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Research Article
Laparoscopic

Gallbladder retrieval through an epigastric and umbilical port in laparoscopic cholecystectomy- a comparative study

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Aim: This comparative prospective study was conducted at the L.N. Medical College and J.K. Hospital Bhopal Madhya Pradesh for a period of one year from Jan 2019 to Dec 2019. **Material and Methods:** The study included 100 patients who underwent planned four-port laparoscopic cholecystectomy for symptomatic, asymptomatic cholelithiasis, and benign gall bladder diseases. These patients were randomly divided into two groups. The first 50 patients in whom GB was retrieved from Epigastric port were assigned in Group A and the other 50 patients where GB was retrieved from Umbilical port were assigned in Group B. The fascial defect of a 10 mm port was closed by vicryl "2.0" with a port closure needle, while three 5 mm ports closed by applying sterile small dressing. Both groups use a surgical glove endobag for gall bladder retrieval. **Results:** The results of both these techniques were collected and analyzed. The mean age of patients was 43.8 years in group A and 43.6 in group B. The male to female ratio was near 1:2. in both groups. Group A VAS score is 4.2 and while in group B 3.1.**Conclusion:** Post-operative port site infection in group A was 2% while in group B is 4%, post-operative port site scar was cosmetically better and satisfactory in umbilical port than epigastric port.

Keywords: Gallbladder, Laparoscopic cholecystectomy, Port site infection, Visual analog score

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To Browse

Introduction

Laparoscopic cholecystectomy offers a cure for gallstones with a minimally invasive procedure with minor pain, minimal scarring, and early return to full activity. Today, laparoscopic Cholecystectomy is the gold standard treatment of choice for symptomatic, asymptomatic gallstones, and benign gall bladder disease [1]. In 1910 Hans Christian Jacobaeus of Sweden performed the first laparoscopic operation in humans [2].

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Professor Muhe of Boblingen, Germany performed the first laparoscopic cholecystectomy on September 12, 1985 [3]. This surgical technique has been a milestone in the management of gall bladder disease by reducing postoperative pain, risk of surgical site infection, and incisional hernia [4]. Laparoscopic cholecystectomy has more advantages than open cholecystectomy including decreased discomfort, reduced hospital stay, improved cosmetic results and faster return to routine and sportive activities [5,6-8]. These advantages arise from less muscle disruption and reduced tissue trauma, resulting in less discomfort and ileus than open surgery. Pain is the most frequent complaint after laparoscopic cholecystectomy and the main reason for staying overnight at the hospital on the day of operation [9]. Pain after laparoscopic cholecystectomy depends on multiple factors including the rupture of blood vessels caused by rapid distension of the peritoneum, traumatic traction on the nerves, trauma to the abdominal wall during port insertion and GB retrieval and pneumoperitoneum created by use of CO_2 to maintain high abdominal pressure [10]. It is reported that incisional pain is more intense than visceral pain and is dominant during the first 48 hours after laparoscopic cholecystectomy [11]. Retrieval of GB is an important terminal event of laparoscopic cholecystectomy and is reported as one of the factors affecting postoperative port site pain. GB is extracted either from the epigastric or umbilical port. Both the ports have been recommended for retrieval of GB in laparoscopic cholecystectomy and are always selected as per the surgeon's preference [11-13].The incision of the epigastric port is directly visible in a sari which is a more popular dress in Indian females. Hypertrophic and keloidal scars are fairly common complications of abdominal wounds in our practice. The postoperativecosmetic appearance of the port site scar depends on tissue trauma and port site infection. In comparison to epigastric port, umbilical port incision after retrieval of large and difficult gall bladder looks cosmetically better, because it easily hides in an umbilical skin crease. At present, there is no definitive guideline for port site incision for GB extraction, in terms of post-operative port site pain. But standard textbooks suggest the umbilical port is preferred site for gall bladder retrieval after Laparoscopic cholecystectomy [14]. The aim and objective of this study are to compare port site pain, infection, and postoperative port site scar after gall bladder retrieval through the epigastric port and umbilical port in adult patients undergoing standard Four-port elective laparoscopic cholecystectomy.

