

Comparative Study of Open & Close Technique of Trocar Insertion for Elective Laparoscopic Cholecystectomy

Dr. Jai Prakash Sinha, Senior Resident, Dept.of Surgery, JLN medical College, Bhagalpur

Dr. Upendra Nath, Professor, Dept. of Surgery. , JLN medical College, Bhagalpur

Dr Mrityunjay Kumar, Associate Professor, Dept.of Surgery, J.L.N Medical College, Bhagalpur

Dr. Chandramauli Upadhyay, Associate Professor, Dept.of Surgery, J.L.N Medical College, Bhagalpur

Corresponding Author: Dr. Jai Prakash Sinha, Senior Resident, Dept.of Surgery, JLN medical College, Bhagalpur

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Abstract

Introduction: There are mainly two techniques by which first trocar can be inserted. First is the close technique; where a spring loaded verses needle is placed intra abdominally without the aid of direct vision and then trocar is placed blindly after creation of pneumoperitoneum. Second is the open technique where under direct vision a blunt tipped trocar is introduced into the peritoneal cavity

Aims and objectives: The aim of our study was to compare the open and close technique of trocar insertion in terms of technique of insertion, patient's safety, intra operative complications and post-operative complications.

Material and Methods: The present study was carried out in surgery department of Jawaharlal Nehru medical college, Bhagalpur. The study was carried out from January 2014 to October 2017. A total of one hundred patients undergoing elective laparoscopic cholecystectomy were included in our study. Case records of patients was recorded in the Performa containing demographic details, size and site of trocar insertion, technique of trocar insertion, intra operative, early post operative and late post operative complications were noted.

Results: Out of 100 patients enrolled mean age was 31.67 ± 16.34 . Out of 100 patients in the study; 35 (35%)

were Male and 65 (65%) were Female. In terms of on table complications; CO₂ leakage is more in open technique of trocar insertion. Gastrointestinal injury is more in close method of trocar insertion. In terms of post-operative complications; wound infection was common in open insertion technique.

Conclusion: We would prefer the open technique of trocar insertion as a technique of choice in primary trocar insertion as it counts more on patient safety as compared to the close technique.

Keywords: Cholecystectomy; Port; Trocar insertion

Introduction

The rapid adoption of minimally invasive surgical techniques, by surgeons representing many specialities and varying degree of expertise, has introduced added challenges to reduce the rate of procedure related complications. The establishment of pneumoperitoneum requires the introduction of a sharp insufflating needle or trocar. Most of the complications occur during the insertion of primary trocar,. There are mainly two techniques by which first trocar can be inserted. First is the close technique; where a spring loaded verses needle is placed intra abdominally without the aid of direct vision and then trocar is placed blindly after creation of pneumoperitoneum. Second is the open technique where

under direct vision a blunt tipped trocar is introduced into the peritoneal cavity.

Material and Methods

The study was carried out in surgery department of J.L.N. Medical College, Bhagalpur from January 2014 till October 2017. The study was prospective, observational and longitudinal. Patients were enrolled along with Informed Consent. All those patients aged ranges from 21-60 years, ASA Grade 1 or 2, who attended Surgery department of J.L.N Medical College for elective laparoscopic Cholecystectomy were included in our study. Equal numbers of patients were selected on random basis for open and close method of trocar insertion. The close technique of trocar insertion consists of following steps:

1. With knife (preferable No. 11) skin is incised just sub-umbilical about 5 to 6 mm, then subcutaneous tissue bluntly dissected until the umbilical fascia is palpable the abdominal wall inferior to the umbilicus, then it lifted.
2. Incision is put on anterior rectus sheath.
3. Lifting abdominal wall with one hand, while the veress needle is in other hand and inserted through the fascia at the base of the umbilicus at 45° angle toward the pelvis, so it prevent injury to aorta and inferior vena cava. Two clicks of the veress needle will be appreciated as it penetrates first the umbilical fascia and then peritoneum.
4. Once position of veress needle is confirmed, the needle is now attached to the insufflator which delivers the CO₂ at the rate of 1 ml per min initially.
5. The needle is removed and replaced by 10 mm trocar with sharp cutting cannula grasped in the palm of one hand and inserted using gentle firm pressure while elevation of the abdominal wall with other hand and aiming at sacral hollow.

