

Assessment of Modified Trans-umbilical Port Placement in Laparoscopy

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ABSTRACT

Background: Primary port placement is a critical step in any laparoscopic procedure. Although the safety and efficacy of open versus closed technique has been much debated, no particular technique is considered as the best. Therefore, over the period of time different methods have been developed and applied in order to perform laparoscopy procedures, Midat hospital has been using a version of modified trans-umbilical open technique for primary port entry from 2 decades and this study is being carried out to evaluate the technique.

Methods: Retrospective review was conducted. The patients who underwent laparoscopy surgery by modified trans-umbilical port placement at Midat hospital from June 2019- April 2020 were included in this study.

Results: A total of 100 cases were studied. Cholelithiasis was the main indication of surgery. The mean time recorded to establish pneumoperitoneum was 3.4 ± 1.3 minutes. The rate of umbilical swab culture growth was 1%, pre-peritoneal port placements was 2%. Post-operative primary port site infection rate was 4%. No intra-abdominal injury was noted during the entry of primary port and there was no port site hematoma or recorded hernia over the period of one year.

Conclusion: This technique of modified trans-umbilical primary port placement is one of the safest, fastest and easiest techniques to enter the peritoneal cavity.

Keywords: Laparoscopy, trans-umbilical primary port, open technique.

INTRODUCTION

Primary port is the first access to the peritoneal cavity and there are two techniques to create the primary port. Closed entry technique: after making a small nick of skin incision, veress needle is inserted in the abdominal cavity in 45° angle, and pneumoperitoneum is created then the primary port placed.¹ Being a blind procedure, one of the major risk in this technique is injury to the underlying structure.²⁻⁴ Hasson in 1974 introduced the open entry technique, in this technique small incision is made in sub-umbilical region, opening the peritoneal cavity, blunt trocar is then inserted through this incision then insufflation with CO₂ is done creating pneumoperitoneum.^{5,6} Although there are much debates, many analysis and trials have not yet indicated one of these techniques to be significantly safe over other.⁶

This study, evaluates a modified trans-umbilical primary

port placement, an open technique, which is being used in MIDAT hospital.

METHODS

Retrospective data was collected in MIDAT hospital from June 2019- April 2020. The Patients who underwent laparoscopic surgery by modified trans-umbilical port placement were included in this study. The patients with incomplete data were excluded. The data recorded were age, gender, weight, indication for surgery, umbilical swab culture test, primary port entry time, pre-peritoneal port placement and port site infection.

All the patients were operated under general anesthesia. Umbilicus was cleaned with povidone-iodine solution 5%.

Umbilicus was then held and traction was applied with allis forceps in bilateral edges and was lifted up (Figure 1).

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Then umbilical swab was taken for culture, to make sure if there are any microorganisms which can cause an infection later.