Method

The setting of study: This study was conducted in J.K. Hospital associated with L.N. Medical College Bhopal (M.P.) in patients who underwent standard four-port laparoscopic cholecystectomy with the retrieval of gall bladder by either umbilical or epigastric port.

Duration and Type of study: This prospective study was conducted between January 2019 to December 2019

Sampling method: Consecutive

Sample size calculation: All consecutive patients who underwent standard four-port laparoscopic cholecystectomy were considered for this study. This study is a duration based study; in which 100 patients were included with a one-year duration.

Inclusion criteria: All patients who underwent planned laparoscopic cholecystectomy

Exclusion criteria: All patients with gallbladder malignancy, renal failure, allergic to NSAIDS, acute pancreatitis and complicated cholelithiasis atient not given consent for laparoscopic cholecystectomy

Data collection procedure: The present study included 100 patients who underwent standard elective four-port laparoscopic cholecystectomy for symptomatic, asymptomatic cholelithiasis, and benign gall bladder diseases.

These patients were included in the study and divided into 2 groups. 50 patients, in whom gall bladder was retrieved from the epigastric port, were assigned in Group A and the other 50 patients in whom gall bladder was retrieved from Umbilical port were assigned in Group B. In the present study age, sex, and site of GB retrieval were tabulated in the chart [Table-1]. Pain score, postoperative analgesia, wound infection and postoperative scarring were analyzed for each group. Postoperative pain was calculated as per the visual analog scale (VAS) [Table 2]. Intravenous aqueous diclofenac in a dose of 1.5 mg/kg 8 hourly for 24 hours was given in both the groups as postoperative analgesia. Intravenous Tramadol as additional analgesia in a dose of 1 mg/kg 8 hourly was given in patients with significant pain (VAS 7 or more). Port site pain was assessed in every patient in both groups at 0, 6, 12, and 24 hours post-operatively with a visual analog scale (VAS) ranging from 0 to 10. Wound infection was analyzed in each group [Table 3]. Postoperative check dressing was done on the third postoperative day in each case. Wound infection diagnosed as

Serosanguineous discharge mixed with pus during the dressing. Discharged fluid sent for pus culture for specific antibiotic therapy and treated accordingly. Postoperative scarring after scar maturation was the most common complaint in both the groups. In all patients, prophylactic measures for scar reduction like taping to reduce the skin tension, silicon-based cream massage; silicone gel sheets application, and sunlight protection of scar were advised for 6 months. Each patient asked for the cosmetic appearance of the resultant scar in the follow up of 6 months. Patients answered as "yes" for the better cosmetic appearance and "no" for the unsightly scar. [Table 4]

Scoring system: VAS scoring for postoperative pain assessment

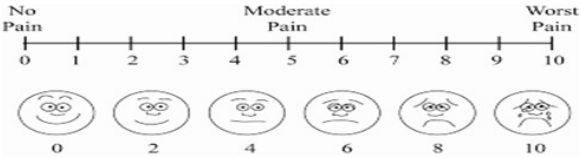

Fig-1: VAS scoring for postoperative pain assessment.

Surgical procedure: In the present study, each patient had been operated in the supine position with a steep head-up and left tilt. Four ports were used: 1. one 10 mm camera port, 2. one 5mm 3.one 10mm dissecting port, and 4.Assisting port5.0mm. The optical camera port was placed at or near the umbilicus and routinely a 30-degree laparoscope was used.

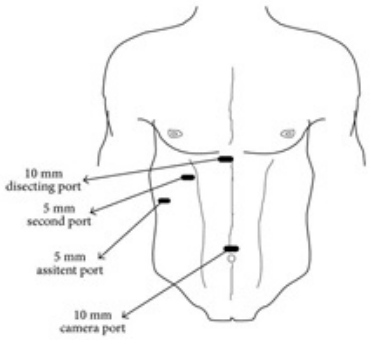

Fig-2: Surgical Procedure.

