

Laparoscopic Port Access Techniques And Port Site Complications...

Dr Ab Bari Shah, Dr Tamer, Dr Ala, Dr Rizwan, Dr Wael, Dr Abdullah,
Dr Hatim

ABSTRACT

Background: Improvement in access techniques in laparoscopy and Port site complications. Complications before and after laparoscopy challenge the benefits of minimal invasive Surgery, and reputation of surgeons.

Aims and objective ; of the study is to determine the effectiveness of various pneumoperitoneum Access techniques and morbidity associated with the port site complications in laparoscopic Surgery and to identify risk factors for complications.

Methods: 565 no. Of patients from 18-65 years, between June 2022 and September 2023, admitted for elective as well emergency laparoscopic procedure were studied. All the patients had preoperative workup and general anesthesia. The patients were observed for any port-site complication during operation and in the immediate and postoperative till 6 months. The access technique used for creating pneumoperitoneum were open method, veress plus visiport or only visiport Majority of the patients were in the BMI range of 18-40kg/m². Cholecystectomy was the done in 223 patients, appendectomy in 164 patient, hernioplasties in 142 and diagnostic laparoscopies in 36 patients. Port site morbidity was observed in 35 patients. As an early port site complication, bleeding, surgical site infection, omental injury, port site ecchymosis and port site hernia and hypertrophic scar were observed.

Conclusions: Port site complications are least when selective access technique will be utilized and best will be open and veress plus visiport and working ports introduced under vision and taken care of freedom movement of working ports

Keywords: Body mass index, endotracheal intubation, Laparoscopic procedure, Port-site Complication

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I. INTRODUCTION

Laparoscopic surgery revolutionized the surgery, in fact all endoscopic procedures. Decreased Postoperative pain, early return to normal activity and least post-operative complications are few of its advantages. The complication rate associated with laparoscopic surgery decreases from the Inception. The incidence of port site complications after laparoscopic surgery is documented to be around 21 per 100,000 cases.(2,3)The rate of port site complications is increased with increasing size of the port site incision and trocar.(4,5) Complication following laparoscopic surgeries includes gastrointestinal (0.6 per 1,000), genitourinary (0.3 per 1000), vascular (0.1 per 1,000), and in omentum (0.4 per 1,000).(1,2) However, metastasis after laparoscopic Oncosurgery, pyoderma gangrenosum and port site infections are rare.(6,7)Hence, present article is done to determine the complications associated with port site and decrease in its incidence in laparoscopic surgery and its associated risk factors. The access technique used for creating pneumoperitoneum are open method (Hassan's technique), closed method by veress needle or visiport or only visiport.