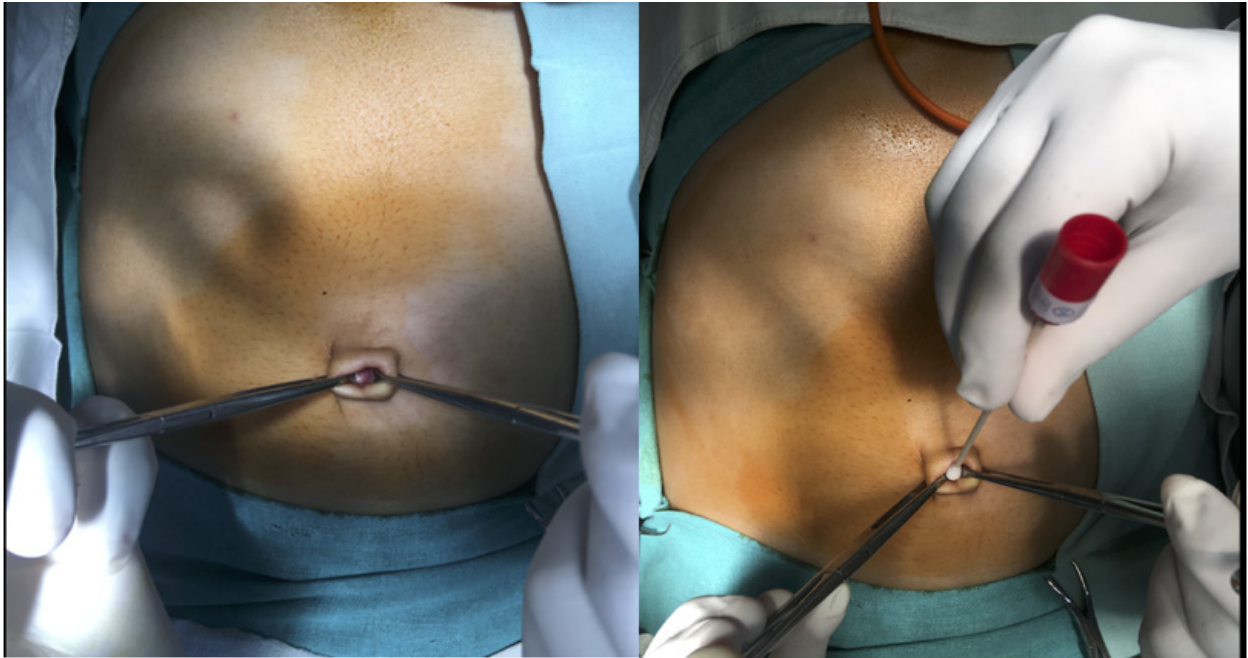


Figure 1. Traction applied with allis forceps and swab collected from the umbilicus.

Surgical blade no.15 was used to give vertical trans-umbilical incision of around 1.5 cm- 2 cm in the umbilicus opening the peritoneal cavity (Figure 2). In some cases, if peritoneal cavity did not directly open, then the peritoneum was held with forceps and incision was given over to open the peritoneal cavity.

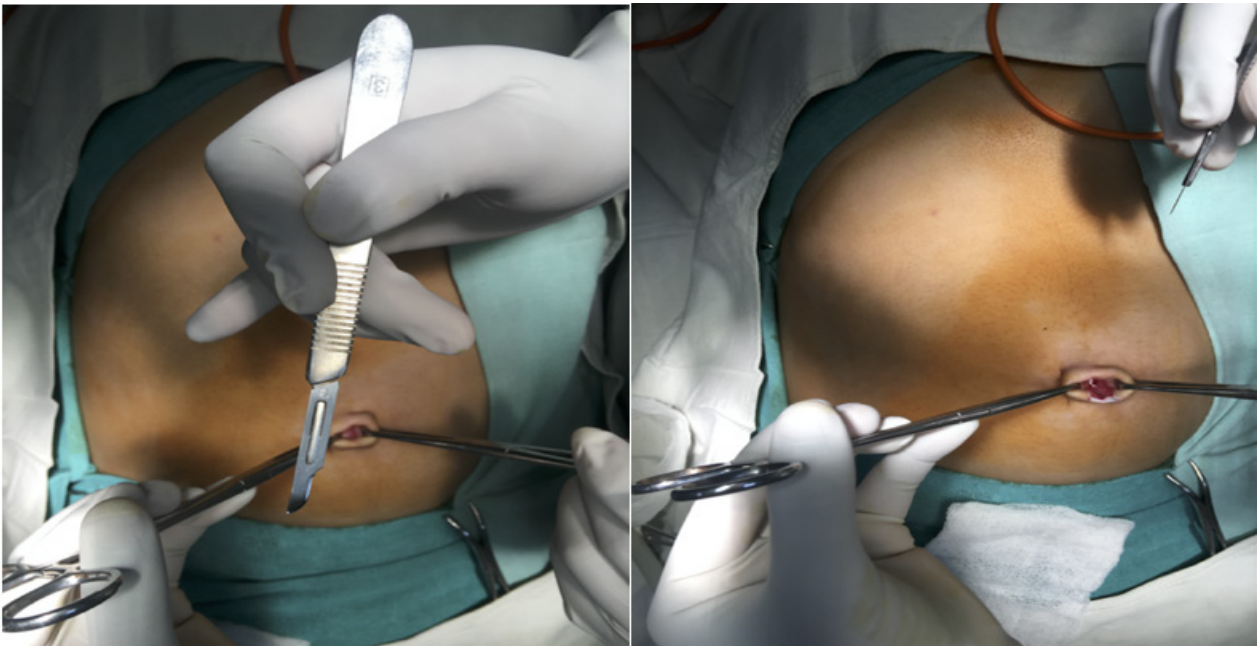


Figure 2. Trans-umbilical incision given with surgical blade no:15.

At the lower edge of the incision, peritoneum was held with Kocher forceps (Figure 3) and 1_(4 metric) VICRYL*Plus Heavy Reverse Cutting (polyglactin 910) (port vicryl) was used to hitch the peritoneum, applying stay suture (figure 3).

