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COMPARISON OF OPEN (HASSON'S TECHNIQUE) AND CLOSED ENTRY TECHNIQUES FOR CREATION OF PNEUMOPERITONIUM IN LAPAROSCOPIC CHOLECYSTECTOMY A COMPARATIVE STUDY OF 50 CASES

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ABSTRACT

Introduction- *Laparoscopic cholecystectomy is the gold standard for treatment of benign gallbladder disease. Pneumoperitoneum creation is a prerequisite to carry out the procedure. Among many techniques to create pneumoperitoneum, traditional closed (Veress needle technique) and open (Hasson) technique are widely used. Many studies have shown that closed technique have more incidence of extraperitoneal insufflations and vascular injury rates as compared to open technique of peritoneal insufflation. Aim of the study is to compare the safety and efficacy of open Hasson's method and closed Veress needle method for creation of pneumoperitoneum.* ***Material and method***- *This prospective randomized clinical study was conducted in Govt. Medical College, Rajindra Hospital, Patiala, Punjab. A total of 50 patients were included in the study which were divided randomly into two groups with 25 patients each with group 1, in which Open method i.e. Hasson's Technique and group 2 closed method i.e. Veress Needle Technique was used for creation of Pneumo-peritoneum.* ***Results***- *Overall, open technique is as good as closed technique and is a good alternative with lesser complications as compared to closed technique for pneumo-peritoneum creation in laparoscopic surgery.*

Introduction

Laparoscopic cholecystectomy is the gold standard for treatment of benign gallbladder disease. Pneumoperitoneum creation is a prerequisite to carry out the procedure.[1] Various techniques have been evolved to gain access to the peritoneal cavity. These includes closed (Veress), open (Hasson), direct trocar insertion, using disposable shielded trocars and visual entry system along with

their modifications.[2] The closed techniques are traditional one that includes Veress needle technique and direct trocar insertion into the peritoneal cavity whereas the open Hasson technique consist of an initial incision into the skin, rectus sheath and peritoneum allowing direct visualization of insertion of the blunt trocar before laparoscope introduction.[3]

Many studies have shown that in closed techniques there are more incidence of extraperitoneal insufflations and vascular injury rates as compared to open technique of peritoneal insufflation. Some surgeons have experienced no significant difference between the technique chosen and incidence of complications. Both techniques are being used at different centres and few studies have been published comparing their advantages and disadvantages but no technique has been shown to be superior to the other.

MATERIALS AND METHOD

This prospective randomized clinical study was conducted in Govt. Medical College, Rajindra Hospital, Patiala, Punjab. In this study, 50 patients were taken after written and informed consent who underwent elective laparoscopic cholecystectomy for cholelithiasis in this institution. A total of 50 patients were included in the study and were divided randomly into two groups using standard randomization methods with 25 patients in each group. In first group, the access to peritoneal cavity was done by open method i.e. Hasson's Technique. In the second group of patients closed method i.e. Veress Needle Technique for creation of Pneumo-peritoneum was used.

Aim of the study

To compare the safety and efficacy of open Hasson's method and closed Veress needle method for creation of pneumoperitoneum.

Inclusion criteria

1. Patients of age group of 18-65 years
2. Willing to give consent to take part in this comparative study.

Exclusion criteria

1. Those with previous upper abdominal midline surgery scar.

2. Patients with serious comorbidities contraindicated for laparoscopic cholecystectomy like severe cardiac dysfunction, Congestive heart failure, COPD, Coagulopathy.
3. Patients with any palpable abdominal lump.
4. Patient with umblical or paraumblical hernia.
5. Patients who refused to give their consent to participate in the study

OBSERVATIONS AND RESULTS

Out of 50 patients included in this study, In group 1, out of 25 patients, 3 were male patients (12 %) and 22 were female patients i.e. 88 % whereas in group 2, out of 25 patients, 4 were male patients i.e 16% and 21 were female patients i.e. 84%. This is in congruence with most of the studies indicative of greater incidence of Cholelithiasis in females.
In group 1 (Open technique), the minimum age of the patient was 20 years and maximum age was 62 years with mean age equal to 40.80 years with standard deviation of 9.89 years whereas In group 2 (Closed technique), it was observed that the minimum age of the patient was 18 years and maximum age was 65 years. The mean age observed in this group was 39.96 years with standard deviation of 12.44 years. On comparison, no significant difference was found in the affected age groups in 2 groups.