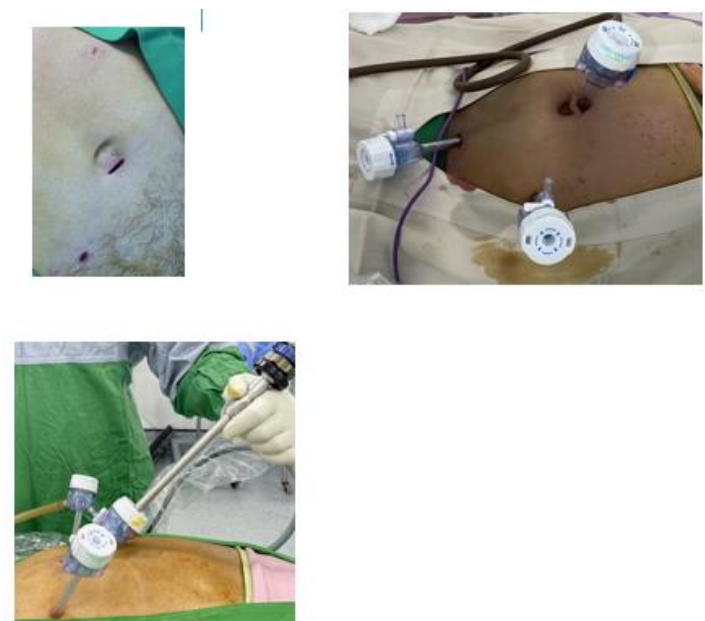
II. METHODS

We present a study including 565 patients of either sex admitted for elective and emergency laparoscopic procedure. All adult patients 'elective/emergency laparoscopic surgeries included and patients between 18 years and more than 65 years All the patients had preoperative workup including a complete blood count, blood urea, serum Creatinine, blood sugar assessment, ultrasonography of abdomen, x- ray of chest, and electrocardiography. All patients were properly assessed by the anesthetist preoperatively. Usual antibiotic regime intravenous 3rd generation cephalosporin (cefazolin) on the day of surgery followed by either oral or intravenous antibiotics as indicated was given. All patients were given general anesthesia with endotracheal intubation. Most of the patients were discharged on 1st, 2nd or 3rd postoperative day. The hospital is following the follow up for patients in weekly in the first month and then monthly for next 6 months. Majority of the patients were in the BMI range of 18-40kg/m² . The pneumoperitoneum access techniques used in patients were Hassan's (Open) method (if needed assisted with visiport especially in obese patients), veress needle inflation

with visiport and only visiport. Cholecystectomy was the indication in 223 patients and primary port in all cases was umbilicus, for Inguinal hernia(142) and appendicitis(164 cases) cases port access was same but for ventral hernia and some diagnostic lap.(36 cases) Cases palmars point was chosen, either first with veress inflation followed by visiport or directly with visiport . Port site associated morbidity was observed in 6.19% patients. As an early port site complication, bleeding, suprafascial dissection ,omental injury, surgical site infection and emphysema were observed .

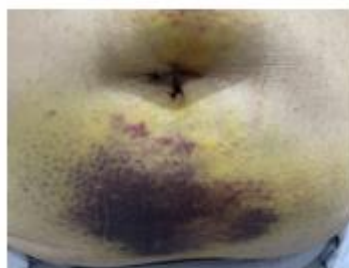


Steps of open pneumoperitoneum access technique:





Techniques of port site closure



Complications

All the data were analyzed using IBM SPSS ver. 20 software. Data were expressed as number and percentage. Frequency distribution was used to tabulate the data. Level of significance was assessed at 5%. Disposable trocars used in all. Once the surgery was finished, all the instruments were removed carefully under vision. Fascia of ports ≥ 10 mm closed with j needle. PSI was defined according to the Centers for Disease Control and Prevention (CDC).[6] Wounds were assessed clinically after surgery and in case of infection, were treated with regular cleaning and dressing, with empirical oral antibiotics. Laparoscopic cholecystectomy was the most commonly performed procedure with female as highest percentage and highest port site complications (52.9%) in our study population. Most common ports involved were epigastric port showing port site bleeding as well port site infection. Port site complications were significantly increased with increased number and size of ports ($p = 0.23$); however, a causal relationship could not be explained. Technique of port closure had no influence on incidence of complication; however, both the omentum-related complications were seen with conventional port closure. The results are clearly depicted in the frequency tables

No. Of patients operated

	Lap. Cholecystectomy	Lap appendectomy	Lap hernia	Diagonastic lap
No of procedures	223	164	142	36
Males	98	114	112	24
Females	125	50	30	12
BMI>40	43	36	25	7

No.of ports used

Lap. Cholecystectomy	Lap. Appendectomy	Lap. Hernia	Diagonastic lap
10 mm port	10 mm	10 mm	10 mm
10 mm port	5mm	5mm	Depends on pathology
5 mm	5 mm	5mm	
5mm			

Complications

Complications/procedure	Lap. Cholecystectomy	Lap. Appendectomy	Lap. Hernia	Diagonastic lap	
Port site bleeding	3	1	1	1	6
Emphysema	3	1	0	0	4
Omental injury	5	2	2	1	10
Gut injury	0	0	0	0	0
Port site hernia	0	1	0	0	1
Port site infection	6	2	0	2	10
Total complications	17	7	3	4	31

Access technique

Access techniques	Lap.cholecystectomy	Lap appendectomy	Lap hernia	Diagonastic lap
Open method	86	74	56	15
Visiport	80	66	46	15
Veress plus visiport	59	24	40	5

Access technique complications

Access techniques	Lap cholecystectomy	Lap appendectomy	Lap hernia	Diagonastic lap
Open	3	1	1	1
Veress plus visiport	2	1	1	1
Visiport	9	4	2	5
Complications	14	6	4	7

Most common complications per access technique

Common complications	Open	Veress plus visiport	Visiport
Omental injury	2	1	7
Port site bleeding	4	1	1
Emphysema /ecchymosis	0	1	2
Port site infection	2	3	5
Port site hernia	0	0	1