Following are the steps of open method of trocar insertion.

1. A sub umbilical incision of 1 cm (10 mm) is placed in the skin with No.11 knife. Skin and subcutaneous tissue incised with sharp dissection up to the rectus sheath.
2. Incision is kept over rectus sheath. To identify rectus sheath is very important landmark and entered in preperitoneal space.
3. At this point one should careful about not to make tunnel in peritoneal space. Identification of peritoneum is again important. New endovision trocar excel is available but it is very costly and not at all cost effective for patients.^[1] Peritoneal cavity is entered.
4. Blunt trocar entered in peritoneal cavity under vision.
5. Trocar with cannula entered in peritoneal cavity and pneumoperitoneum created by attaching to carbon dioxide insufflator.
6. The complications were graded on intra operative, early and late post operative complications.

Results and Observation

A total of 100 cases were included in the study. The age of the patient ranges from 21-60 years and the mean age was 31.67±16.34. In terms of gender distribution 35 (35%) were Male and 65 (65%) were Female.

Out of 100 cases, undergoing Laparoscopic cholecystectomy were performed, equally divided in both closed and open methods of trocar insertion, each group containing 50 cases.

On table complications of trocar insertion in both the methods were as follows:

Complication	Open	Closed
CO ₂ leakage from port site	10	00
Major vascular injury	00	00
Abdominal wall hemorrhage	00	03

Gastrointestinal injury	00	00
Bladder injury	00	00
Laceration to solid organ	00	00

Table 1: complications of trocar insertion

The early post operative complications of trocar insertion were as follows:

Complications	Open	Closed
Subcutaneous Emphysema	06	00
Pneumothorax	00	00
Pneumomediastinum	00	00

Table 2: early post operative complications of trocar insertion

The late post operative complications of trocar insertion were as follows:

Complication	Open	Closed
Wound infection	5 (10%)	2 (4%)
Port site hernia	1 (2%)	-----

Table 3: Late post operative trocar insertion related complication.

Wound infection was more common in open technique. It was superficial and involved only skin and subcutaneous tissue. They resolve by antibiotics and antiinflammatory agent. It didn't require any surgical intervention.

In open technique there was one case of port site hernia and it was uncomplicated.

Discussion

In the era of modern surgery, laparoscopic surgery has gained much popularity amongst the doctor as well as the patients. The main reason for this being its advantages like minimal access approach, shorter hospital stay, early return to daily activity and minimal post operative morbidity and good cosmesis.

However, in laparoscopic surgery, adequate training and surgical expertise is a must. Primary trocar insertion is a crucial step in laparoscopic surgery. It is also associated with complications like bowel perforation, major vessels injury, subcutaneous emphysema, etc. Thus a proper technique of trocar insertion must be implemented. In our study we have compared the two basic techniques of primary trocar insertion.

In our study, most laparoscopic surgery were done on elective basis , similar to study of Harmeet Singh Rehan, Ashish Kumar Kakkar et al. (2010).^[2] Most common provisional diagnosis was cholecystitis and most common surgery performed was laparoscopic cholecystectomy .

There are two techniques of primary trocar insertion. Out of 100 patients, 50 patients were subjected to open trocar insertion technique and 50 patients were subjected to close trocar insertion technique.

Though both open and close technique are commonly used according to surgeon preference, closed technique has known to have more complications as compared to open technique. This is similar to study done by Merlin TL, Hiller JE, Maddern GJ, Jamieson GG, Brown AR, Kolbe A(2003).^[3] Open technique comprises insertion of trocar in peritoneal cavity under vision, thus it is more advantageous in hands of inexperienced surgeon, in presence of intra abdominal adhesions and there are less chances of bowel and major vascular injuries. However, it has also insertion related complications like CO₂ leakage, subcutaneous emphysema, more time consuming for primary trocar insertion and late complications like port site infection, port site hernia.

