

Veress Needle: A Safe Technique in Modern Laparoscopic Era

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ABSTRACT

Background: Prospective analytical study to evaluate the Veress needle technique for creating pneumoperitoneum in terms of safety profile.

Materials and methods: A total of 4,014 patients undergoing laparoscopic surgery for different reasons in which Veress needle was the technique to create pneumoperitoneum were included in the study during the period of January 2008 to September 2012.

Results were evaluated by analysing the data through SPSS version 16.

Results: Total 27 patients developed complications in terms of abdominal wall emphysema 12 (44%), omental injury 11 (40.7%), small bowel injury 2 (7.4%) and mesenteric vascular injury 2 (7.4%).

Among these complications majority of patients were having BMI > 30 (78%).

All the complications were managed by simple measures laparoscopically.

Conclusion: Veress needle technique for creating pneumoperitoneum is comparable with open technique, particularly in patients with BMI < 30.

Keywords: Veress needle, Pneumoperitoneum complications, BMI.

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INTRODUCTION

Gaining access into the abdomen has been a challenging issue in terms of complications. Access is associated with injuries to the gastrointestinal tract and major blood vessels, and at least 50% of these major complications occur prior to commencement of the intended surgery.^{1,2}

Laparoscopy is widely used for different surgical and gynecological procedures. Access to the peritoneal cavity and creation of pneumoperitoneum is the first and foremost important step.³

Among the different methods of primary access in laparoscopy, the popular ones being the Veress needle and Hasson's technique.⁴ The Veress needle technique is still being used by many surgeons and gynecologist as an gold standard technique^{5,6} while others recommend the open method of access as gold standard. Some studies have shown

that almost 50% of complications in laparoscopic surgery are related to primary access.

Some complications like gas embolism, major vascular injury and visceral injuries are underreported as advocated by some authors.^{5,7}

In high volume center there are similar bowel injury but no, major vascular injury with the open technique. Some studies have shown even more complications with open technique compared to closed technique.⁸

In our study we used Veress needle in most of our cases and found it to be more convenient than open technique. Complications rate were found quiet comparable and even lower, particularly in patients with BMI <30 in comparison to open technique. Open technique were reserved for the patients having history of abdominal surgery for any other reasons and in case of failure of Veress needle technique.

Our experience with 4,014 patients undergoing laparoscopic surgery during the period of January 2008 to September 2012 in which Veress needle technique was used for primary access to abdominal cavity. Patients who were converted into open method due to some or other reasons were not included in our study.

MATERIALS AND METHODS

In our study, total of 4,014 patients were included who underwent laparoscopic surgery for different reasons. The surgeries were performed by the surgeons and gynecologists having experience of more than 5 years in the field of laparoscopic surgery. This study was conducted at PGIMER Dr RML Hospital New Delhi between the period of January 2008 and September 2012.

In all these patients Veress needle technique was used for primary access. The Veress needle was introduced through the umbilical scar by giving a supraumbilical curvilinear skin incision. In all patients abdominal wall was lifted with nondominant hand or by the assistant to facilitate safe and easy introduction of Veress needle. The entry into the abdominal cavity was confirmed by double click sound and later on by Drop test.

CO₂ insufflation was confirmed by the obliteration of liver dullness on percussion and tympanitic sound of the abdominal cavity. All the complications which occurred during primary access were recorded and analyzed with the help of SPSS version 16.

RESULTS

Among the total 4,014 patients who underwent laparoscopic surgery, 3,211 (80%) were females and 803 were males (20%) (Fig. 1 and Table 1). Average age of our patients was 40 years. These patients were divided into two groups depending upon their BMI: group A having BMI ≤ 30 and (total no of patients: 70%) and group B (total no of patients: 30%) (Table 2). The procedures done were laparoscopic cholecystectomy for symptomatic gall stone disease in 2,810 patients (70%), gynecological procedures in 803 patients (20%) and other surgical procedures like TAPP, laparoscopic appendectomy, diagnostic laparoscopy and bariatric procedures, such as sleeve gastrectomy in 401 patients (10%) (Fig. 2).

Entry time for the primary access was taken from the skin incision to the insertion of first trocar. In our study the total entry time was in the range of 4.1 to 7.2 minutes. Mean entry time were recorded in relation to the BMI of the study group. Entry time was broadly divided into two groups <5 minutes and >5 minutes. It was observed that entry time <5 minutes were in 90% patients in group A compared to 40% in group B. Similarly entry time >5 minutes were observed in 10% patients of group A compared to 60% in group B (Table 3). The most probable cause of greater entry time in patients with BMI > 30 are thick pad of fat in the abdominal wall and comparable laxity of the abdominal musculature. On statistical analysis it was found that there was a significant association between entry time required for Veress needle entry and BMI of the patient (p-value < 0.05).

