Original Article

Assessment of open versus closed method of pneumoperitoneum creation in laparoscopic surgery

[1]Dr. Alapati Yaswanth Roy Chowdary, [2]Dr H B Janugade, [3]Dr. R. G. Naniwadekar
[1]3rd year Resident, Department of General Surgery, KIMS, Karad, Maharashtra, India
[2,3]Professor, Department of General Surgery, KIMS, Karad, Maharashtra, India
Email: alapatiyaswanthroychowdary6@gmail.com
DOI: 10.47750/pnr.2022.13.S06.090

Abstract

Background: The concept of open laparoscopy is to eliminate the risks associated with blind insertion of the Veress needle and trocar. The present study was conducted to assess open versus closed method of pneumoperitoneum creation in laparoscopic surgery.

Materials & Methods: 74 patients who underwent operative procedure for laparoscopysurgery of both genderswere divided into 2 groups based on method used. Group I patients were of open laparoscopy (Hasson technique) and group II were of Veress needle (closed method). 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.

Results: out of 74 patients, males were 46 and females were 28. In group I and group II, the mean size of incision (mm) was 11.2 and 10.4, duration of pneumoperitonium creation (Sec) was 104.2 and 138.4, multiple attempts were seen in 9 and 4, gas leak at port site in 7and 3, port site bleeding in 5 and 2, pre peritoneal insufflation in 0 and 1 and wound infection in 1 and 2 respectively. The difference was significant ($P< 0.05$).

Conclusion: Both methods were comparable interms of time taken to complete the operation and major and minor complications. Thus, open and closed methods of creating pneumoperitoneum in laparoscopic surgery are safe to perform.

Keywords: laparoscopy, pneumoperitoneum, trocar

INTRODUCTION

The word laparoscopy is the method of examining the abdominal cavity which is achieved by sufficiently distending the abdominal cavity by air called pneumoperitoneumand visualizing the abdominal contents using illuminated telescope containing camera. 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.1

There are five basic ways available at present to create pneumoperitoneum - blind Veress needle insertion, direct trocar insertion, optical trocar insertion, open method, and modified open method, out of which direct Veress needle insertion is the most commonly used.2 The most significant risks for laparoscopy consist of trocar injuries during insertion into the abdominal cavity, port site complications like port site infection, port site oedema, port site haematoma, and port site pain, and a greater risk of hypothermia and peritoneal trauma due to increased exposure to cold and dry gases during insufflation.3

Hasson introduced the concept of open laparoscopy to eliminate the risks associated with blind insertion of the Veress needle and trocar.4The open (Hasson cannula) method involves making an incision and then dissecting the fascia to the peritoneal cavity, to introduce the Hasson cannula under direct vision. The closed (Veress needle) technique involves the blind insertion of the Veress needle into the peritoneal cavity.5The present study was conducted to assess open versus closed method of pneumoperitoneum creation in laparoscopic surgery.

Materials & Methods

The present study comprised of 74 patients who underwent operative procedure for laparoscopysurgery of both genders. All gave their written consent for the participation in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups based on method used. Group I patients were of open laparoscopy (Hasson technique)and group II were of Veress needle (closed method). Patients underwent physical examination, 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. 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. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