The minimum time required to achieve pneumo-peritoneum in group 1 was 3.4 minutes and maximum time required to do the same was 7.2 minutes. The mean time for this group was 4.96 minutes with standard deviation of 1.06 minutes. In group 2, the minimum time required was observed to be 6 minutes and the maximum time was 9.5 minutes. The mean time required to achieve pneumo-peritoneum for this group was 7.18 minutes with standard deviation of 0.87 minutes. The mean Time required to achieve pneumo-peritoneum (minutes) was significantly more among Group 2 (Closed Entry Technique) compared to Group 1 (Open technique).

The minimum time required to close the wound in group 1 was 3.5 minutes and maximum time required to do the same was 6.2 minutes. The mean time for this

group was 4.82 minutes with standard deviation of 0.74 minutes. In group 2, the minimum time required was observed to be 5.4 minutes and the maximum time was 10 minutes. The mean time required to close the wound for this group was 7.96 minutes with standard deviation of 1.28 minutes. The mean time required for closure of wounds (minutes) was significantly more among Group 2 (Closed Entry Technique) compared to Group 1 (Open technique).

In group 1, extra peritoneal insufflations were not reported in any of the patients.

In group 2, it was observed that the incidence of extra peritoneal insufflation occurred in 1 patient i.e. 4%. There was no significant difference in the incidence of Extra Peritoneal Insufflation between Group 1 (Open technique) and Group 2 (Closed Entry Technique).

The leakage of gas around the port site during creation of pneumo-peritoneum was observed for both the groups. In group 1, out of 25 patients, gas leakage was observed in 3 patients (12%) whereas no gas leakage occurred in 22 patients (88%). In group 2, gas leakage was not reported in any of the patients. There was no significant difference in the incidence of Gas Leakage between Group 1 (Open technique) and Group 2 (Closed Entry Technique).

In group 1, minor vessel injury was observed in 3 patients (12%) and no minor vessel injury occurred in 22 patients (88%). In group 2, minor vessel injury occurred in 1 patient (4%) and none was reported in 24 patients (96%).There was no significant difference in the incidence of Minor Vessel Injury between Group 1 (Open technique) and Group 2 (Closed Entry Technique).

In group 1, periumbilical hematoma was reported in 3 cases i.e 12% of the patients, not reported in the remaining 22 patients. In group 2, periumbilical hematoma was observed in only one patient i.e 4%. There was no significant difference in the incidence of Periumbilical Haematoma between Group 1 (Open technique) and Group 2 (Closed Entry Technique).

The incidence of port site infection was observed in both the groups and it was observed that in group 1, 8 % of patients i.e. 2 out of 25 patients had port site infection.

In group 2, the port site infection was observed in one patient only i.e. in 4 % patients.

There was no significant difference in the incidence of Port Site Infection between Group 1 (Open technique) and Group 2 (Closed Entry Technique).

In group 1, out of 25 patients, one patient developed incisional hernia whereas no case was reported in group 2.There was no significant difference in the incidence of incisional hernia between Group 1 (Open technique) and Group 2 (Closed Entry Technique).

