our results suggest that with a lower complication rate, direct insertion of the disposable trocar is a safe alternative to Veress needle insertion technique for the creation of pneumoperitoneum. Such an approach has further advantages such as less cost/instrumentation and rapid creation of pneumoperitoneum.

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Laparoscopic cholecystectomy (LC) mandates the implementation of successful pneumoperitoneum in the vast majority of patients since the so-called "gasless" technique does still require further refinement.¹ Among general surgeons, the worldwide-preferred technique for the creation of pneumoperitoneum is the conventional Veress needle insertion method.¹ Nevertheless, several reports from gynecological centers pointed out that direct insertion of the trocar without previous pneumoperitoneum is a safe alternative to Veress needle insertion.²⁻⁴ The disposable shielded trocars has also been used for direct insertion²; but to our knowledge only one study has prospectively evaluated the efficiency/safety of this instru-

ment in comparison with Veress needle insertion in a small number of gynecological patients.⁵ To further assess this issue in general surgical practice, we investigated the pros and cons of direct disposable shielded trocar insertion in comparison with Veress needle insertion.

MATERIAL AND METHODS

Between November 1992 and May 1998, 1,567 LC were performed at our institution. Among these 1,567 patients, 67 had their pneumoperitoneum created by the open technique. Previous abdominal incision (with the only exception of a gridiron incision for appendectomy) was the sole indication for using the open approach regardless of the cause or site. Excluding these 67 patients, 1,500 LC in which the pneumoperitoneum was created by closed methods were the subject of this study. Classical Veress needle insertion technique was used in 470 patients (group A) and direct disposable shielded trocar insertion was used in 1,030 patients (group B). There were no specific indications for a particular insertion technique to be used in favor of the other one, and surgeon's preference determined the type of insertion. All insertions were done through an infraumbilical 1 to 1.3 cm transverse incision. Veress needles were inserted with strict adherence to the universal precautions as outlined elsewhere.^{1,6}

Technique of Direct Trocar Insertion

The positioning of the patient is the same as in Veress needle insertion, and the patient is positioned in supine with a 20- to 30-degree Trendelenburg tilt. An important detail is to ensure an appropriate length and depth of skin incision so that the necessary amount of entry force applied to the trocar could be kept minimum. For this purpose, care is taken to make the incision length more than the diameter of the trocar, and also all layers of skin must be cut down to the subcutaneous fat through the entire length of the umbilical incision. These simple maneuvers will allow easier introduction of the trocar with minimal force and maximal control. The abdominal wall is elevated away from the viscera preferentially by grabbing and pulling the skin upward from both sides of the umbilical incision or by using towel clips. Once the tip of the trocar is freely inserted through the incision, the tip is directed to the midline with 30- to 40-degree angulation toward the pelvis as in the Veress needle insertion. Then, by applying gentle but steady pressure, the trocar is easily advanced by a continuous twisting motion into the peritoneal cavity. In contrast to Veress needle insertion where one can feel the penetration through the fascia and peritoneum separately, a distinct and single "pop" signifies that the trocar has

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TABLE
Patient Characteristics and Complications in Veress Needle (Group A) and Direct Trocar (Group B) Insertion Groups

	Group A (n = 470)	Group B (n = 1,030)
Age (years)	59 (20–69)	60 (23–71) NS
Gender (M:F)	179:291	437:593 NS
Body weight (kg)	63.5 (51–103)	66 (49–109) NS
Complications		
Subcutaneous emphysema	30 (6.3%)	4 (0.4%)
Omental emphysema	25 (5.3%)	2 (0.2%)
Omental laceration	8 (1.7%)	3 (0.3%)
Gastric perforation	1 (0.2%)	0
Iliac artery laceration	1 (0.2%)	0
Total	65 (14%)*	9 (0.9%)*

* $P < 0.01$.

NS, not significant.

pierced the fascia and peritoneum. It is important not to loosen the handle grip by constant application of pressure so that one does not permit the loading mechanism to be loosened.

Operations were performed by seven experienced hepatobiliary surgeons, and the series does not include the learning curve of any surgeons involved. Veress needles were either reusable or disposable types (Autosuture or Ethicon), and trocars were all disposable shielded types (Autosuture or Ethicon). In group A the intraperitoneal position of the Veress needle was confirmed by well-known techniques.^{1,6} In group B, proper positioning of inserted trocar was confirmed by insertion of the camera and direct visualization of abdominal cavity. Complications related to needle or trocar insertion had been prospectively recorded and retrieved from the database. Characteristics of the two groups with respect to age, gender, body weight, and indication for surgery were determined. For statistical analysis, the chi-square and Student *t* tests were used as appropriate. The study protocol was approved by the Institutional Ethics Committee, and informed consent was obtained from the patients.

