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Original research article

A Study to Compare Close (Veress Needle) versus Open (Hasson's) Entry Techniques for Creation of Pneumoperitoneum in Patients Undergoing Laparoscopic Cholecystectomy

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Abstract

Introduction: Laparoscopic cholecystectomy has emerged as a gold standard technique for the treatment of gall stones. The first step of a laparoscopic procedure is creation of the pneumoperitoneum for which the most commonly used gas is Co_2. For the induction of pneumoperitoneum in laparoscopic surgeries two methods, i.e. open and closed are commonly used but none of them is proved complication free till now.

Aim: To compare the open versus closed methods of creating pneumoperitoneum for doing laparoscopic cholecystectomy in terms of safety, time taken and complications.

Material and Methods: Patients of either sex undergoing laparoscopic cholecystectomy satisfying the study design and presenting during the study period will be included in the study. Total 120 patients were studied, out of which 60 patients underwent laparoscopic surgery with open entry technique and another 60 patients with closed entry technique.

Results: In our study, the open entry technique is almost equal to closed entry technique in terms of the time taken to complete the operation and major and minor complications because there was no statistically significant difference.

Conclusion: According to this study, open access technique is the safest technique for all patients than closed technique.

Keywords: Pneumoperitoneum, veress needle, hasson's method, laparoscopic cholecystectomy.

Introduction

Laparoscopic cholecystectomy is a minimally invasive surgical technique to remove a diseased gallbladder. Laparoscopic surgery causes relatively less tissue injury than open surgery because of the selective dissection of tissue performed under a magnifying camera. With the advancement in technology and patient awareness, laparoscopic cholecystectomy has become the choice of procedure for cholelithiasis, substituting the conventional open cholecystectomy.

Jacobeus of Sweden in 1910 performed the first laparoscopy in a human [1]. Since then laparoscopic techniques have been in constant evolution. Laparoscopic cholecystectomy has become the action of choice for uncomplicated symptomatic cholelithiasis worldwide [2, 3]. Since the early 1990s, this method has mostly replaced the open technique for cholecystectomies. Laparoscopic cholecystectomy is presently specified for treating any disease of gall bladders like acute or chronic cholecystitis, cholelithiasis, dyskinesia, gallstone pancreatitis, and gallbladder masses or polyps [4].

Laparoscopic cholecystectomy is the type of surgical technique that allows a surgeon to access the abdomen and pelvis without having to make a large incision on the skin, hence is known as key-hole surgery. Abdominal access and the creation of a pneumoperitoneum are the first important steps in any laparoscopic surgery and carry an expected risk of bowel and vascular injuries. These are unique to laparoscopic surgery and are rarely seen in open surgery [5].

The first step in laparoscopic surgery is the establishment of pneumoperitoneum, including entry into the abdominal cavity and then insufflation of air or gas, for facilitating adequate working and viewing space. After entry into the abdominal cavity, gas is insufflated through the trocar (open method) or the Veress needle (closed method) to separate the abdominal wall from the internal organs. The established pneumoperitoneum provides sufficient operating space to ensure adequate camera visualization and instruments manipulation in the abdominal cavity [6]. We are including two methods for creating

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pneumoperitoneum, First is Closed method- Insertion of Veress needle is a standard and closed technique via infra or supra umbilicus approach. The Verres needle is the method introduced in 1938 by Dr. Verres, and it is a commonly used practice, especially in gynecological surgeries. It was described as a quick and easy method for creating pneumoperitoneum [7]. The needle has a bezel-shaped tip which provides a standard of efficacy and safety thus making it a fast, effective and easy technique. Although above all these benefits, chances of visceral injuries are there. Second is Open method- In this, a minor infra umbilical incision is made, the sheath is visualized, and the small incision is made on a sheath. This is followed by the insertion of Hasson's trochar under direct vision. This has been the favorite method for entry of many surgeons, which was developed by Hasson in 1971. This method has an advantage in preventing visceral and vascular injury, which can be caused by blind puncture done by a needle [8]. Both closed and open methods are widely employed and have their typical warnings for use. The present study was planned to compare these two techniques i.e. open and closed in terms of safety and time re quired to complete the procedure.