DISCUSSION

Laparoscopic techniques have "revolutionized the field of surgery with benefits that include decreased postoperative pain, earlier return to normal activities following surgery, and fewer postoperative complications" compared with open techniques.[4] Although it is uncommon, about 50% of major laparoscopic complications occur at the time of primary access for creating pneumo-peritoneum.[5] One of the key steps in the procedure is creation of pneumo-peritoneum. Traditional closed method of pneumo-peritoneum involves initial blind entry into abdomen and more than half of such injuries are related to this primary blind access and occur before the start of actual anatomic dissection.[6]

Among many techniques introduced to prevent these complications, the Veress needle technique and Hasson's technique with their different modifications are the two widely used methods.[7-8]

In our study, the mean time required to achieve pneumo-peritoneum (in minutes) was significantly more among Closed Entry Technique (7.18 ± 0.87 minutes) compared to Open technique (4.96 ± 1.06 minutes). This was in accordance with the studies by Akbar et al [9,10] who found that the time required from incision to the introduction of laparoscope was comparatively lesser among open method. Channa et al [9,10] reported that mean access time in the Hasson's group (4.6±1.1 minutes) was less than that of for the Veress needle arm (5.4±0.7minutes). This time variation between two techniques occurs as a result of slow insufflation in Veress technique due to possible multiple blind entrances and low gas flow rate.

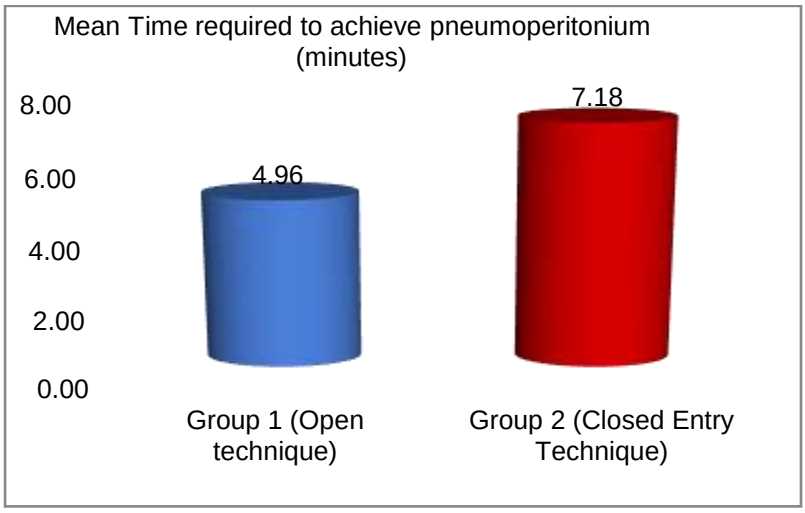

Figure 1. Mean Time required to achieve pneumo-peritoneum (minutes)

In our study, the mean Time required for closure of wounds (minutes) was significantly more among Closed Entry Technique (7.96 ± 1.28 minutes) compared to Open technique (4.82 ± 0.74 minutes). This agreed with the findings by Akbar et al [10], the time required to close the wounds in group A (closed method) was significantly more than group B (open method). The closure time was found to be reduced as application of the stay sutures results in the effective closure of the umbilical wound.