After positioning the four ports, the fundus of the gallbladder was retracted upwards and over the superior edge of the right lobe of the liver by the assistant. Then sharp dissection of cystic pedicle done with help of scissors attached with electrocautery. The separation of the cystic duct and Cystic artery was performed by Maryland grasper. The cystic artery was clipped and then divided by hook scissors. The dissection of the cystic pedicle was completed by the placement of a clip to occlude the cystic duct at its junction with the gallbladder and divided near the gall bladder. Gallbladder had been separated from the liver bed with the help of scissors or hook with electrocautery. The gallbladder had been extracted either through the epigastric operating port or through the umbilical operating port as per the surgeon's preference. For retrieval, surgical gloves had been used as an endobag for the collection and retrieval of the gall bladder. The fascial defect of a 10 mm port was closed by vicryl "2.0" with a port closure needle, while three 5 mm ports closed by applying sterile small dressing.

Result

Our analysis demonstrated that the mean age of patients was 43.8 years in group A while 43.6 in group B. The male to female ratio overall 1:2 in both groups.

Table-1: Comparison of different baseline variables.

Variables		Group-A	Group-B
No of patients		50	50
Age	Range (years)	22-68	28-72
	Mean age	43.8	43.6
Sex	Male	15 (30%)	16 (32%)
	Female	35 (70%)	34 (68%)

Group-A meanVAS score 4.2 and while in Group-B 3.1, which was significant (P value<0.05)

Table-2: Postoperative pain score after retrieval of the gall bladder through Epigastric port versus Umbilical port.

Variables	Group-A (Epigastric Port)	Group-B (Umbilical Port)
Mean VAS	4.2	3.1 P-Value<0.05

Post-operative wound infection in group A was 2% while in group B 4%, in Group A 86 % of patients are not satisfied with the port site scar and 90% of patients in group B are satisfactory to the port site scar. It indicates that the umbilical port is superior tothe epigastric port in terms of cosmoses. This study thus indicates that in laparoscopic cholecystectomy, gall bladder retrieval through the umbilical port is a better alternative to gall bladder retrieval via an epigastric port in terms of postoperative pain; port site wound infection and port sitethe cosmetic appearance ofa scar, which is better and satisfactory in umbilical port than

Epigastric port.

Table-3:Port site infection after retrieval of the gall bladder through Epigastric port versus umbilical port.

Variables	Group-A (Epigastric Port)	Group-B (Umbilical Port)
Port site infection	1 (2%)	2 (4)%

Table-4: Postoperative cosmetic appearance of scarring after retrieval ofthe gall bladder through epigastric port versus umbilical port: the question askedto the patients "Is the cosmetic appearance of the resultant scar issatisfactory or not"

Variables		Group-A (Epigastric Port)	Group-B (Umbilical Port)
Postoperative Scarring	Yes	7 (14%)	45 (90%)
	No	43 (86%)	5 (10%)