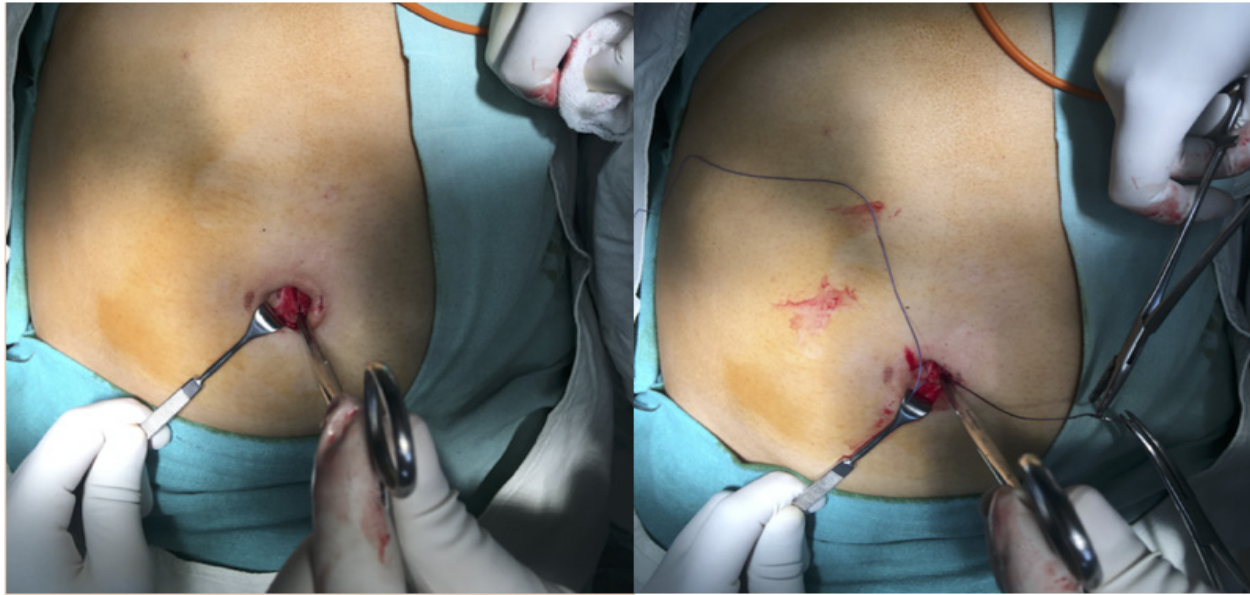


Figure 3. Peritoneum held with Kocher forceps and hitched with port vicryl.

Maintaining the upward pull on the 1_(4 metric) VICRYL*Plus stay suture, blunt cone trocar was screwed in to reach the peritoneal cavity (Figure 4).

