

# Comparative Study of Veress Needle and Visiport in Creating Pneumoperitoneum in Laparoscopic Surgery

Sheela Prince<sup>1</sup>, Packirisamy Kannan<sup>2</sup>, RK Mishra<sup>3</sup>

## ABSTRACT

**Introduction:** In minimal access surgery, the technique of first entry in the human body with the telescope and instruments is called the access technique. Laparoscopic access is of two types: closed and open access.<sup>1,2</sup> Here we are analyzing the merits and demerits of two entry techniques and the incidence of complications in both techniques. Comparison is between the blind technique by using the Veress needle and the undervision technique by using Visiport.

**Aim of study:** To assess, evaluate, and compare the incidence of complications in blind and clear view access techniques in laparoscopic surgery.

**Materials and methods:** A total of 150 cases of laparoscopic surgeries using the Veress needle and 150 cases of laparoscopic surgeries done by Visiport have been reported. (All laparoscopic surgeries were done in the General Surgery Department in Rashid Hospital from January 1, 2015 to December 12, 2015.)

**Result:** In this study of comparison, both techniques were seen to have been associated with their own complications. But Visiport is a safe and faster method of creating pneumoperitoneum, though there was a statistically insignificant major vascular injury. It happened with an inexperienced surgeon.

**Conclusion:** Visiport is a safe and faster method of creating pneumoperitoneum in laparoscopic surgery.

**Keywords:** Laparoscopic access, Pneumoperitoneum, Veress needle, Visiport.

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## INTRODUCTION

In minimal access surgery, the technique of first entry in the human body with the telescope and instruments is called the access technique.<sup>3</sup> It is important to know that 20% of laparoscopic complications are caused at the time of initial access. Developing access skill is one of the important achievements for the surgeons practicing minimal access surgery. First entry access in laparoscopy is of two types: closed and open access.

In the closed technique, a Veress needle is commonly used by minimal access surgeons worldwide but it is a blind technique. Nowadays, an entry technique with optical trocars is used for visual guided access into the abdomen. Here we are analyzing the merits and demerits of two entry techniques and the incidence of complications in both techniques. Comparison is between the blind technique by using the Veress needle and the undervision technique by using Visiport.

## MATERIALS AND METHODS

### Study Area

Rashid Hospital, General Surgery Department.

### Study Population

All the patients who underwent laparoscopic surgery in Rashid Hospital in General Surgery Department from January 1, 2015 to December 12, 2015.

### Sample Size

One hundred fifty Veress needle, blind access technique cases of laparoscopic surgery and 150 Visiport, clear-view access technique cases of laparoscopic surgery.

<sup>1</sup>Department of General Surgery, Zulekha Hospital, Dubai, United Arab Emirates

<sup>2</sup>Department of General Surgery, Rashid Hospital, Dubai, United Arab Emirates

<sup>3</sup>Department of General Surgery, World Laparoscopy Hospital, Gurugram, Haryana, India

**Corresponding Author:** Sheela Prince, Department of General Surgery, Zulekha Hospital, Dubai, United Arab Emirates, Phone: +971 567600373, e-mail: sheelaprinced8@gmail.com

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**Conflict of interest:** None

## Selection Criteria

- Inclusion criteria—all the patients who underwent laparoscopic surgery in General Surgery Department of Rashid Hospital from January 1, 2015 to December 12, 2015, were included.
- Exclusion criteria—patients with more than one abdominal surgeries earlier and medically unfit patients with multiple comorbidities were excluded.

## Data Collection

Record-based, crossover study, collected patients' details from the case file, time out sheets, operation notes, and follow-up files. Details of all variables entered in a particular proforma for data collection.

## Data Analysis

Data obtained from the proforma were entered in the Excel format; the data presented in appropriate charts, tables, graphs, and figures.

## Statistical Procedure

Analysis in which qualitative variables were expressed as mean, standard deviation, and median. Quantitative variables were expressed as proportion. Comparison quantitative data between two groups were analyzed by the independent samples *t* test. Comparison of qualitative variables between two groups was analyzed by the Chi-square test, association *A*. *p* value <0.05 was considered statistically significant. Data analysis was performed using SPSS version 22.0.

## OBSERVATION AND RESULTS

The average age of the subjects in the Veress needle group was 33.1 ± 12.8 years and that of the Visiport group was 35.4 ± 10.6 years. Both group were comparable according to age.

36.0% of the Veress needle group and 60.7% of the Visiport group were female.