The complications observed were abdominal wall emphysema in 12 patients (44.2%), omental injury in 11 patients (41%), small bowel injury in two patients (7.4%) and mesenteric vascular injury in two patients (7.4%).

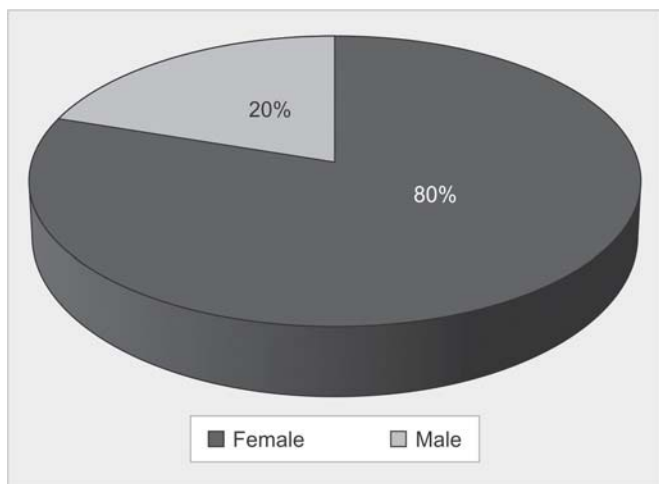


Fig. 1: Gender distribution of study group

Among the 12 patients who developed abdominal wall emphysema, nine (75%) patients were having BMI > 30. They were managed conservatively. Similarly omental injury which was observed in 11 patients, 8 (73%) were having BMI > 30 (Table 4). They were also managed conservatively. All the two cases of small bowel injury and mesenteric injury were reported in patients of BMI > 30. All the two cases of small bowel injury were in the form of simple laceration of the bowel and were managed by simple intracorporeal suturing. The two cases of mesenteric injury were in the form of small contusion in the mesenteric arcade which was managed conservatively.

DISCUSSION

There has been a tremendous development and technological changes in laparoscopic surgery since the past few years. The number of laparoscopic surgeons and number of procedures being performed with laparoscopically are on rise.^{9,10}

The most crucial in laparoscopic surgery is creation of pneumoperitoneum. Different methods have been described for primary access but none is found to be free from

Table 1: Gender distribution of study group

Gender	Freq	%
Female	3,211	80
Male	803	20
Total	4,014	100

Table 2: Distribution of BMI in the study group

BMI	Freq	%
<30	2,810	70
>30	1,204	30
Total	4,014	100

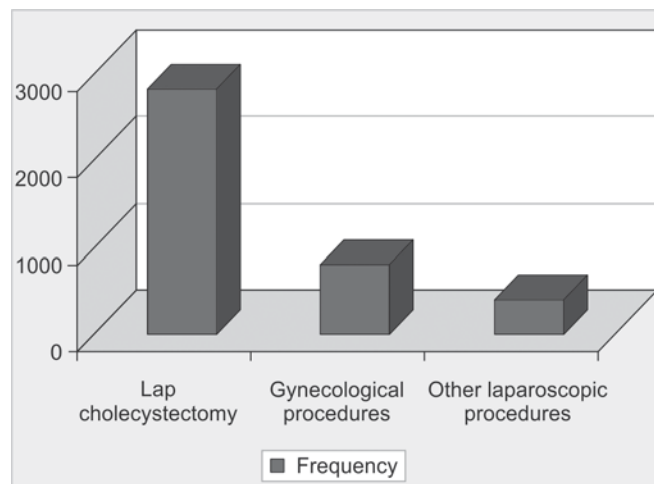


Fig. 2: Distribution of procedures in study group

Table 3: Distribution of entry time according to BMI

Entry time	BMI				Total
	Group A (<30)		Group B (>30)		
	Freq	%	Freq	%	
<5 minutes	2,529	84	481	16	3,010
>5 minutes	281	28	723	72	1,004
Total	2,810	70	1,204	30	4,014

Table 4: Distribution of complications in relation to BMI

Complications	BMI				Total
	Group A (<30)		Group B (>30)		
	Freq	%	Freq	%	
Abdominal wall emphysema	3	25	9	75	12
Omental injury	3	27	8	73	11
Small bowel injury	0	0	2	100	2
Mesenteric vascular injury	0	0	2	100	2
Total	6	22	21	78	27

complications. Roal Palmer in 1974 introduced the Veress needle for creation of pneumoperitoneum¹¹ and very soon it became a very popular method. This method is called closed method as the Veress needle and the first trocar afterward are introduced blindly, whereas in Hasson's technique first trocar is introduced under vision. Different type of trocars like optical trocars and shielded trocars have also been introduced but none have been proved to be superior to others, but these are even more expensive.^{12,13} Many studies have reported more number of complications with Veress needle as compared to open method but as per the available evidence open technique has not eliminated the complications.^{14,15} Many studies have shown that there is no difference of bowel injury in the two above mentioned method but vascular injury in open method is reported to be very very low.⁸