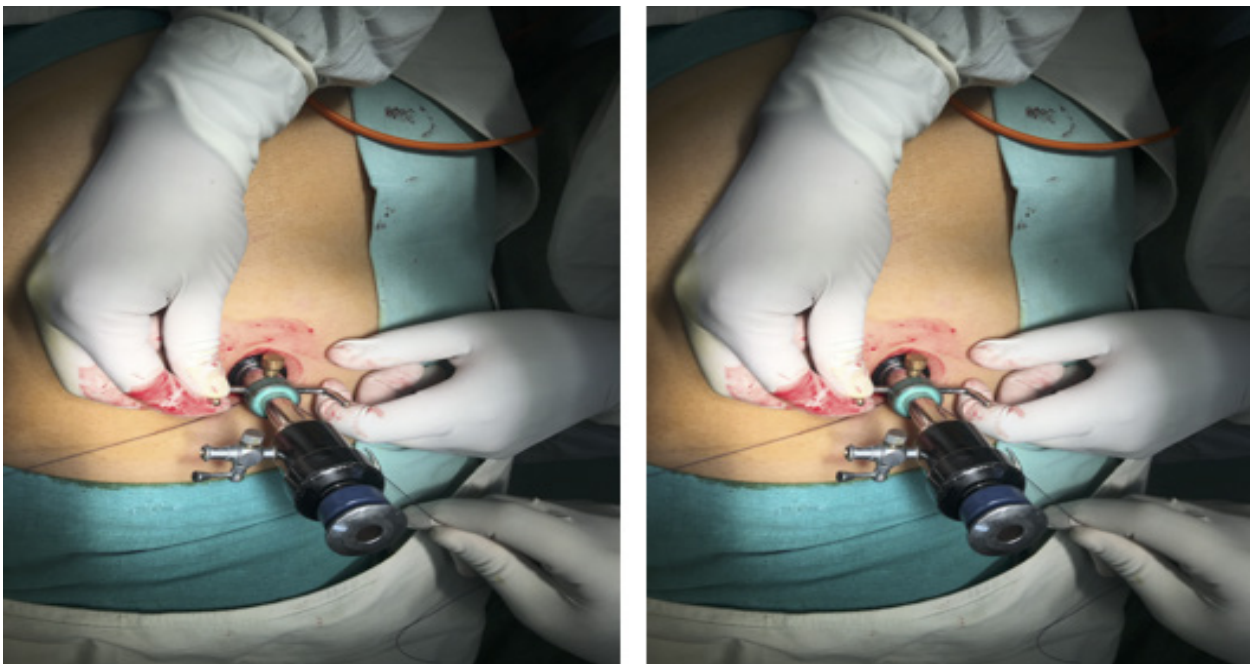


Figure 4. Blunt trocar inserted in the abdominal cavity and held in place with the help of port vicryl.

The trocar was then held in place (fixed) with the help of 1_(4 metric) VICRYL*Plus stay sutures (which was already been hitched with the peritoneal cavity) (Figure 4).

Finally, pneumoperitoneum was established and laparoscope was introduced in peritoneal cavity (figure 5). The time from incision to the establishment of pneumoperitoneum was recorded.



Figure 5. Pneumoperitoneum created; laparoscope introduced in abdominal cavity.

Post procedure, closer of the anterior rectus fascia and peritoneum was done under direct vision with 1_(4 metric) VICRYL*Plus.

Skin suture was done with 3-0 ETHILON* Reverse Cutting and was removed in 7th post-operative day.

A descriptive statistical analysis was carried out in this study. Age, weight and time for pneumoperitoneum were expressed in mean± standard deviation and the other data were expressed in numbers and percentage.

RESULTS

A total of 100 cases were taken. Average age of the patients was 43±13 years. Cholelithiasis was the main indication of surgery (Table 1). The mean time recorded to establish pneumoperitoneum was 3.4±1.3 minutes (Table 2). The rate of umbilical swab culture growth was 1%. Staphylococcus aureus was isolated in 1 patient and was treated according with the sensitive antibiotic. The patient, post procedure, did not develop wound infection. Pre-peritoneal port placements were 2% (Table 3). Post-operative primary port site infection rate was 4%. No intra-abdominal injury noted during the entry of primary port and there was no port site hematoma or recorded hernia during 1 year follow up period.

Table 1. Indication for laparoscopy

Indications for Laparoscopy

Cholelithiasis	80 (80%)
Appendicitis	16 (16%)
Ovarian cystectomy / ectopic pregnancy	4 (4%)

Table 2. Patient's data and pneumoperitoneum time.

Patients Data

Age	43 ± 13 years
Gender (female: male)	81: 19
Weight	64 ± 12 Kgs
Umbilical swab culture growth	1 (Staphylococcus aureus isolated)
Time taken to establish pneumoperitoneum	3.4 ± 1.3 minutes

Table 3. Related complications, during the procedure.

Complications	Numbers (%)
Extra peritoneal/ pre-peritoneal port placement	2 (2%)
Intra-peritoneal injury during port placement	0
Post-operative port site infection	4 (4%)
Port site hernia	0
Mortality	0
Total Complications	6 (6%)

DISCUSSION

Insertion of the primary port to create a pneumoperitoneum is a critical step in laparoscopy procedures. According to the preferences of the surgeons, usually, the primary ports are made infra-umbilicus, supra umbilicus or transumbilicus.⁵⁻⁹ There are guidelines developed, techniques introduced and many advance instruments invented to minimize the risk of primary port placement, as it is considered to be a key step to a successful laparoscopy procedure.^{10,11} In laparoscopy, there are 2 basic principle of opening the primary port. Much debate has been done about the standard technique but no conclusion has been met till now.^{6,12-16} Therefore, different surgeons have perfected their own modified versions of open and closed techniques of primary port placement.

This study has evaluated a new version of the modified open techniques, for the primary port placement. We investigated the usefulness of this technique: (i) Short time duration for opening the port. Success of any laparoscopy procedure depends on successful placement of primary port. Umbilicus is used as an anatomical landmark to help create a primary port. The function of primary port is to help create pneumoperitoneum and the laparoscope (camera) is introduced into the peritoneal cavity through this port which helps to create other secondary ports under vision. Hence, to ensure a smooth procedure, opening of the primary port should be effortless and quick but sometimes can become very tedious. In this study trans-umbilical vertical incision was given to open the primary port, this method is very quick and easy, the port opening time with this method was in between 2-4 minutes. Similar study carried out in

