



OPEN VERSUS CLOSED METHOD OF ESTABLISHING PNEUMOPERITONEUM FOR LAPAROSCOPIC SURGERY- A PROSPECTIVE OBSERVATIONAL STUDY.

General Surgery

Niranjana P. B	Assistant Professor, Department of General Surgery, Shimoga Institute of Medical Sciences, Shimoga
Dr. Shivakumar N. H	Senior Resident, Department of General Surgery, Shimoga Institute of Medical Sciences, Shimoga
Dr. Bhavya. S. Rao*	Assistant Professor, Department of OBG, Shimoga Institute of Medical Sciences, Shimoga *Corresponding Author

ABSTRACT

Background: The main challenge facing the laparoscopic surgery is the primary abdominal access, as it is usually a blind procedure and associated with many complications including life threatening vascular and visceral injuries. **Objectives:** To compare the efficacy and safety of the open (direct trocar insertion/ DTI) and closed method (veress needle) to gain access in the abdominal cavity for laparoscopic surgery. **Methods:** This is Prospective Observational study conducted in the department of General surgery, from April 2020 to March 2022 comprising of 100 cases, 50 cases from each methods. The patients admitted in our department for Laparoscopic surgery was taken up for the study. 100 patients of either sex were selected who undergone operative procedure for laparoscopy surgery and written informed consent, appropriate workup is done. Purposive sampling technique was used. SPSS (Version 22.0) was used for analysis. **Results:** Duration for pneumoperitoneum creation in open method group is shorter as compared to closed method group for pneumoperitoneum creation in laparoscopic surgery and it was statistically significant ($p < 0.05$). Also difficulties like multiple attempts, gas leak at port site and port site bleeding are more in open method than in closed method, which is attributed to larger size of incision in open method. Furthermore, a significant higher incidence of such minor complications is found in case of BMI > 25 ($p < 0.05$). Wound infection (clear discharge) occurred in five cases, one in open method and four in closed method group which was statistically significant and were treated successfully by antibiotics and dressing. Port site hernia is reported in none 3 cases on the follow up period till date but longer period of follow up is needed. Previous surgery especially laparoscopic surgery and surgery around umbilicus and their scar may cause adhesions between viscera and scar and may increase likelihood of injury during pneumoperitoneum which was more in closed method and was significant. **Conclusions:** Open technique is as good as closed technique, and is good alternative to closed technique.

KEYWORDS

Hasson technique, Pneumoperitoneum, laparoscopic surgery, port site incisional hernia, Port site bleeding.

INTRODUCTION

The word laparoscopy is the method of examining the abdominal cavity which is achieved by sufficiently distending the abdominal cavity by air called pneumoperitoneum and visualizing the abdominal contents using illuminated telescope containing camera.[1,2] The major difference between laparoscopic surgery and conventional open surgery is the minimal access to the abdominal cavity, as the abdominal incision is replaced by very small incisions. [3] As a result there is minimal traumatic insult to the patient, if achieved without complication, the patient's postoperative recovery will be shorter with less pain and return to full activity and work in shorter time. The main challenge facing the laparoscopic surgery is the primary abdominal access. [4] Techniques for the creation of pneumoperitoneum in laparoscopy include the standard technique of insufflation after insertion of the veress needle (closed method), or open laparoscopy (Hasson technique), optical trocar insertion and direct trocar insertion, as well as variation of these techniques. [5] The rationale behind the study was to compare the safety between these two techniques i.e. closed method or open (Hasson technique) for accessing the abdominal cavity and creation of pneumoperitoneum in laparoscopy.

MATERIALS AND METHODS

It was a Prospective observational study for 2 years from April 2020 to March 2022 done in Department of surgery of a tertiary Care hospital. 100 patients of either sex were selected who undergone operative procedure for laparoscopy surgery and written informed consent, appropriate workup is done.

Inclusion Criteria

All patients undergoing elective laparoscopic surgery and haemodynamically stable patients.

Exclusion Criteria

Patients undergoing emergency laparoscopic surgery, Past history of abdominal tuberculosis or puerperal sepsis, cases of machinery failure for establishment of pneumoperitoneum, Patients having intestinal obstruction

METHODOLOGY

The patients were diagnosed on the basis of clinical symptoms, physical examination and haematological as well as radiological

investigations. Per operative findings like method of pneumoperitoneum creation and its duration, multiple attempts, incision size, extraperitoneal insufflation, port site bleeding, gas leak, total gas used were recorded. Per operative complications like visceral or vascular injury, port site hematoma, conversion to open surgery noted. Patients were assessed in post-operative period for wound hematoma, wound infection, gas embolism and port site incisional hernia noted in follow up to 3 months.

Statistical Analysis

Analysis of data was done by using SPSS software ver. 22. Data were statistically described in terms of mean ($\pm$ SD), frequencies (number of cases) and percentages when appropriate. Comparison of quantitative variables between the study groups was done using Student t test for independent samples if normally distributed. For comparing categorical data, Chi square test was performed. A probability value (p value)* less than 0.05 was considered statistically significant.