RESULTS

The distribution of gender, age, indication for surgery, and presence of obesity were similar in both groups. Complications related to both insertion techniques are summarized in the **Table**. Complication rate was significantly higher in the Veress needle group (14.4% versus 0.9%; $P < 0.01$). It is noteworthy that even minimal subcutaneous and omental emphysema were regarded as a complication and recorded. Among all complications, only two complications were major (gastric perforation and iliac artery laceration) and these complications resulted in conversion to open surgery and were managed by suturing of the perforated viscus and lacerated vessel, without any further morbidity. Both of these complications occurred late during the series, and gastric perforation occurred at the 113th case of one surgeon and arterial injury occurred at the 90th case of another surgeon. All emphysematous complications and all but 3 patients with omental laceration

were managed expectantly with success. In 3 patients (2 from group A, 1 from group B) with omental laceration, laparoscopic cauterization-clip application was used to arrest the bleeding. All minimal complications (65 in Veress needle and 9 in direct trocar insertion groups) were evenly distributed throughout the study period.

COMMENTS

The initial step of LC with pneumoperitoneum is peritoneal entry, which is classically accomplished by the insertion of the insufflating Veress needle. This maneuver is intended to decrease the risk of injury to the intraabdominal organs by the insertion of the trocar. However, the insertion of Veress needle itself is not free of complications,^{1,5} and this is also confirmed in recent general surgical practice^{7,8} as well as by the present study. Furthermore, it has been shown that intraabdominal organs are still prone to trocar injury even after successful pneumoperitoneum by a Veress needle,⁹ and no sound evidence is available concerning the preventive role of Veress needle induced pneumoperitoneum in decreasing the trocar injuries.

Direct insertion of trocar has been reported as a safe alternative to Veress needle insertion,^{2–4} and this may be particularly true for the recently introduced disposable shielded trocar of the last decade. In their randomized prospective study of 200 patients, Nezhat et al.⁵ reported 22%, 6%, and 0% rates of minor complications after Veress needle insertion ($n = 100$), direct conventional laparoscopic trocar insertion ($n = 50$), and direct disposable shielded trocar insertion ($n = 50$), respectively. Our findings are also similar to those of Nezhat et al, even though the disposable shielded trocars in our series were used for more than one occasion. In our study, we failed to document any advantage for the use of a Veress needle. In contrast, complications were significantly higher in this group of patients.

Considering the fact that pneumoperitoneum with Veress needle insertion has actually three blind steps as opposed to one in direct trocar insertion, we think that our results are not surprising. During pneumoperitoneum with Veress needle insertion, insertion of the needle, pneumoperito-

neum through it, and trocar insertion are the three blind steps, which are reduced to only one, that is, insertion of the trocar itself during pneumoperitoneum by direct trocar insertion. Ability to directly visualize the trocar tip location prior to insufflation is a major advantage of direct trocar insertion, and it is for this reason that the number of emphysematous complications in our Veress needle group outnumbered similar occurrences in the direct trocar insertion group. The very small number of emphysematous complications (0.6%) that occurred in our direct trocar insertion group resulted from premature insufflation prior to visualization of the trocar tip and therefore were theoretically avoidable.

The Veress needle has been implicated as the cause of more vascular accidents at laparoscopy than the trocar,⁷ and many noncomparative/randomized series have confirmed the safety of direct trocar insertion.²⁻⁴ The results of this present series point out the safety of direct disposable shielded trocar insertion with fewer complications in comparison with Veress needle insertion.

It is noteworthy that the present series excluded patients who had indications for open trocar insertion in whom we used the Hasson cannula. We do not use the open technique routinely although there are others advocating the insertion of the first trocar under direct vision at each case.^{8,10} This is surely a safe alternative but because of its time-consuming nature and cost, we use the Hasson cannula selectively as do many other laparoscopic surgeons. In conclusion, direct insertion of the disposable shielded trocar may be regarded as a safe alternative to Veress needle

insertion if pneumoperitoneum is going to be created by a closed method.

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