Mexico had the opening time in between 1-7 minutes⁹ and another study in India showed the mean entry time of 2 ± 0.7 minutes.¹⁷ Similar to this study, both of these techniques are a form of modified Hasson. Although, they are similar as both these technique uses open access they are not exactly the same technique, they are different from each other and different from the technique used in this study. Therefore, the difference in the entry time could be due to the difference in the techniques. Besides this, the instruments, operation theater settings and learning curve of the surgeons could also be a contributing factor resulting to the difference in entry time. (ii) Better cosmetic outcome: as it is a trans umbilical vertical incision, after healing, operative scar camouflages with natural umbilical scar making it more cosmetically preferable.¹⁸ (iii) Ability to reach the abdominal cavity safely and securely: umbilicus is considered as naturally weak point in anterior abdominal wall due to the absence of all the layers and the absence of pre-peritoneal and subcutaneous fat no matter how obese the patient is.^{8,19} Due to this reason, less effort is needed to reach the abdominal cavity through umbilicus than any other area in anterior abdominal wall. (iv) Ease in the removal of large specimen by utilizing the extensibility of the skin in the umbilicus.

We also examined the possible risk factors: (i) port site infection: In this procedure umbilicus was thoroughly cleaned with betadine and all the visible dirt was removed, as it is the most unclean part, swab was also taken to look for any growth. Out of the collected data, growth was noticed in 1 case and was treated according with the sensitive antibiotic and didn't developed the port site infection later. Even though the umbilical swab culture test was sterile, 4 cases developed port site infection, the port site seroma was superficial, which might be due to poor hygiene or due to the contamination of the port with the infected specimen which was removed via this port.¹⁹⁻²¹ None of the patients had growth in wound swab culture even after the infection. (ii) Preperitoneal port placement: this was noticed in 2 cases, this was mainly due to failure in the adjustment of the trocar length and may be due to a small incision which prevented an entry of the port in peritoneal space, the preperitoneal port placement is easily noticeable as there will be sudden rise in the pressure, observed in insufflator device but there will be no rise in the abdominal cavity. This can be easily corrected by re-entering the trocar. (iii) Intra-peritoneal injury: There was no intra- peritoneal injury in this study. However, other studies with open techniques suggests and reports of major vessel injuries and injuries to the underlying structures.⁶ But, the advantage with open technique is, even if the injury occurs, it's easier to identify and repair at the same

time. (iv) Port site hernia: There is a report suggesting that all hernias occur within 6-22 months follow up.²⁰ In this study, none of cases reported the port site hernia even after 12 months' post-surgery, this might also be due to the less people coming for follow up. However, studies suggest port site hernia as a major complication with trans umbilical open access technique.²²⁻²⁴ (v) Gas leakage through incision: Gas leakage is considered one of the major technical problem during the procedure.^{12,25,26} However, in this study, this was not a complication as the cone trocar was screwed tightly with the skin and was fixed properly and also all the instruments before inserting were properly checked and fixed, as the instrument also plays a major role causing leakage of the gas. During the procedure, gas leakage from the trans umbilical primary port was minimal to none, and this minimal leakage played no tedious role during the procedures or directly affected its outcome.

In contrast to the classic Hasson technique of sub-umbilical incision, trans-umbilical incision was used in this study. Being a naturally weak spot, this area gave us a very easy access to the peritoneal cavity. Similar to the other open techniques including Hasson's, this technique also had all the advantages of the open techniques.^{17,27,28} One of the meta-analysis which reviewed 57 RCTs including four multi-arm trials, with a total of 9865 participants, and evaluated 25 different laparoscopic entry technique reported risk of 3/1000 for vascular or any measure vessel injury, 2/1000 visceral injury and 8/1000 failed entry in open technique.⁶ However, there were no cases of vascular or visceral injuries, no failed entry to the peritoneal cavity, no gas embolism, no trocar site bleeding, omental injury or any reported case of incisional hernia in this study.

All the procedures were performed with consistent technique and each case was hand reviewed. However, there are few limitations to this study, being retrospective, some variables were unknown. Limited follow-up, small sample size as the data is from only one center and small number of surgeons performing this technique.

CONCLUSIONS

This study demonstrated a technique which is one of the simple, safe, fast and easy approaches to enter the peritoneal cavity, methods used in this study, gives a quick entry in the abdominal cavity without injury. Only 6% cases had minor complications and there were no major complications or mortality. It is easy to learn and safe to use. Therefore, this method can be one of the safe and easy techniques. This method simplifies and makes the procedures less tedious this technique

of modified trans umbilical primary port placement is recommended to be used routinely during laparoscopy procedures.

CONFLICT OF INTEREST

None

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