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Original Article

Surgery Section

Open Technique Versus Blind Technique in Placement of Primary Ports in Laparoscopic Procedures- A Prospective Cohort Study

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ABSTRACT

Introduction: Laparoscopic access has always been a challenge because it has been associated with severe complications and sometimes fatal also.

Aim: To compare open technique versus blind technique in placement of primary port in various laparoscopic procedures in terms of operative time, complications, ease of use and acceptability.

Materials and Methods: This prospective cohort study was conducted at Government Medical College, Patiala, Punjab, India, between June 2014 to August 2016. The study included 100 patients, which were divided into two groups. Group A (n=50) received placement of primary port by open technique and Group B (n=50) received placement of primary port by blind technique. The time taken for access into peritoneal cavity and duration of surgery was noted. Multivariate analysis done using Chi-square test, p-value of less than 0.05 was considered significant.

Results: Mean age of patients in group A and group B was 42.66±12.37 years and 43.06±14.67 years, respectively. Majority of patients were females in both groups (n=45 in group A and n=39 in group B). There was no significant difference in time taken for access into peritoneal cavity (p-value>0.05). The duration of hospital stay (in hours) of the patients was 36.96 in Group A and 34.42 in Group B which was not statistically significant. The incidence of intraoperative and postoperative complications was not significant. Most common complication port site infections 3 (6%) in Group A.

Conclusion: There was no significant difference between the two techniques with respect to time taken for peritoneal access and complications. In expert hands, both methods are comparable.

Keywords: Complications, Gastrointestinal tract, Pneumoperitoneum, Surgical instruments, Visual control

INTRODUCTION

It has been always a challenge to access abdominal cavity in laparoscopy, particularly insertion of surgical instruments through small incisions. Major complications including injuries to the gastrointestinal tract and major blood vessels occur during obtaining access. It has been reported that 50% of the injuries occur prior to commencement of intended surgery [1,2]. Increased morbidity and mortality is due to delay in recognition of injuries early or not addressing them quickly [3]. A primary port is the first entry site through which a lens, camera and light is introduced. Furthermore, all practitioners agree that ancillary ports must be inserted under direct vision, and several authors favor insertion of the primary port under visual control as well since this will further mitigate entry complications [4].

The use of veress needle to induce pneumoperitoneum for laparoscopy using carbon dioxide was popularised by Raoul Palmer in 1947. Under usual circumstances, the veress needle is inserted in umbilical area, in the mid-sagittal plane, with or without stabilising or lifting the anterior abdominal. The techniques described for determining the correct placement of the verres needle are double click sound of the needle, aspiration test, hanging drop test and the syringe test [5]. In 1978, Hasson JM introduced an alternative method of trocar placement that permitted direct visualisation of trocar entrance into the peritoneal cavity. Subsequent to the development of the Hasson technique, general surgeons became more receptive to laparoscopic surgery, as the open technique allayed fears of bowel and vascular injuries [6].

No access technique has emerged as the safest and best technique. The techniques for abdominal access include direct puncture and an open-access technique [7]. Keeping all this in view, the study was undertaken to compare open and blind techniques of primary port placement in laparoscopic surgeries in terms of operative time, complications, ease of use and acceptability.

MATERIALS AND METHODS

This prospective cohort study was conducted on hundred patients of either sex admitted to Surgical Wards of the Government Medical College, Patiala, Punjab, India, between June 2014 and August 2016. Institutional Ethical Committee approved the study vide letter number BFUHS/2k14/P-TH/5654. In all cases relevant history, general physical examination and investigations was done to confirm diagnosis and assess surgical status of patient.

The patients were divided assigned into two groups i.e., group A included placement of primary port by open technique and group B included placement of primary port by blind technique.

Inclusion criteria: Patients undergoing laparoscopic procedures, medically fit and stable patients and patients giving consent for surgery were included.

Exclusion criteria: Patients undergoing open procedures, multiple co-morbid conditions, pregnancy and patients not giving consent were excluded from the study.

Procedure

All patients were given tab. alprazolam 0.25 mg one night before the procedure and one dose of injection cefoperazone sulbactum 1.5 gm one hour before the start of surgical procedure. After overnight fasting, all patients were given injection midazolam 1-3 mg intramuscular (i.m.) 30 minutes before surgery. All patients were operated under general anaesthesia.