Results

Table I Distribution of patients

Total- 74		
Gender	**Males**	**Females**
Number	46	28

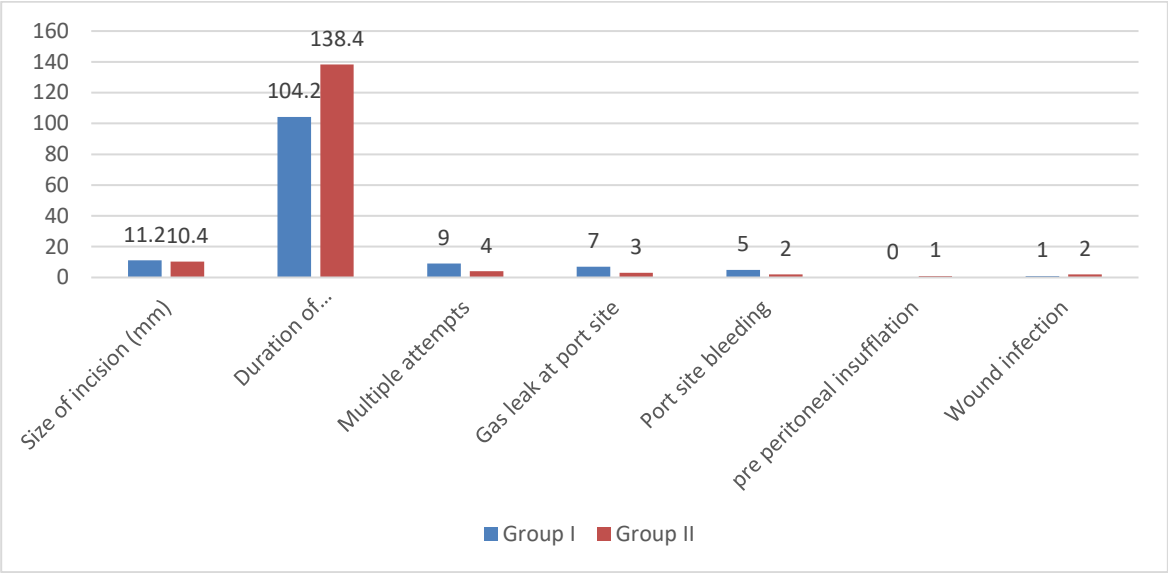
Table I shows that out of 74 patients, males were 46 and females were 28.

Table II Assessment of parameters

Parameters	**Group I**	**Group II**	**P value**
Size of incision (mm)	11.2	10.4	0.05
Duration of pneumoperitonium creation (Sec)	104.2	138.4	0.02
Multiple attempts	9	4	0.05
Gas leak at port site	7	3	0.04
Port site bleeding	5	2	0.03
pre peritonealinsufflation	0	1	0.12
Wound infection	1	2	0.51

Table II, graph I shows that in group I and group II, the mean size of incision (mm) was 11.2 and 10.4, duration of pneumoperitonium creation (Sec) was 104.2 and 138.4, multiple attempts was seen in 9 and 4, gas leak at port site in 7 and 3, port site bleeding in 5 and 2, pre peritoneal insufflation in 0 and 1 and wound infection in 1 and 2 respectively. The difference was significant (P< 0.05).

Graph I Assessment of parameters



Discussion

Laparoscopic cholecystectomy has become the treatment of choice for uncomplicated symptomatic cholelithiasis around the world.6 It is effective, associated with lesser complications, cost-effective and also has cosmetic benefits.7Its superiority over open cholecystectomy is established, it is not completely void of complications many of which are related to the entry technique and the establishment of pneumo-peritoneum.8One of the challenges of laparoscopic surgery is the insertion of surgical instruments through small incisions.9 Over 50% of the complications arise during this time and a great majority of these occur during the insertion of the primary umbilical trocar. To address these complications, various techniques have evolved to gain access to the peritoneal cavity.10 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.11The present study was conducted to assess open versus closed method of pneumoperitoneum creation in laparoscopic surgery.

We found that out of 74 patients, males were 46 and females were 28. Jain et al12compared open or Hasson's method and closed or Vress method of creation of pneumoperitoneum. They divided the patients (n=100) into two groups i.e., open method (group O) (n1=50) and closed method (group C) (n2=50) groups. They compared the two techniques in terms of time required to complete the procedures and complications (major and minor) associated with creation of pneumoperitoneum. All the patients that participated in this study belonged to the age group of 10-69 years out of which majority were 15-50 years old. In this study, the mean time required to create pneumoperitoneum by closed method (group C) was 9.3 seconds while by open method (group O), it was 7.84 seconds.

We found that in group I and group II, the mean size of incision (mm) was 11.2 and 10.4, duration of pneumoperitonium creation (Sec) was 104.2 and 138.4, multiple attempts were seen in 9 and 4, gas leak at port site in 7and 3, port site bleeding in 5 and 2, pre peritoneal insufflation in 0 and 1 and wound infection in 1 and 2 respectively. Vaishnani BVet al13assessed the practicality of both methods in creation of pneumoperitoneum and to compare both methods with regards to ease of performance and incidence of complications. Average size of incision was more in open method, hence more incidence of minor complications like multiple attempts, gas leak at port site and port site bleeding in open method while less duration for creating pneumoperitoneum as compared to closed method. While there were no major complications in either groups. Open technique is as good as closed technique, and is good alternative to closed technique.

