

Comparison of Veress Needle and Direct Trocar Insertion in Establishing Pneumoperitoneum for Laparoscopic Cholecystectomy

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ABSTRACT

Aim: To compare the efficacy and safety of direct trocar insertion and Veress needle to gain access in the abdominal cavity for laparoscopic cholecystectomy

Study design: Randomized control study

Place and duration of study: Surgical unit II, Akhtar Saeed Trust Teaching Hospital/ Farooq Hospital West Wood, Lahore, from August, 2012 to July, 2014.

Methodology: All patients undergoing laparoscopic cholecystectomy during the study period were enrolled. All patients younger (<20years) and older patients (>65years) and those with co morbid conditions were excluded. The remaining was randomized into two groups. In one group, Veress needle was used, while in other group, the trocar was inserted directly to establish pneumoperitoneum. Surgeries were performed by the experienced surgeons of the unit.

Results: There were total of 30 patients in each group. The time to establish pneumoperitoneum was much less in the direct trocars technique. In the direct trocars group, gas leak occurred in 5 patients while there were 4 patients in Veress needle group.

Conclusion: 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 instrumentation / cost and rapid creation of pneumoperitoneum.

Keywords: Pneumoperitoneum, veress needle, disposable trocar,

INTRODUCTION

The first laparoscopy in humans was performed by Jacobeus of Sweden in 1910¹. Since then laparoscopic techniques have been in constant evolution. Over the last two to three decades it has become the preferred option for multitude of operative procedures². Laparoscopic cholecystectomy has become the gold standard for uncomplicated symptomatic cholelithiasis around the world^{3,4,5,6}. It is effectively associated with lesser complications, cost-effective and also has cosmetic benefits⁶. Although its superiority over open cholecystectomy is established, it is not completely void of complications. Many of the complications of pneumoperitoneum are related to the entry technique and the establishment of pneumoperitoneum^{7,8}. A perusal of the literature gives one the impression that gynecologists are more circumspect about access related complications^{9,10,11,12}.

One of the challenges of laparoscopic surgery is the insertion of surgical instruments through small incisions. Over 50% of complications arise during this

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time and a great majority of these occur during the insertion of the primary umbilical trocar. To address these complications, various techniques have been evolved to gain access to the peritoneal cavity. These include closed (Veress), open (Hasson), direct trocar insertion, the use of disposable shielded trocars, radially expanding trocars and visual entry systems along with their various modifications.

There have been many studies comparing the efficacy and safety of the numerous access techniques although meta-reviews of these have turned out to be inconclusive, warranting the need for further evidence.^{11,12} Given this uncertainty, the choice of method is usually left to the surgeon's preference. This works for experienced surgeons but is an area of confusion for residents and younger surgeons.

There is dearth of study in Pakistan comparing these two techniques. Thus, no local, evidence-based guidelines can be performed. In view of the mentioned confusion and the paucity of literature there is a need for local guidelines to be drafted. This study was conducted to compare the safety and efficacy of the direct cannula and Veress needle techniques for gaining entry and establishing pneumoperitoneum.

METHODOLOGY

This randomized controlled trial was carried out in Surgical Unit II, Akhtar Saeed Trust Teaching Hospital/ Farooq Hospital West Wood, Lahore. All patients, admitted in this ward for laparoscopic cholecystectomy between August, 2013 to July, 2014, were screened for enrollment. Patients above 65 years or below 20 years of age and those with co-morbid conditions of chronic liver disease, chronic renal failure, and malignancy were excluded. Written informed consent was taken from the participants. Participants were then randomized to be in either of the two groups using a random number of table. Each patient had an equal chance of being enrolled in either of the two study arms. Surgeries were performed by experienced surgeons in all cases. A total of 60 cases were enrolled in the study. Thirty were randomized to the Veress needle technique, while the remaining 30 were in the direct cannula technique.