100.0% of the Veress needle group and 98.7% of the Visiport group have no vascular injury.

98.0% of the Veress needle group and 99.3% of the Visiport group have no visceral injury.

96.7% of the Veress needle group and 100% of the Visiport group have no preparational insufflation.

0.7% of the Veress needle group and none of the Visiport group have failure of technique.

0.7% of the Veress needle group and 0.7% of the Visiport group have port site.

Average time required to induce pneumoperitoneum among the Veress needle group was 3.1 ± 0.7 minutes and that of the Visiport group was 2.1 ± 0.4 minutes. The observed difference was statistically significant (*p* < 0.05). Time required to induce pneumoperitoneum among the Veress needle group was significantly greater than the Visiport group.

Average duration of hospital stay among the Veress needle group was 83.5 ± 36.1 hours and that of the Visiport group was 62.8 ± 34.3 hours. The observed difference was statistically significant (*p* < 0.05). Duration of hospital stay among the Veress needle group was significantly greater than the Visiport group.

Average duration of surgery among the Veress needle group was 56.7 ± 17.2 minutes and that of the Visiport group was 59.6 ± 26.0 minutes. The observed difference was not statistically significant (*p* > 0.05). Duration of surgery among the Veress needle group was significantly greater than the Visiport group.

## DISCUSSION

Ever since the first laparoscopy performed by Jacobeus of Sweden in 1925, different techniques, technologists, and evidence-based guidelines have been introduced to eliminate the risk associated with laparoscopic entry, whatever be the method adopted for first port entry into the abdomen.<sup>4</sup>

From studies, it has been proved that in 50% of laparoscopic surgeries, major complications occur prior to the commencement of surgery and a delay in diagnosis of visceral injury will lead to increased morbidity and mortality.<sup>4</sup>

Regardless of the methods used, gaining access to the abdomen and initiating pneumoperitoneum remains a source of

morbidity and mortality with most common complications being visceral and vascular injuries. Over the last three decades, rapid advances have made laparoscopic surgery a well-established entity. However, laparoscopy being relatively new, there are controversies regarding the best method of creating pneumoperitoneum.<sup>5</sup>

To establish pneumoperitoneum, access to the peritoneal cavity can be gained through different ways that include Veress/trocar (blind technique), the open technique (Hassons method), direct trocar insertion, disposable shielded trocars, radially expanding trocars, and the visual entry system.<sup>6</sup> Related to this present study, we have reviewed and compared 37 similar studies related to different access techniques in creating pneumoperitoneum in various laparoscopic surgeries.

Laparoscopic surgery will only continue to expand in terms of procedures, which can be performed using technology. Regardless of the procedure, the first step being induction of pneumoperitoneum; all surgeons need to achieve competence in the technique.<sup>7</sup>

In our study, 150 cases of Veress needle and 150 cases of Visiport were compared and analyzed. This included appendectomy, cholecystectomy, laparoscopic inguinal and ventral hernia repair, laparoscopic sleeve gastrectomy, laparoscopic mini gastric bypass and diagnostic laparoscopy, and laparoscopic closure of perforated duodenal ulcer.

In this study, there were two vascular injuries, both of them happened to the same surgeon who created pneumoperitoneum through the optiview trocar while attempting to do mini gastric bypass. Those two cases were converted to open and vascular surgeon was called in and repaired. This happened to the surgeon who was inexperienced with the technique. The rest of all the Visiport cases were safe and faster in creating pneumoperitoneum during the surgery; there was no statistical significance on comparison of both the techniques. There were three omental injuries with the Veress needle (2%). There was one omental tear among the Visiport group (0.7%). There were five cases of preperitoneal insufflation among the Veress group (3.3%); no preperitoneal insufflation was noted in the Visiport group. There was one failure of technique in the Veress group (0.7%). No failure of technique was noted in the Visiport group. There was one port site hematoma in the Veress needle group (0.07%) and four cases of port site hematoma in the Visiport group (2.7%).

Time required to induce pneumoperitoneum using Veress needle was 3.1 ± 0.7 minutes and that of Visiport was 2.1 ± 0.4 minutes. *p* value is 0.001. The observed difference was statistically significant. Time required to induce pneumoperitoneum among the Veress needle group was significantly greater than the Visiport group.

Duration of surgery: average duration of surgery among Veress needle was 56 ± 17.2 minutes and that of Visiport was 60 ± 25.6 minutes. Observed difference was not statistically significant (*p* > 0.05).