Of 31 complications, 10 (58%) were due to PSI. All cases were superficial wound infections. Six (23.5%) patients developed port site bleeding; all were minor vessel injury during the placement of secondary trocars. Bleeding was managed with electrocoagulation or lateral compression of ports. The ports involved were epigastric, suprapubic port, and paramedian ports. Ten patients had omentum-related complications at the port site (1.7%). Those were immediate postoperative herniation/entrapment of the omentum from the site of umbilical (camera) port and late (herniation of the omentum from the port site (port site hernia). Both were associated with 10 mm ports and the fascia was closed by the conventional method. However, the present study did not show significant difference in the rate of complication between port closure needle and conventional

suturing. Laparoscopic surgeries are associated with minimal port site complications. Complications at port site include wound infection, dehiscence, herniation of small bowel, entrapment of the omentum, bleeding. Percentage wise, the incidence of these complications noted in the study is comparable with statistics worldwide (0.2 to 6). The commonest intraoperative complications were seen in primary ports. All complications were manageable with minimum morbidity. Consideration of meticulous surgical technique during entry and exit at all the port sites can minimize these complications further. Port placement is also of utmost importance following the triangulation and baseball diamond concept and maintaining the working angles and freedom movements. Electric coupling and work force should be minimized.

III. DISCUSSION

Port site complications can be grouped into access-related complications, port position related and postoperative complications, and have been reported in all age groups and in both genders.(5,7) The literature shows that obesity is associated with increased morbidity related to port site due to various factors like the need for longer trocars, thick abdominal wall, need for larger skin incision to expose fascia adequately, and limitation in mobility of the instrument due to increased subcutaneous tissue.(8,2) Care must be taken during placement of trocars to align their axes as needed for the procedure. The present study showed that cholecystectomy was the commonest procedure performed and more frequently associated with port site complications. This is comparable to observations made by Fuller et al.[9,14] Neudecker et al. had shown that port site complications were increased with more number of ports.[15] Fascial closure is recommended for ports ≥ 10 mm; the fascia are closed with sutures to reduce the risk of developing a port site hernia.[16] Reapproximation of the fascia can be accomplished in a variety of ways. Ideally, the fascia is directly visualized with the aid of retractors. The fascial edges are grasped and the sutured closed with interrupted or continuous suture. A number of specialized instruments have been devised for fascial closure at the port site [17,18] The technique of closure of the rectus sheath had no influence on our study. Laparoscopic procedures have a reduced incidence of PSIs and other wound-related complications.[19] Nonetheless, they can produce significant morbidity. The presence of significant peri-incisional erythema, wound drainage, and fever may indicate the presence of a necrotizing fascial infection.[20] The incidence of PSI was 1.8%. Our results are comparable with many other studies. Den Hoed et al. found the incidence to be 5.3%.[21] Shindholimath et al. 6.3% [12] and Colizza et al. <2% [22] All PSIs were superficial, involving only the skin and subcutaneous tissue. Superficial skin infection is more common and has been reported by another study.[13] Umbilical port site was the most common site of PSI followed by epigastric port site. In the literature, there is great emphasis on the increased frequency of umbilical site PSIs and the role of umbilical flora in the development of PSIs (23;24). Emphasis is also there on the increased frequency of PSI and the trocar site of extraction. All gall bladder specimens in cholecystectomy were removed through the epigastric port.(31,33)Wound infections are prevented by appropriate administration of antibiotic prophylaxis, sterile techniques, and the use of specimen bags during specimen extraction. Once present, infections are treated with drainage, packing, and antibiotics as appropriate.