Data was collected on standardized questionnaires. Variables taken in to consideration included the ability to create pneumoperitoneum, the time taken to establish it, leakage of carbon dioxide gas from the margins of the access site, conversion to laparotomy, mortality and the known complication of Laparoscopic cholecystectomies these include abdominal wall hematoma, subcutaneous insufflations of gas, port-site wound infection, port-site hernia penetrating injuries to blood vessels intra-abdominal viscera. Patients were assessed in the immediate postoperative period and followed after one week and two months after discharge to assess for complications.

Data was analyzed and managed using SPSS version 17. Proportions were calculated for categorical variables while means and standard deviations were calculated for continuous variables. An unpaired t-test was used to calculate the difference between the means where applicable. The results were tabulated.

The study was approved by the institutional authorities. Confidentiality was strictly maintained and only the study investigators had access to the study data. Patients were managed as routine cases and there was no difference in their management in the ward.

RESULTS

A total of 60 cases were enrolled. 30 were randomized to the Veress needle technique while the remaining 30 were in the direct trocars group. Majority of the participants were middle aged (mean age 40+-4 years), married (85%), Muslim (99%),

women (92%). There was no difference in the demographic profiles of the two study groups.

The comparative analysis of the study variables are presented in the table1. The time to establish pneumoperitoneum was much less in the direct trocars technique(4.4+-1.2minutes) as compared to Veress needle technique (5.1+-0.9 minutes) $p<0.001$.Pneumoperitoneum was achieved in all 60 cases. In the direct trocars group, gas leak occurred in 5 patients (16.6%).while there were 4 patients (13.3%) in Veress needle group who had extra peritoneal insufflations. Other complications include port site hematoma in 2 patients (6.6%), and port site wound infection in 3 patients (10%) in the direct trocar arm.

There were no complications of visceral or vascular injury or port site hernia in either of the study arm. No case needed conversion to open laparotomy and there was no perioperative mortality.

Table 1: Comparison of direct trocar insertion and Veress needle technique for the establishment of pneumoperitoneum in laparoscopic cholecystectomy (n=60)

Variables	Direct trocar insertion	Veress needle
Access time (p<0.002)	4.4+-1.2 minutes	5.1+-0.9 minutes
Gas leak	5 (16.6%)	0 (0%)
Extra peritoneal insufflations	0 (0%)	4(13.3%)
Vascular injury	0 (0%)	0(0%)
Visceral injury	0 (0%)	0(0%)
Port site hematoma	2 (6.6%)	0(0%)
Port site infection	3 (10%)	0(0%)
Port site hernia	0 (0%)	0(0%)

DISCUSSION

Presently, the laparoscopic surgeon uses three techniques to establish pneumoperitoneum A) the Veress needle closed technique; B) the Hasson open technique and C) the direct trocar insertion without previous pneumoperitoneum. In our study we compared two techniques in establishing pneumoperitoneum .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 in the setting of laparoscopic cholecystectomy. This approach has added advantages such as less cost, decreased need for instrumentation and rapid creation of pneumoperitoneum. The results conform to those found in other studies. Yerdel MA study 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

pneumoperitoneum¹³. Such an approach has further advantages such as less cost/instrumentation and rapid creation of pneumoperitoneum.

Although there are certain complications associated with this technique. Gas leakage is more frequently observed in direct trocar insertion. However this technique is associated with less time consumption. In the study by Inan A et al, they concluded that direct trocar entrance also reduces the operation time¹⁴. In laparoscopic cholecystectomy the direct trocar entrance method is a more reliable and less time consuming method than Veress needle usage.

We conducted study in establishing pneumoperitoneum in laparoscopic cholecystectomy. However this technique used in other laparoscopic procedure specially in Gynaecology Department also found that direct trocar insertion is safe alternative for pneumoperitoneum. Günenç MZ et al concluded that direct trocar insertion without previous pneumoperitoneum was reported to be a safe alternative to Veress needle insertion¹⁵.

CONCLUSION

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 instrumentation, cost effectiveness and rapid creation of pneumoperitoneum.

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