In Group A patients, a small incision was made just below the umbilicus and abdominal fascia will be located under direct vision. Two Kocher clamps were placed on the fascia, and with a curved Mayo scissors a small incision was made through the fascia and underlying peritoneum. A finger was placed into the abdomen to make sure that there is no adherent bowel. A sturdy suture was placed on each side

of the fascia and secured to the wings of a specialised trocar, which was then passed directly into the abdominal cavity.

In Group B patients veress needle was inserted through stab incision in supra umbilical region with patient in 15° Trendelberg position. Once needle tip entered the free peritoneal cavity, it was connected to pneumo-insuffulator and insufflated till the pressure rose to 10 mmHg. The veress needle than removed and at site of veress needle puncture, a 10 mm safety trocar was inserted. Operative time from onset of procedure (i.e., time since incision was given) to closure of wound will be noted. After surgery postoperative complications were recorded for first week than after one month and after three months. The findings noted down for the patients in two subgroups were compared and results were evaluated at the end of study.

STATISTICAL ANALYSIS

Statistical evaluation was done on Statistical Package for the Social Sciences (SPSS) software windows version 20.0. Univariate analysis was performed with Analysis of Variance (ANOVA) test. Multivariate analysis was done using Chi-square test, p-value of less than 0.05 was considered significant.

RESULTS

The youngest patient was 15-year-old and oldest was 70-year-old. Mean age in Group A was 42.66 years, and in Group B was 43.06 years. However, majority of the patients in this study were females in both the groups [Table/Fig-1].

Age (years)	Group A (N=50)		Group B (N=50)	
	Male	Female	Male	Female
0-20	0	2	0	1
21-40	2	18	6	13
41-60	2	23	5	20
61-80	1	2	0	5
Mean±SD	42.66±12.37		43.06±14.67	
p-value	0.719*			

[Table/Fig-1]: Demographic profile of the study subjects.
*Chi-square test

The most common diagnosis in both groups was cholelithiasis [Table/Fig-2]. There was no significant difference in time taken for access to peritoneal cavity. The mean time for peritoneal access in Group A was 3.23 minutes while in Group B the mean time for peritoneal access was 2.83 minutes (p-value >0.05) [Table/Fig-3].

Diagnosis	Group A (N=50)	Group B (N=50)
Recurrent appendicitis	04 (8%)	0 (0)
Cholelithiasis	45 (90%)	46 (92%)
Perforated gall bladder	01 (2%)	0 (0)
Acute appendicitis	0 (0)	01 (2%)
Gall bladder polyp	0 (0)	01 (2%)
Left ovarian cyst	0 (0)	01 (2%)
Cholelithiasis with hydatid cyst	0 (0)	01 (2%)
p-value	0.003*	
df	24	

[Table/Fig-2]: Diagnosis.
*One-way ANOVA test

Time to peritoneal access (min)	Group A (N=50)	Group B (N=50)
2-3	19 (38%)	21 (42%)
3-4	26 (52%)	29 (58%)
4-5	05 (10%)	0 (0)
Mean±SD	3.23±0.58	2.83±0.57
p-value	0.241	
Chi-square value	2.84	

[Table/Fig-3]: Time to peritoneal access (min).

The duration of hospital stay (in hours) of the patients was 36.96 in Group A and 34.42 in Group B which was not statistically significant. The incidence of intraoperative and postoperative complications was not significant. [Table/Fig-4-6] show scar formed at one month postoperative.

Complication	Group A (N=5)	Group B (N=5)
Port site infections	03 (6%)	02 (4%)
Subcutaneous emphysema	0 (0)	03 (6%)
Gas leak	02 (4%)	0 (0)
p-value	0.644	
Chi-square value	1.66	

[Table/Fig-4]: Complications

[Table/Fig-5]: Group A scar formation; **[Table/Fig-6]:** Group B scar formation. (Images from left to right)

DISCUSSION

Creation of pneumoperitoneum is the first step in laparoscopic surgery and there are numerous techniques available to the surgeon, which includes closed technique with veress needle, open technique with Hasson port, direct trocar insertion, the use of disposable shielded trocars, radially expanding trocars or visual entry systems [8]. This first step is the most dangerous, and most complications related to laparoscopic surgery occur at this stage, with a mortality rate of 0.05-0.2% [9]. Even when all the necessary safety measures are observed and despite complete mastery of the technique, these complications cannot be completely avoided during the blind procedure [10]. Hanney RM et al., encountered two cases of aortic injury during use of the Hasson cannula, whilst still supporting the technique in preference to the verres needle [11]. Hence, caution has to be exercised in both open as well as closed techniques.