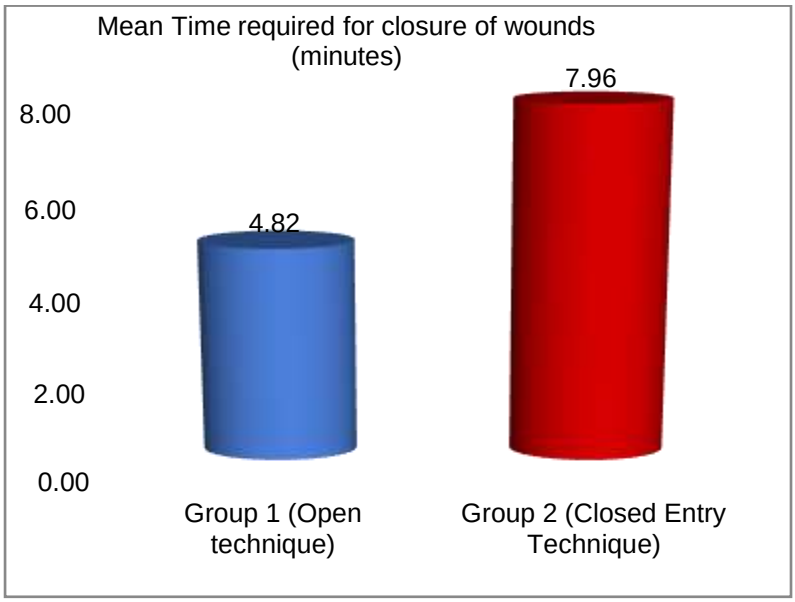

Figure 2. Mean Time required for closure of wounds (in minutes)

In current study, no significant difference was reported of Port site infection between open and closed techniques with 2 cases in open and 1 case in closed group. In the study by Abdullah et al, Port site infection (which is considered as minor complications) occurs in two cases (2.6%) in open technique and one case (1.33%) in Veress needle technique.[11]

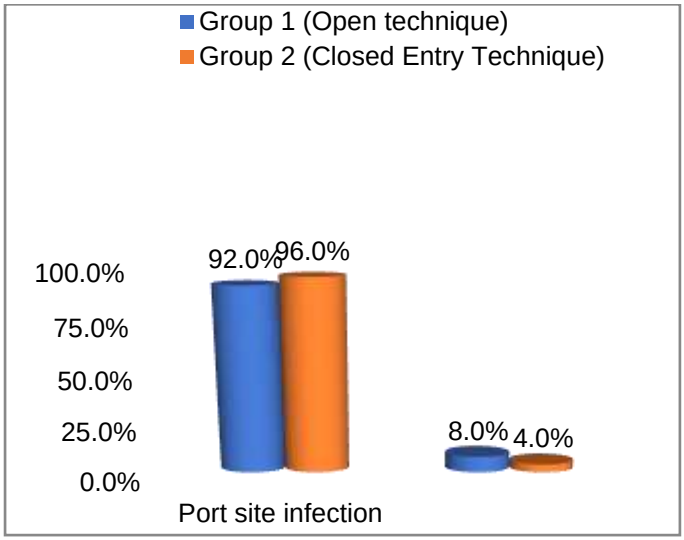

Figure 3. Comparison of incidence of Port Site Infection among 2 groups.

In our study, Gas Leakage was more among Group 1 (Open technique) than Group 2 (Veress needle Technique) though the difference was non-significant. This was in congruence with the study of Parveen et al, leakage of gas during procedure was observed in 80% cases in open method, while this problem was not faced in Veress needle method [12] and Ali et al [13] found leakage of gas in 2.91% and 6.2% in close and open laparoscopy respectively. Though leakage of gas was found more in cases of open method, this as such did not increase the risk of the operation or delayed complication.