There are reports from general surgeons for demand of Hasson's technique in all circumstances¹⁶ but cohort studies reported by gynecologist like Swiss Association of Laparoscopic and Thoracic Surgeons (SALTS) showed no superiority of open method over the closed method regarding the primary access related complications.¹⁷

There are some studies which have highlighted that the number of entry related complications was higher in open technique compared to closed ones and hence the closed technique should not be abandoned.² Jansen et al in a study on 25,764 patients found that 83 out of 145 complications were related to primary access and there was no significant reduction of complications with open methods.² Although there is no consensus regarding the best method of gaining access to the peritoneal cavity to create a pneumoperito-

neum, the Veress needle insertion is the most frequently used technique.²⁷

In our study there was not any major vascular injury whereas different comparative studies have shown vascular injury in 0.04% of cases with closed primary access 0.01% with open primary access. Visceral injury was reported to be 0.07% in closed and 0.05% in open method^{5,20,26} but in our study it was 0%. Different authors have reported the rate of trocar related injury (mesenteric, small bowel and omental injury) as high as 1%^{1,3,17} but in our study it is 0.37%. Out of these complications, 80% occurred in group B and only 20% in group A. Most of the trocar-related injury occur during the first trocar insertion as others are inserted under vision.²⁷ Champault et al in a French survey of 103,852 laparoscopic surgeries found that 83% of vascular injuries, 75% of bowel injuries and 50% of local hemorrhages were caused during primary trocar insertion.¹⁸ Jared et al described an approach by giving incision on left side of umbilicus and the abdomen is opened at the point where base of umbilicus joins linea alba and claimed that it reduces the incidence of visceral and vascular injury.¹⁹ HJ Bonjer in his review favored the open technique conforming the low incidence of injury with open technique and claimed that it is safe, simple and cost-effective as it can be performed with a reusable trocar.²⁰ Studies conducted by Ballem RV, Bonjer HJ, Sigman HH, et al compared open to closed access techniques, found open technique to be superior with respect to less complications than closed.²⁰⁻²²

A meta-analysis by Larobina et al of 760,890 closed laparoscopy and 22,465 open laparoscopy concluded that the open (Hasson) technique eliminate the risk of vascular

injury and gas embolism and reduces the risk of bowel injury and recommend the open technique to be adopted for primary laparoscopic entry.²⁶

Argesta favors direct trocar insertion in nonobese patient rather than Veress needle insertion as it has a higher feasibility rate and is associated with fewer minor complications but seems to be no different in both techniques regarding the major complications.¹⁰

In a retrospective analytical, multicentric study conducted by Muhammad Sajid et al to evaluate closed technique for creating pneumoperitoneum in terms of procedural safety on 5,244 patients undergoing laparoscopic surgery, authors concluded that closed technique using Veress needle for creating pneumoperitoneum is as safe as Hasson's technique and no method has advantage over the other.²³ Merlin et al reported in a systematic review of the various methods used by general surgeons and gynecologists to establish access for laparoscopic surgery that risk of bowel injury in nonrandomized studies was higher with the open technique than with closed technique, although bias introduced through patient selection may have been a factor.⁷

Chapron et al in a nonrandomized comparison of open versus closed laparoscopic entry concluded that open laparoscopy does not reduce the risk of major complications during laparoscopic access.²⁴

Hasson had concluded that there is no evidence to support abandoning the closed entry technique in laparoscopy; however, the selection of patients for an open or alternative procedure is still recommended.²⁵

Jansen et al, Gary and most of the gynecologists continue to use closed laparoscopic entry and concluded that none of the method is superior or inferior to others.^{2,14,15}

It is not only the technique of primary access to abdominal cavity that matters in respect of the complications but also the other factors like proper selection of patients, BMI, history of previous abdominal surgeries, obesity and lastly the expertise of the surgeons.

CONCLUSION

Based on the above mentioned discussion we conclude that the Veress needle technique of primary access is quiet comparable or even superior to open one in terms of primary access related complications. It is recommended that Veress needle technique is still a safe, easy and cost effective technique, but surgeon must continue with the primary access technique in which they feel more comfortable and confident.

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