Port site bleeding .Incidence of port site bleeding was found to be 1%.Our results are comparable with other studies.[23] All were associated with the placement of secondary trocars. There was no associated bleeding with port site dilatation for specimen removal. Injury to epigastric vessels can be related to carelessness during the operative procedure usually during the placement of secondary trocars which should be placed under direct vision and with prior illumination of the abdominal wall. Bleeding from the abdominal wall may not become apparent until after the port is removed because the port may tamponade muscular or subcutaneous bleeding. In addition to visually inspecting the access site upon its creation, the site should also be inspected during and following removal of the port. Bleeding points can usually be identified and managed with electrocautery. On occasion, the skin incision may need to be enlarged to control the bleeding. If persistent bleeding continues, a Foley catheter can also be inserted, inflated, and gentle traction applied to tamponade the site. Also, U- stitches can be placed into the abdominal wall under direct laparoscopic visualization using a suture passer with absorbable braided sutures. A number of specialized instruments have been devised for fascial closure at the port site and these may also be useful for managing abdominal wall bleeding. Omentum-related complications. Ten patients were found to have omentum-related complications at the port site, mainly when visiport is used without closed pneumoperitoneum. Incidence of omental complications was 0.4% and is comparable with other studies (0.02-1.6%).[24–26] The risk of developing incisional hernia is low with the use of trocars ≤ 12 mm, radially dilating trocars, or bladeless trocars.[16,30] Most authors close fascial defects if a port 12 mm is used, regardless of site or type of trocar. Some advocate closure if 10 mm in size.[27,30] According to our study , if 5 mm telescope is available then 5 mm working ports should be used as we are using for TAPP hernia repair ‘ laparoscopic varicocelectomy’ ventral hernia repair and Laparoscopic appendectomy.The fascia should be closed with suture to reduce the risk of developing a port-site hernia.[16] Although rare, hernia has been reported even for 5 mm trocar sites. When port site hernia is identified following laparoscopy, the site should be repaired to prevent the development of intestinal complications (i.e., obstruction,

strangulation).[28] Various factors are attributed to the occurrence of these complications including a) removal of the ports prior to complete deflation of the peritoneal cavity, b) inadequate/faulty closure of the port site incisions, and c) large incision at the port site.[6] They can be avoided or managed as follows: a) After the procedure, all the ports should be removed under careful vision, b) all the accessory ports to be removed under vision and primary access port should be checked through any other port followed by the releasing pneumoperitoneum by opening the valve of 10 mm cannulas, c) after release of gas is completed, the primary port and telescope are to be removed together, with a clear view at all times that the port is free of any entrapped bowel, d) to limit the size of the port incisions, and e) a secure and adequate closure of the port sites of size 10 mm and above should be ensured Other documented omental complications include laceration and penetrating injuries of the omentum during insertion of the port, omental bleeding,[29] and granulomas of the omentum in the late postoperative period.[10,11]. Other complications associated with port sites are: Failed entry: If bile, enteric contents, or blood returns at the placement of the Veress needle, the needle should be left in place and alternative access gained immediately. Leaking port: If a port leaks during a procedure, it is usually due to the fascial defect being too large. This can be mitigated with additional sutures or the placement of a towel clamp to clinch the tissue closed around the trocar. Loss of port position: If a port slides within the abdominal wall, the port may need to be repositioned and/or secured with additional sutures. The use of longer or larger diameter trocars may also be helpful.(33,34) Port site pain: Pain from placement of trocars is expected, but can be minimized by using the least number of ports required to perform the procedure safely, Nerve injury: The location of port sites should be chosen to avoid abdominal wall nerves. Nerve injury is unlikely to be recognized intraoperatively, and usually results in persistent postoperative pains (8;9). Ahmed et al and Memon et al are also in agreement with the present study and reported lower infection rate of 0.31% and 1.8% respectively with laparoscopic surgeries.(1,6) However, Voitk et al and Hamzaoglu et al showed slightly higher rate of infections (9% and 8% respectively).(14,26) Kumar et al studied 104 patients and reported incidence of port site infection as 5.7%.(19;28) In present study port site bleeding was observed in 2% patients which is comparable to the reports of Quilici et al.(10) Bleeding points can usually be identified and managed with electrocautery. Different authors have reported that obesity is associated with increased morbidity related to port site.(21,22) The possible reasons for increased morbidity in obese patients may be due to need for longer trocars, thick abdominal wall need for larger skin incision to expose fascia adequately, and limitation in mobility of the instrument.(23,24) In present study 23.33% had BMI between 18-40kg/m²; out of that only 1 patients developed port site hernia which means in present study, there was no increase in the frequency of morbidity related to port site and obesity. Similar results were reported by Karthik et al.(17,24;25) Cross sectional nature of the study limits the findings to be considered for the population, a large randomized clinical trial is required to strengthen the present study results.

IV. CONCLUSION

Present study has shown that post-operative discomforts are least with laparoscopic surgery. Laparoscopic surgery has replaced the open surgery with extremely low morbidity and mortality.

Cholecystectomy being the most commonly involved procedure resulted in common complication at port site which include infection and bleeding.

Pneumoperitoneum access technique should be chosen wisely

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