Channa et al14compared the efficacy and safety of the Hasson cannula (open) and Veress needle (closed) method to gain access in the abdominal cavity for laparoscopic cholecystectomy. All patients undergoing laparoscopic cholecystectomy during the study period were enrolled. Patients were randomized into two study groups. In one group, the Hasson cannula was used, while in the other Veress needle was used to establish pneumoperitoneum. Surgeries were performed by experienced surgeons of the

ward. Variables comparing the safety and efficacy of the two methods were studied. There was a total of 60 patients in each group. In the Hasson cannula group 15 (25%) had complications of gas leakage, one developed a port-site hematoma and two patients developed wound infections. No complications occurred in the Veress needle arm. The mean access time in the Hasson cannula group (4.6±1.1 minutes) was less than that of for the Veress needle arm (5.4±0.7minutes). Complications of visceral or vascular injury, port-site hernia or gas embolism did not occur in either arm

The limitation the study is small sample size.

Conclusion

Authors found that both methods were comparable interms of time taken to complete the operation and major and minor complications.Thus, open and closed methods of creating pneumoperitoneum in laparoscopic surgery are safe to perform.

REFERENCES

1. Cogliandolo A, Manganaro T, Saitta FP, Micali B. Blind versus open approach to laparoscopic cholecystectomy: a randomized study. SurgLaparoscEndosc. 1998;8(5):353-5.
2. Nezhat C, Nezhat F, Silfen SL, Schaffer N, Evans D. Laparoscopic myomectomy. International journal of fertility. Int J Fertil. 1991;36:275–80.
3. Byron JW, Markenson G, Miyazawa K. A randomized comparison of Verres needle and direct trocar insertion for laparoscopy. SurgGynecol Obstet. 1993;177(3):259-62.
4. Gullà N, Patriti A, Lazzarini F, Tristaino B. Our choice of the method to induce pneumoperitoneum in videolaparoscopic surgery. Minerva chirurgica. Minerva Chir. 2000;55(5):371-5.
5. Agha R, Muir G. Does laparoscopic surgery spell the end of the open surgeon? Journal of the Royal Society of Medicine. J R Soc Med. 200;96(11):544–6.
6. Chotai NR, Choksi BB, Damor S, Bhedi A. Intraperitoneal access by closed method (veress needle) versus open (Hasson's) method in laparoscopic surgery to create pneumoperitoneum. Int Surg J. 2017;4(8):2786-90.
7. Perugini RA. Complications of laparoscopic surgery [Internet]. Surgical Treatment: Evidence-Based and Problem-Oriented. Holzheimer RG, Mannick JA, editors. Munich: Zuckschwerdt; 2001.
8. Kwak HD, Ju JK, Kang DW, Baek S-J, Kwak JM, Kim J, et al. Outcomes according to body mass index following laparoscopic surgery in patients with colorectal cancer [Internet]. J Min Access Surg. 2018;14:134-9.
9. Lécuru F, Leonard F, Philippe Jais J, Rizk E, Robin F, Taurelle R. Laparoscopy in patients with prior surgery: results of the blind approach Internet. JSLS. 2001;5(1):13–6.
10. Bathla V, Thekdi PI, Koradia P, Jhala D, Gadhvi U. Comparative study of modified open technique and closed technique for primary trocar insertion in laparoscopic surgery. Int J Res Med Sci. 2016;4(1):160–4.
11. Hamayun M, Saba N, Bilal M, Mehsud N. Comparison of open versus closed pneumoperitoneum in laparoscopic surgery. Gomal J Med Sci. 2015;13(2):115–7.
12. Jain AP, Shah SC, Shah PC, Patel KR. A comparative study of open versus closed method of establishment of pneumoperitoneum in laparoscopic surgery. Int Surg J 2019;6:3335-40.
13. Vaishnani BV, Kachhadiya KR, Chauhan MR. A comparative study of the open versus closed method of pneumoperitoneum creation in laparoscopic surgery. Int Surg J2021;8:3344-7.
14. Channa GA, Siddiqui AJ, Zafar SN. Open versus closed method of establishing pneumoperitoneum for laparoscopic cholecystectomy. J Coll Physicians Surg Pak. 2009 Sep 1;19(9):557-60.