RESULTS

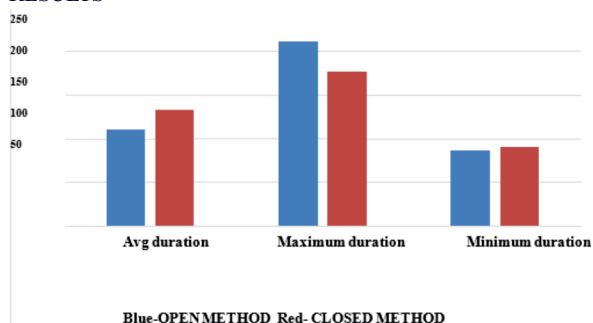


Figure 1- Duration of Pneumoperitoneum

As per figure 1 Duration for pneumoperitoneum creation in open method group is shorter as compared to closed method group for pneumoperitoneum creation in laparoscopic surgery and it was statistically significant ($p < 0.05$). Also difficulties like multiple attempts, gas leak at port site and port site bleeding are more in open

method than in closed method, which is attributed to larger size of incision in open method. Furthermore, a significant higher incidence of such minor complications is found in case of BMI >25 ($p<0.05$).

Table 1- Per-Operative findings

Findings	Open Method	Closed Method	p-value
Multiple Attempts	10	3	0.01*
Gas leak at port site	7	3	0.01*
Port site bleeding	5	3	0.11
Bradycardia	1	1	0.32

As per table 2 per-operative findings like Multiple attempts, gas leak were found to be more in Open method which was statistically significant ($p<0.05$). However, port site bleeding /discharge and Bradycardia were also common but not significant findings.

Table 2- Complications seen in Both Methods

Complications	Open Method	Closed Method	p-value
Vascular injury	0	2	0.11
Port site haematoma	0	1	0.12
Wound infection	1	4	0.01*
Port site hernia	1	2	0.01*
Previous scar adhesions	1	5	0.01*

As per table 2 in the present study no case of visceral/vascular injury and port site hematoma was reported in Open method. Wound infection (clear discharge) occurred in five cases, one in open method and four in closed method group which was statistically significant and were treated successfully by antibiotics and dressing. Port site hernia is reported in none 3 cases on the follow up period till date but longer period of follow up is needed. Previous surgery especially laparoscopic surgery and surgery around umbilicus and their scar may cause adhesions between viscera and scar and may increase likelihood of injury during pneumoperitoneum which was more in closed method and was significant. Hence it is better to perform open method of creating pneumoperitoneum in these patients.

DISCUSSION

Over the past 50 years, many techniques, technologies and guidelines have been introduced to eliminate the risks associated with laparoscopic entry. No single technique or instrument has been proved to eliminate laparoscopic entry associated injury. Besides the classic blind veress technique, there are open laparoscopy (hasson type, direct trocar insertion), use of disposable shielded trocars, radially expanding and optical trocars.[1,2]

The advantage of open technique is that peritoneal cavity access is gained under direct vision, preventing most severe injuries. Injury to intra-abdominal structures is potentially avoidable complication of laparoscopy. Many of these injuries are related to the blind placement of the veress needle or sharp primary trocar into the abdomen when performing a technique referred as closed laparoscopy. Most laparoscopists still feel it safer to use classic blind veress needle entry to create pneumoperitoneum first before inserting the trocar as routine laparoscopic approach. [4,5]

In the present study duration for pneumoperitoneum creation in open method group is shorter as compared to closed method group for pneumoperitoneum creation in laparoscopic surgery and it was statistically significant ($p<0.05$). Also difficulties like multiple attempts, gas leak at port site and port site bleeding are more in open method than in closed method, which is attributed to larger size of incision in open method. Furthermore, a significant higher incidence of such minor complications is found in case of BMI >25 ($p<0.05$). Per-operative findings like Multiple attempts, gas leak were found to be more in Open method which was statistically significant ($p<0.05$).

Schafer et al while comparing the complications of both techniques concluded that the open access method failed to show any superiority over the closed technique. [6] However, Bonjer et al in their comparison between open and closed techniques found that the rates of visceral and vascular injury were respectively 0.08% and 0.07% after closed laparoscopy, and 0.05% and 0% after open laparoscopy ($p=0.002$). There was no significant difference in the mortality rates [7] Chandler et al. also found that the open technique had no advantage over the closed technique in terms of safety [8]

The European association for endoscopic surgery states that, the randomized controlled trials comparing closed versus open approach

have an inadequate sample size to find a difference in serious complications. In large outcomes studies, there were fewer complications in the closed group, although randomized controlled trials found the open approach faster and were associated with a lower incidence of minor complications. The panel did not favour the use of either technique over the other. [9] In this study, we found that the open technique was faster than the closed technique. This is also similar to previous studies. Petigen et al found that the open technique took half the time required by the closed technique and recommended its use on the basis of it being more cost-effective. [10]

Zakherah et al in his study concluded that the open technique is safe alternative to the closed entry technique for the creation of pneumoperitoneum[11] Such an approach has further advantages such as less cost and instrumentation and rapid creation of pneumoperitoneum. Moberg A et al in his study reported no major injuries using open technique [12] He also reported lesser incidence of minor complications like gas leak.

CONCLUSION

The open technique has slightly more incidence of minor complications due to large incision size but has advantage of lesser duration needed for procedure. But major vascular and visceral injury did not occur in any of the groups. Hence, open technique is as good as closed technique, and is good alternative to closed technique for pneumoperitoneum creation in laparoscopic surgery.

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Conflict of Interest- None declared

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