Visceral perforation is the other major complication reported in both the open and closed techniques. All of the techniques are associated with both vascular and visceral injury, but extensive literature reviews have not proved the superiority of one technique to the others, largely due to the lack of large, randomised controlled trial data [12]. For safe access to the abdominal cavity, it is critical to visualise all sites of trocar entry. For safe access to the abdominal cavity, it is critical to visualise all sites of trocar entry [13].

This study compared open and closed laparoscopic entry techniques. Majority of patients were of cholelithiasis. In a study by Lal P et al., various surgeries for related diagnosis were laparoscopic cholecystectomies (70.19%), diagnostic laparoscopies (15.36%), interval appendicectomies (11.65%) and varicocele ligation (4.32%) [10]. Channa GA et al., did a study on all laparoscopic cholecystectomies [14]. In a study by Dunne N et al., 59.4%, patients underwent laparoscopic cholecystectomies and others procedure were laparoscopic Inguinal hernia repair (n=729), anti-reflux procedures (n=347), Heller's cardiomyotomies (n=16), rolling hiatus hernia repairs (n=16), diagnostic laparoscopies (n=31) cases, and esophagogastric carcinomas (n=130).

The mean time for peritoneal access in Group A (open technique) was 3.23 minutes (range 2 m 30 s to 5 m) with peritoneal access being attained in 3 to 4 minutes in 52% of the cases. In Group B (closed technique) the mean time for peritoneal access was 2.83 minutes

(range 2 m to 4 m) with 58% of the cases clocking 3-4 minutes. In a study by Hurd WW et al., time for peritoneal access with open technique was 300 seconds and with closed access was 230 seconds [16]. Hasson HM et al., reported mean time of 3-10 minutes and Minervini A et al., reported 443 seconds (range 2-10 minutes) with open technique [17,18]. In the study conducted by Dawka S and Timilsina DS time taken for peritoneal access with closed technique was 3.3 minutes (range 2m30s-6m30s) [19]. The time difference in both the groups was found to be statistically insignificant in present study however the mean time in this study was comparable with the above stated studies. Time taken in both the techniques depends on the surgeon's familiarity and comfort with that particular technique.

In a study by Dunne N et al., previous surgery rates were 16.3%. 63.1% patients had pelvic incisions, 21.6% upper abdominal incisions and 15.3% had previous laparoscopy [15]. In the present study, there was no incidence of failed entry in both the groups. There was no incidence of conversion of closed laparoscopy into open laparoscopy, and no conversion to laparotomy. In study by Dunne N et al., the rate of intraabdominal injury in the sub-group of patients with a previous history of abdominal surgery was 0.78% [15]. Bonjer HJ et al., experienced two of their three visceral complications associated with closed laparoscopy occurred in patients with a history of abdominal surgery [20]. Kaali SG and Bartfai G did not find previous abdominal surgery to be a contraindication to the use of direct insertion of the laparoscopic trocar [21]. Lécuru F et al., failed to get into peritoneal cavity in five cases out of 881 and an open technique was required [22].

In the present study, no intraoperative complications were seen in the patients with previous history of abdominal/pelvic surgery. The complications seen in group A were Port Site Infections (PSI)and gas leak. In the two out of three cases of PSI had undergone laparoscopic appendectomy. In group B there were two PSI and three subcutaneous emphysema. Gas leak, a known complication of open technique, was seen in two patients. In a study by Bonjer HJ et al., visceral injury (0.048%) was seen with open technique however no vascular injury and mortality was reported [20]. In closed access, there were visceral injury in 0.083% cases with mortality of 2.5% and vascular injury in 0.075% cases with a mortality of 0.8% noticed. Hasson HM et al., reported wound infection in 0.4% cases with open technique and umbilical wound infection (0.1% for diagnostic cases, 3% for laparoscopic appendectomies) with closed technique [17]. Long JB et al., reported enterotomy rate of 0.049% and 0.067% with open and closed access, respectively. Vascular injury was seen 0.044% of cases in closed access [23].

Limitation(s)

The study period was brief. Better results can be obtained with large sample size and a multicentric study.

CONCLUSION(S)

The study did not found significant difference between the open and closed methods with respect to complications and time to access peritoneal cavity. However, surgeon's expertise in any method is important. Both methods are comparable in expert hands.

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