

COMPARISON OF DIRECT INSERTION OF DISPOSABLE AND STANDARD REUSABLE LAPAROSCOPIC TROCARS AND PREVIOUS PNEUMOPERITONEUM WITH VERESS NEEDLE

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A randomized prospective study was conducted to evaluate the ease of use and safety of direct insertion of laparoscopic trocars. Comparison of previous pneumoperitoneum by Veress needle insertion with direct insertion of the reusable conventional laparoscopic trocar and direct insertion of the disposable shielded trocar revealed minor complication rates of 22, 6 and 0%, respectively. No major complications occurred in this series of 200 patients. (*Obstet Gynecol* 78:148, 1991)

Laparoscopy is one of the most common surgical procedures done today. However, complications persist in spite of proper surgical training and experience because the abdomen is entered blindly.

Direct insertion of the laparoscopic trocar, without previous pneumoperitoneum, has been reported to be a safe alternative to Veress needle insertion,¹⁻⁵ although only one study prospectively compared the two methods.¹ A disposable shielded trocar has recently been introduced, providing two advantages: a safety shield after the peritoneum is entered, and a freshly sharpened instrument for each surgical case. This instrument has also been investigated for direct abdominal insertion.² We conducted a randomized prospective study to compare the ease of use and safety of Veress needle insertion with previous pneumoperitoneum (group 1), direct insertion of the conventional reusable trocar (group 2), and direct insertion of the disposable shielded trocar (group 3) in laparoscopy.

Materials and Methods

Two hundred patients requiring diagnostic and operative laparoscopy over an 8-month period from Janu-

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ary 1990 to September 1990 were randomly assigned to the Veress needle or direct trocar insertion group. The first 50 cases in the direct trocar group were performed using conventional reusable trocars, sharpened monthly according to the operating room protocol; the last 50 were performed using disposable shielded trocars (Ethicon, Inc., Somerville, NJ). Patients with a history of laparotomy were excluded from this study. Surgery was performed by the same two experienced surgeons (FRN and CN) to ensure comparability of results. Informed consent, outlining the three different procedures, was obtained.

In group 1, a 5-mm transverse infraumbilical incision was made, the abdominal wall was elevated lateral to the umbilicus bilaterally, and the Veress needle was inserted in the direction of the uterus. Pneumoperitoneum was induced at a pressure of 10 mmHg or less. The Veress needle was then removed, the infraumbilical incision extended to 1 cm, the abdominal wall again elevated, and the laparoscopic trocar introduced in the direction of the uterus.

In groups 2 and 3, a 1-cm transverse subumbilical incision was made, and the abdominal wall was elevated lateral to the umbilicus bilaterally. The trocar was inserted into the peritoneal cavity in the direction of the uterus, and the laparoscope was immediately introduced. Intraperitoneal placement was confirmed before pneumoperitoneum was created.

In each group, a second attempt was made to place the same instrument into the peritoneal cavity if entry did not occur on the first attempt. After two successive failed attempts, a trocar was substituted in the Veress needle group and a Veress needle was substituted in the trocar groups.

The χ^2 test was used for statistical analysis of the data.

Results

Tables 1 and 2 summarize the results of this series. Following the protocol, peritoneal entry was accomplished by the third attempt in all cases. However, in nine cases entry was not accomplished with the primary method; 3% of group 1, 8% of group 2, and 4% of group 3 required use of the alternate method. In each group, 20% of the cases required two insertions before peritoneal cavity entry.

No major complications occurred in the series of 200 cases. Minor complications were limited to subcutaneous emphysema (ten patients) and omental emphysema (12 patients) in group 1, and omental perforation (two patients) and subcutaneous emphysema (one patient) in group 2.

The mean body mass index was calculated as weight

Table 1. Outcome of 200 Cases of Veress Needle or Direct Trocar Insertion

Outcome	Veress needle	Direct trocar
No. of patients	100	100
No. of complications	22	3*
No. requiring two insertions	20	20
No. of failed insertions	3	6†
Average body mass index	20.3	22.5

* $P < .05$ ($\chi^2 = 14.811$).

† $P > .05$ ($\chi^2 = 1.86$).

in kilograms divided by the square of the height in meters (kg/m^2). A value of 30 or greater is consistent with obesity.⁶ Because the average body mass index was 20.3 in the Veress needle group and 22.5 in the direct trocar group, obesity was excluded as a confounding factor:

Discussion

Laparoscopy begins by blindly entering the peritoneal cavity. When this procedure is initiated by inserting a Veress needle, there are actually three blind steps: Veress needle insertion, induction of pneumoperitoneum through the needle, and trocar insertion. By directly inserting the laparoscopic trocar without previous pneumoperitoneum, the number of blind procedures is reduced to one.

Direct visualization of trocar location before CO_2 insufflation in this series reduced the incidence of subcutaneous and omental emphysema. If potential major complications are considered, pneumointestine could similarly be avoided in cases of inadvertent bowel entry.⁴ In laparoscopic cases using a nitrogen/oxygen/ CO_2 mixture for insufflation, air embolism at the time of inadvertent vascular puncture could also be averted.²

Because of its larger diameter, injury caused by a trocar has been feared to be more common than injury caused by a Veress needle. However, a review of

serious vascular complications revealed that the opposite has been true; the pneumoperitoneum needle has been implicated as the cause of more vascular accidents at laparoscopy than has the trocar.⁷ Other reports on direct insertion of the trocar without previous pneumoperitoneum have confirmed the safety of this technique.¹⁻⁵ Direct trocar insertion required less operating time and fewer instrumental insertions in comparison with Veress needle insertion for laparoscopic sterilization.¹ Although our experience demonstrated fewer complications with direct insertion of the trocar, it did not confirm fewer or easier insertions; in fact, we suggest that the Veress needle be used when direct trocar insertion is not successful. Dullness of trocars can cause increased force, multiple insertions, and excessive instrumental manipulation, all associated with increased risk of laparoscopic complications.⁷ Disposable shielded trocars have been introduced to ensure sharpness. Insertion of disposable shielded trocars in the presence of pneumoperitoneum has been shown to require half the force needed for a reusable trocar that was professionally sharpened after every 16th case.⁸ In the present study, although no complications occurred in the disposable trocar group, this difference did not achieve statistical significance. Frequency of trocar sharpening is not standard, and in one survey of Canadian gynecologists, most surgeons were unaware of the frequency of trocar maintenance at their hospitals.⁹ Therefore, we remind laparoscopic surgeons to monitor their hospitals' equipment maintenance, and conclude that availability of a sharp trocar, whether disposable or reusable, is important in direct trocar insertion.

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Table 2. Outcome of 100 Cases Comparing Conventional and Disposable Trocars

Outcome	Conventional trocar	Disposable trocar
No. of patients	50	50
No. of complications	3	0*
No. requiring two insertions	10	10
No. of failed insertions	4	2†

* $P > .05$ ($\chi^2 = 1.375$).

† $P > .05$ ($\chi^2 = 0.177$).

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