Aim and Objective

To compare the open versus closed methods of creating pneumoperitoneum for doing laparoscopic cholecystectomy. The objective of the study is to compare the open and closed technique for creating pneumoperitoneum in terms of time taken and complications

Material and Methods

This hospital based Observational study was carried out from January' 2021 to June '2022 in the department of General Surgery, AIMSR Bathinda after getting approval from the Research committee, AIMSR and Ethics committee, Adesh University for a period of 18 months. Patients of either sex with age less than 18 and >70 years presenting for Laproscopic cholecystectomy who have no history of previous laparotomy after obtaining their informed written consent were included in the study. Preganant women, Patients with serious systemic illness, Gall bladder carcinoma were excluded from study. Total 120 patients were studied. 60 patients underwent laparoscopic surgery with Open Entry Technique and 60 patients with Closed Entry Technique.

All the data was recorded in a Microsoft Excel Sheet. And analysed using SPSS-26 to draw relevant results. Parametric Data was presented as Mean ± standard deviation and categorical data was presented as Number & percentages. To find the relevant conclusion student t test for parametric data and chi square was applied on categorical data. Significance $p<0.05$ was considered as significant and $p<0.001$ was considered as highly significant.

Results

In the present study Mean age was 40.73±8.61 years in group A and 39.8±11.08 years in group B. Minimum and maximum age of patient is 22 years & 59 years. In the present study maximum number of females are presented i.e. approximately 80%. In this study minimum weight of the patient is 49 kg and maximum weight is 80kg. Mean weight was 65.60±7.56kg in group A and 62.82±8.34kg in group B. Out of 60 patients in group A, 31 (51.7%) were having calculus cholecystitis and 29 (48.3%) were presented with cholelithiasis. Among group B, out of 60 participants, 34 (56.7%) were having calculus cholecystitis and 26 (43.3%) were presented with cholelithiasis. (Table 1)

Table 1: Demographic data

	Group A	**Group B**	**P value**
Age (Years)	**N (%)**	**N (%)**	
≤ 30	8(13.3)	17(28.3)	0.083
31-40	20(33.3)	16(26.7)	
41-50	22(36.7)	13(21.7)	
>50	10(16.7)	14(23.3)	
Gender			
Male	11(18.3)	10(16.7)	0.810
Female	49(81.7)	50(83.3)	
Presenting Complaint			
Calculus cholecystitis	31(51.7)	34(56.7)	0.583
Cholelithiasis	29(48.3)	26(43.3)	
Mean Age ± SD (years)	40.73±8.61	39.8±11.08	0.607
Mean Weight ± SD (kg)	65.60±7.56	62.82±8.34	0.058

In the present study minimum time taken for access is 2min and maximum is 11min. Mean access time was 5.62±2.19 min in group A and 4.55±1.76min in group B. 53.3% patients of group A were in 6-10 min access time and with open method we get access within 1-5 min and 66.7% patients Which is statistically significant ($p<0.05$). (Figure 1).

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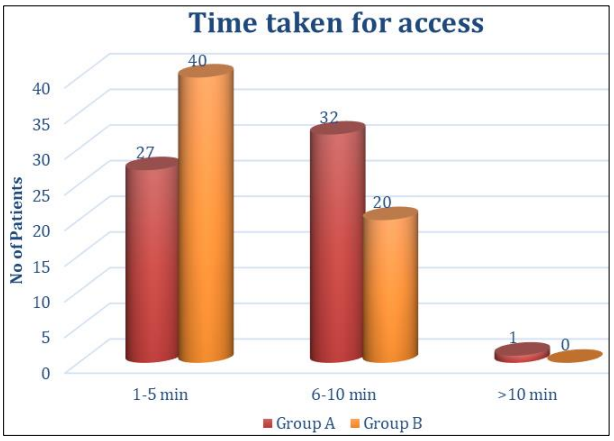

Fig 1: Comparison of time taken for access in both the study groups

At the time of discharge from hospital maximum patients are having no pain and some of these having complaint of moderate pain. In this study 25(41.7%) patients in Group A and 26(43.3%) patients in group B are having port site gas leakage. Entry in Wrong Plane were observed in 10(16.7%) patients of group A and 5% patients of group B and loss of space were seen in 7(11.7%) patients. Extra- Peritoneal Insufflations are seen in 5(8.3%) patients of group A. (Table 2).