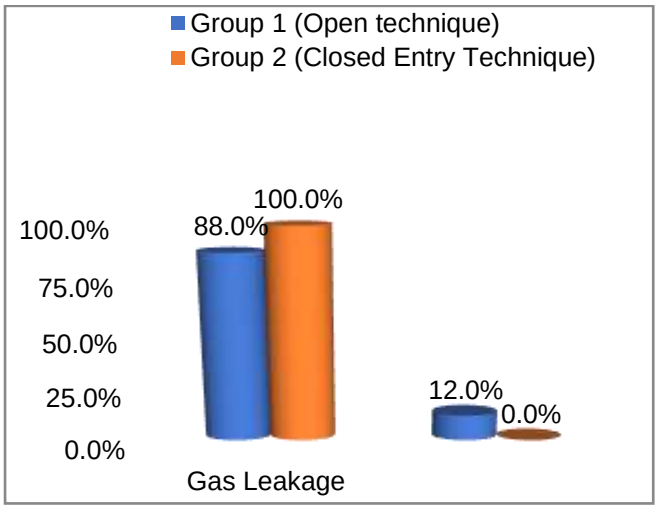

Figure 4. Incidence of Gas Leakage during creation of Pneumo-peritoneum

In current study, no significant difference in the distribution of Extra Peritoneal Insufflation between Group 1 (Open technique) and Group 2 (Closed Entry Technique) with only 1 case was seen among closed method. Chotai et al [50] reported extra peritoneal insufflations during entry occurred in 7.93% patients in Veress needle method and 2.06% in open method. Ali et al[13] found that 6 cases of extra peritoneal insufflations occurred in closed method and 2 cases in open group.

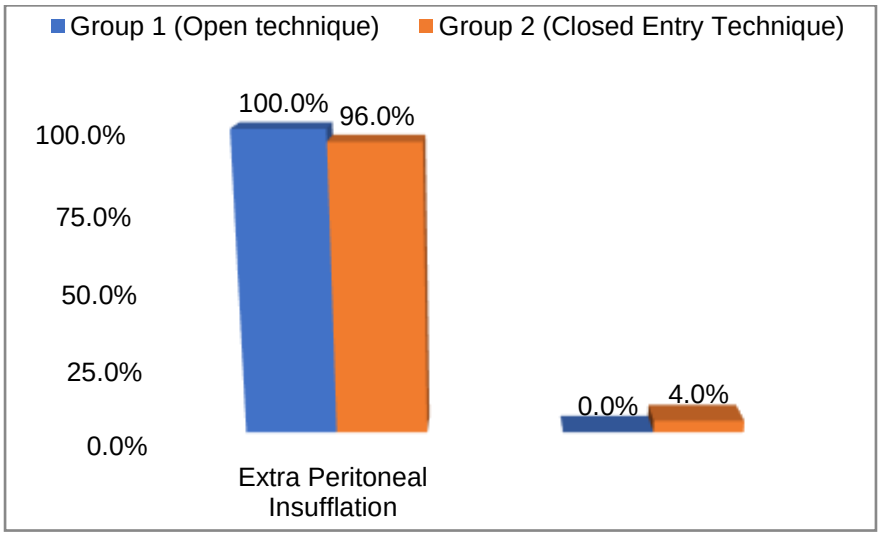

Figure 4. Incidence of Extra Peritoneal Insufflation during creation of Pneumo-peritoneum

No cases of bowel injury with either of the methods were reported in our study. This was in agreement to the findings by Chotai et al [14] in which no cases of bowel injury were reported. Ali et al observed 0.73% cases of bowel injury in

open method group and 1.45% in closed method group with non-significant difference.

In our study, no cases of failure of technique were reported with open and closed method. Akbar et al observed failure of technique in 11.4% cases of close technique and none in open group. Ali et al observed 2.9% cases in Veress needle group and 0.73% cases in Hassan group with no significant difference.

In our study, no major vessel injuries were reported among any of the groups. Minor vessel injury occurred in 3 patients in open group and 1 patient in the closed group. This was in line with the studies by Molloy et al [15] reported that vascular injury rates were 0.04% and 0%, respectively and in study by Taye et al [16] the incidence of vascular injury in close technique was 0.13% compared with 0% in open technique. Open (Hasson) technique is relatively safer as major complications are rare and should be adopted in learning and beginning phase.