In present study, CO₂ leakage is more i.e. 10 (20%) cases with open technique of trocar insertion. It leads to reduction in intra abdominal operative field and subcutaneous emphysema. Meticulous dissection of subcutaneous tissue, small incision in rectus sheath,

circum cannula stitch with one size nylon to reduces CO₂ leakage.

In the present study, there was subcutaneous emphysema in 6 (12%) of patient due to constant leakage of CO₂ from port site and large incision over the sheath.

In the present study, port site infection was seen in 5 (10%) cases. Port site infection was due to the larger primary port incision and more subcutaneous dissection.

The incidence of port site hernia was 1 (2%), which was due to dehiscence of sheath after infection at the primary port site. This is similar to study done by David Mark Bunting, where he got the incidence of port site hernia is 99 out of 5984 patients, i.e.1.7%.^[4]

There was no reported case of gastrointestinal and major vascular injury noted in open technique of trocar insertion, as trocar was introduced under vision in peritoneal cavity. This is similar to study done by Hasson HM (1999) where incidence of bowel injury in open technique was 0% and also in study done by Catarci M, Carlini M, Gentileschi P, Santoro E (2001) where incidence was 0.5%.^[5,6]

In close method pneumoperitoneum was created with Verres and trocar was inserted blindly in peritoneal cavity. This procedure is less time consuming and easier to use in obese patient.

In the present study, there were 3 cases (6%) of abdominal wall haemorrhage during close technique. Management includes tamponade with a Foley's catheter balloon or a lever applied pressure to the posterior aspect of the anterior abdominal wall. Coagulation or ligation of the bleeding point externally or internally with a laparoscopic approach is an alternative method.

Finally, if all such methods fail, a laparotomy should be done to stop the bleeding. Injuries to the abdominal wall vessels may also be avoided in thin patients by trans-illumination and by inspection of the abdominal wall prior to the trocar insertion.

In the present study, there were only 2 cases (4%) of port site infection in close technique as compared to 5 cases (10%) in open technique. This is because of less tissue dissection and smaller incision in close technique.

In the present study, there was no reported case of port site hernia, due to the smaller incision over the sheath in close technique of trocar insertion.

Conclusion

In the present study, we have compared the two technique of primary insertion of trocar and they are –

- Open technique
- Close technique
- When we weighed the above two techniques on basis of various parameters like – patient safety, intra operative complications and post operative complications; we found that the open technique of trocar insertion was far better than the close technique, as it was done under direct vision. The most common dangerous complications of which surgeon is worried during the primary trocar insertion, like gastrointestinal perforation, major vascular injury and bladder perforation were very less as compared to the close technique of trocar insertion.

Hence, we would advocate the open technique of trocar insertion as a technique of choice in primary trocar insertion as it counts more on patient safety as compared to the close technique.

Reference

1. String A, Berber E, Foroutani A, Macho JR, Pearl JM, Siperstein AE. Use of the optical access trocar for safe and rapid entry in various laparoscopic procedures. Surg Endosc. 2001Jun 15(6):570-3.
2. I.C Gyssens, I.E. Geerligs et al.,(1996)
3. Merlin TL, Hiller JE, Maddern GJ, Jamieson GG, Brown AR, Kolbe A. Systematic review of the safety and effectiveness of methods used to establish

- pneumoperitoneum in laparoscopic surgery. *British Journal of Surgery*. 2003; 90(6):668–679. [Pub Med]
4. David Mark Bunting. Port site hernia following laparoscopic cholecystectomy. 2010 Oct-Dec; 14(4):490-497.
 5. Kazemier G, Hazebroek EJ, Lange JF, Bonjer HJ. Vascular injuries during laparoscopy. *J Am Coll Surg*. 1998; 186:604–5. [PubMed]
 6. Hasson HM. Open laparoscopy as a method of access in laparoscopic surgery. *Gynaecol Endosc*. 1999; 8:353–62.