Table 2: Comparison of complications in both the study groups

Complication	Group A	Group B	P value
	N (%)	N (%)	
Port Site Gas Leakage	25(41.7)	26(43.3)	0.853
Extra- Peritoneal Insufflations	5(8.3)	1(1.7)	0.094
Loss Of Space	7(11.7)	1(1.7)	0.028
Entry in Wrong Plane	10(16.7)	3(5)	0.040
Omental Injury	2(3.3)	2(3.3)	-

Discussion

In the present study demographic data was found statistically insignificant. Female dominance was seen in this study, 81.7% of patients of the close entry group and 83.3% patients of the open entry group were female. Novacek G [9] also mentioned in his research that the presence of gallstones is two to three times higher among women than men. These results are comparable with the study of Baruah A *et al.* [10].

Time of access in the close entry group is the time calculated from insertion of the veress needle to insertion of the first port. In the open entry group, it is the time taken from the skin incision to trocar entry. Time of access is significantly lower in open entry group compared to close entry group. Mean access time was 5.62±2.19 minutes in the close entry group and 4.55±1.76min in the open entry group. Maximum patients of close entry group had 6-10 min access time; in open entry group 66.7% patients had 1-5 min access time. Our results were statistically significant and comparable with Chotai NR *et al.* [11].

In contrast, Baruah *et al*. revealed that 127/200 patients had 1-5 min access time with close entry technique (veress needle) and with open method (Hasson cannula) 144/200 patients with is maximum had 6-10 min access time. Mean access time was 5.62 ± 2.23 and 7.18 ± 2.52 respectively.

Shookar N *et al.* [12] also revealed in their study the mean time taken for access 4.78 ±11.43 and 6.11±4.12 and close and open entry group which is also contrary with our results. After the analysis between the two groups, the access time, we found that using the open entry technique to access the abdomen was significantly quicker than the close entry technique.

At the time of discharge from hospital 32(53.3%) and 33(55%)patients had no pain in group A and group B respectively. 28 (46.7%) patients in close entry group and 27(45%) patients have moderate pain. In both the groups' improvement in pain was observed fast. The same results were revealed by Chotai NR *et al*. Total 37 patients of veress needle group had severe pain and 24 patients had moderate pain on 1st post-operative day. 33 patients had no pain and 20 had mild pain on the day of discharge. 43 patients in open method group had severe pain and 53 patients had moderate pain on 1st post-operative day. 52 patients had no pain and 45 had mild pain on discharge. Post op pain is similar between two groups of patients with on the day of discharge.

In our study 25(41.7%) patients in close entry and 26(43.3%) patients in open entry group are having port site gas leakage. This observation is concordant with Chotai NR *et al*. Entry in Wrong Plane were observed in 10(16.7%) patients of close entry group and 5% patients of open entry group and loss of space were seen in 7(11.7%) patients which is statistically significant. Extra- Peritoneal Insufflations are

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seen in 5(8.3%) patients of close entry group. No complications like vascular injury, bowel injury and gas embolism were noted in both the groups of our study. This is comparable with the study done by Navaz T *et al* [13].

Conclusion

We can conclude that both the closed (Veress needle) and the open (Hasson) method for gaining access into the peritoneal cavity quite safe. The open technique had a time benefit over the closed method. Port site Gas leakage were noted in approximately 40% patients of both the groups. There were slightly more complications like entry in wrong plane, loss of space extra peritoneal insufflations and Omental injury associated with closed method than open method. Overall, open technique is as good as closed technique and is a good substitute to closed technique for pneumoperitoneum creation in laparoscopic cholecystectomy.

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