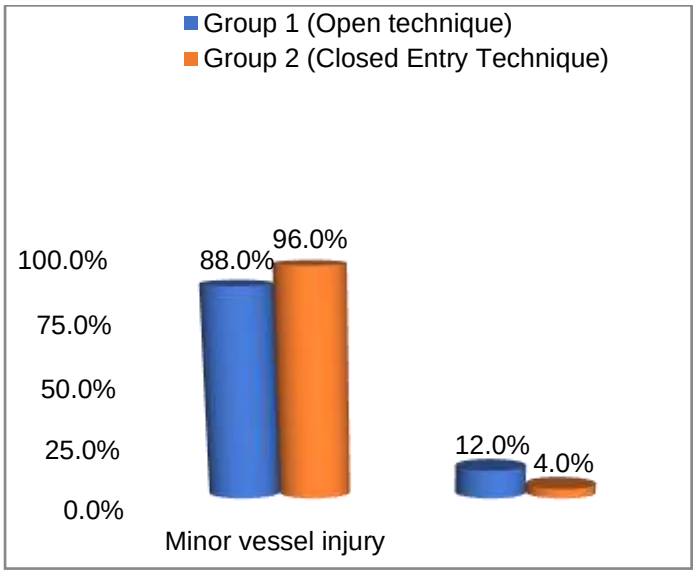

Figure 5. Comparison of incidence of Minor Vessel Injury among 2 groups.

Catarci et al [17] in retrospective analysis found that the major vessel injury was 0.5%, and minor vascular lesion in 0.07% during creation of pneumo-peritoneum. The rate of complications was 0.18%, 0.09% and 0.27% in closed, open and optical trocar method respectively. They concluded that there is no foolproof method for the creation of pneumo-peritoneum.

In our study, there were 3 cases of periumbilical hematoma (12%) in open method and 1 case (4%) in closed method respectively. Lal P et al reported 2.91% periumbilical haematoma out of 755 cases of modified open. Channa et al reported port-site hematoma was seen in one patient in open group and no case in the closed group [18].

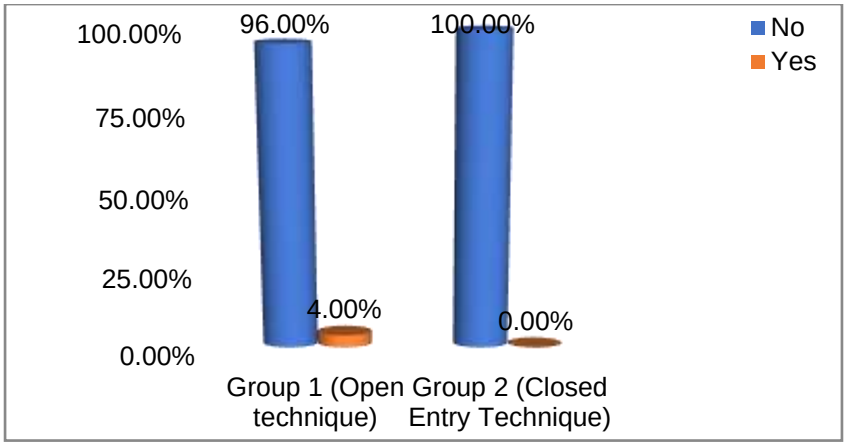

Figure 6. Comparison of incidence of Incisional Hernia among 2 groups.

Hasson et al concluded that there is no evidence to support abandoning the closed entry technique in laparoscopy; however, the selection of patient for an open or alternative procedure is still recommended [19]. Channa et al concluded that both the closed (Veress needle) and the open (Hasson cannula) method for gaining access into the peritoneal cavity are safe. The open technique had a time advantage over the closed method. However, there were more complications associated with it. The limitations of the study are as this was a single-centre study and hence, its results cannot be generalised.

CONCLUSION

For intraperitoneal access in laparoscopy, both the closed (Veress needle) and the open (Hasson's) method for gaining access into the peritoneal cavity are safe. The open technique had a time advantage over the closed method. Major vascular and visceral injuries did not occur in any of the groups and overall, there were slightly more Minor complications, Omental injury, gas leak,

extraperitoneal insufflations, loss of space and entry in wrong plane associated with closed method than open method. Overall, open technique is as good as closed technique and is a good alternative to closed technique for pneumo-peritoneum creation in laparoscopic surgery. Further studies are needed in multiple centres and on larger samples for conclusive evidence.

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