Duration of surgery among Veress needle was significantly greater than Visiport.

In the 5-year study of Lapham et al. from 2001 to 2006 using Visiport, 1,623 out of 1,626 cases were successful in inducing pneumoperitoneum.<sup>8</sup> There were three (0.2%) retroperitoneal vascular injuries. In the study of Dunne et al., there was visceral injury with the Veress needle (0.1%) but there was no vascular injury with the Veress needle technique.<sup>7</sup>

In Struge et al.'s 4-year study, there were only (0.3%) complications with Visiport in creating pneumoperitoneum.

In Berch et al.'s 4-year study in optical trocar, there were no trocar-related bowel or vascular injuries with Visiport.

## DEMOGRAPHIC DATA OF PATIENTS AND RESULTS

| Demographic data                             | Veress needle |                | p value |
|--|---------------|----------------|---------|
|  | VN group      | Optical trocar |         |
| Number of cases                              | 150           | 150            |         |
| Mean age (years)                             | 33.1 ± 10.4   | 35.4 ± 10.6    | 0.09    |
| Male/female                                  | 96/54         | 59/91          | 0.001   |
| Time for creating pneumoperitoneum (minutes) | 3.1 ± 0.7     | 2.1 ± 0.4      | 0.001   |
| Duration of surgery (minutes)                | 56.7 ± 17.2   | 60 ± 25.6      | 0.204   |
| Duration of hospital stay (hours)            | 83.5 ± 36.1   | 62.8 ± 34.3    | 0.001   |
| Aortic injury                                | 0             | 1              | 0.365   |
| IVC injury                                   | 0             | 1              | 0.365   |
| Visceral injury                              |               |                |         |
| Omental injury                               | 3             | 0              | 0.109   |
| Omental tear                                 | 0             | 1              |         |
| Preperitoneal insufflation                   | 5             | 0              | 0.024   |
| Failure of technique                         | 1             | 0              | 0.317   |
| Port-site hematoma                           | 1             | 4              | 0.176   |
| Gas embolism                                 | 0             | 0              |         |

## COMPLICATIONS

| Complications              | Veress needle (150) (%) | Visiport (150) (%) | Total (%) |
|----------------------------|-------------------------|--------------------|-----------|
| Vascular injuries          | 0.0                     | 0.3                | 0.3       |
| Visceral injuries          | 2                       | 0.7                | 1.3       |
| Preperitoneal insufflation | 3.3                     | 0.0                | 1.7       |
| Failure of technique       | 0.7                     | 0.0                | 0.3       |
| Port-site hematoma         | 0.7                     | 2.7                | 1.7       |

## Hospital Stay

Average duration of hospital stay among the Veress needle group was 83.3 ± 36.1 hours and that of the Visiport group was 62.8 ± 34.3 hours. The observed difference was statistically significant ( $p < 0.05$ ). Duration of hospital stay among the Veress needle group was significantly greater than the Visiport group. This difference is due to the difference in cases; most of the cases under the Veress group were infective cases like appendicitis with perforation, collection, abscess formation, and acute cholecystitis, blunt abdominal trauma cases for diagnostic laparoscopy, and all these needed more hospital stay. However, those under Visiport were bariatric surgery and hernia cases; these were all clean cases and needed less duration stay in the hospital.

## CONCLUSION

In this study of comparison, both techniques were seemed to have been associated with their own complications. But Visiport is a safe and faster method of creating pneumoperitoneum, though there was statistically insignificant major vascular injury. It happened with an inexperienced surgeon. There is no strong evidence of superiority of one technique over the other.

Even though both techniques are associated with potential danger of perforating injuries on inserting the first trocar, the undervision technique allows early recognition of injuries and immediate repair. No single technique and instrument has been accepted as the "gold standard" for creating pneumoperitoneum in laparoscopic surgery.<sup>9,10</sup>

Good surgical skills and proper evaluation of the patient are important for safe access in minimal access surgery.<sup>11</sup> The surgeon should be competent in both the techniques. Regardless of the technique that has been chosen, one must abide by the safe general principles of surgery, be meticulous, take your own time, and be highly alert for appearance of signs of injury.

With further research and development, an optimal form of the laparoscopic entry technique for creating and maintaining pneumoperitoneum in laparoscopic surgery needs to be designed.

The surgeons should be familiar with both the techniques and adapt their entry technique to individual patient's circumstances.

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