Discussion

Laparoscopic cholecystectomy is the procedure of choice for the majority of patients with gallbladder disease. Gallstones are the most common biliary pathology. It is estimated that gallstones affect 10–15% of the population in Western societies. They are asymptomatic in the majority of cases (>80%). In the UK, the prevalence of gallstones at the time of death is estimated to be 17% and may be increasing. Approximately 1–2% of asymptomatic patients will develop symptoms requiring surgery [14]. The extraction of the gallbladder in laparoscopic cholecystectomy is a time taking part in this procedure. Although several techniques and methods are suggested to facilitate the retrieval of gall-bladder safely, problems occurring during retrieval have not been completely remedied and generally widening of the port site is required most of the time, this increases the risk of bleeding/hematoma and infection, post-operative pain as well as leaving a cosmetically bad scar mark. Common Indications of cholecystectomy aresymptomatic cholelithiasis,biliary colic, acute cholecystitis, choledocholithiasis, gallstone pancreatitis, cholangitis, or obstructive jaundice, asymptomatic cholelithiasis, acalculous cholecystitis gallbladder dyskinesia, gallbladder polyps >10 mm in diameter, porcelain gallbladder [15]. In the present study, age was evenly distributed in both groups (43.8 years in Group A vs. 43.6 in Group B). These results are similar to the results of Siddiqui et al. (42.5 ± 10.7 vs. 40.6 ± 12.6) and Bashir et al. (47.49 ± 9.4 vs. 46.84 ± 5.60) [16,17]. Age is a well-known risk factor for asymptomatic cholelithiasis and the prevalence of asymptomatic cholelithiasis increased with age in many studies [18]. Increased formation of cholelithiasis with age is suggested to be related to a longer period of exposure to various risk factors for cholelithiasis and gallbladder dysmotility secondary to sedentary activity in old age [19,20]. There was the predominance of the female population in this study (70% in the group- A and 68% in the group- B) comparable to the series by Shakya et al. (75% female)[21], Siddiqui et al. (76% female)[16], Bashir et al. (56% female)[17] and Ahmad et al. (60% female)[22]. This predominance of females is due to the increased incidence of cholelithiasis in India and worldwide. Female sex is an important risk factor for asymptomatic cholelithiasis, and most previous studies reported a higher prevalence of asymptomatic cholelithiasis in females than males [23]. In the present study, females showed a significantly higher prevalence of asymptomatic cholelithiasis than males. This increased risk of cholelithiasis in females is related to the estrogen effect, pregnancy, use of oral contraceptives, or hormonal replacement therapy [24,25]. Three types of pain have been proposed i.e. visceral, parietal, and shoulder tip pain, with different intensity and time courses. Visceral and parietal pain being the most important during the first 24-48 h after surgery [10]. The main sources of pain are incision sites within the abdominal wall. The pneumoperitoneum in association with both local (peritoneal and diaphragmatic stretching, acidosis and ischemia) and systemic (hypercarbia causing sympathetic nervous system excitation with amplification of local tissue inflammatory response) changes; and the post-cholecystectomy wound within the liver (visceral pain) are the causes of pain. The largest component (50-70%) arises from incisional sites, followed by the pneumoperitoneum (20-30%) and ‘‘cholecystectomy wound’’ (10-20%) [25]. Despite exhaustive literature search, no local or international guidelines were available which has primarily compared the difference in port site pain in between two groups. According to the VAS score, it ranges from 0-10with 10 being the worst pain. In the present study, post-operative pain, in terms of mean VAS was 4.2 in Group-A while 3.1 in Group-B. The high score of postoperative pain in group A due to stretching of tough muscles and incision site pain. The result is significant with the umbilical port being the better port for extraction in terms of pain in the present study. This is in support of the results by Siddique et al who considered umbilical port to be the better port in terms of VAS [16]. In their

Randomized control trial of 120 patients, patients were randomized to either group A (n = 60, GB retrieval through epigastric/subxiphoid port) or group B (n = 60, GB retrieval through the umbilical port). [16] VAS for pain was assessed at 1, 6, 12, 24, and 36 h after surgery. The VAS for pain at the umbilical port was less than the subxiphoid port at 6, 12, 24 and 36 hr after surgery (5.9±1.1 versus 4.1±1.5, 4.6±0.94 versus 3.5±1.05, 3.9±0.85 versus 2.4±0.79, 3.05±0.87 versus 2.15±0.87, respectively) and the difference was statistically significant (p-value < 0.001) [16]. The result of the present study is contrary to the study of Bashir et al. [17] and Ahmad etal[22], they recommended both umbilical and subxiphoid ports to be equally effective for gallbladder extraction in terms of postoperative pain. The study has evaluated only right-handed surgeon, the scenario may be different for left-handed surgeons. No surgical wound is completely immune to infections. Despite the advances in the fields of antimicrobial agents, sterilization techniques, surgical techniques, and operating room ventilation, port site infection still prevail. The incidence of surgical site infection after elective laparoscopic cholecystectomy is less than that after open elective cholecystectomy due to shorter length of incision [25]. The technique of primary port entry to the peritoneum does not show any difference in umbilical port site infection in patients undergoing laparoscopic cholecystectomy [26]. The umbilical port site infection rate in laparoscopic surgery has been reported to be 8% with 89% of the infections occurring after laparoscopic cholecystectomy [27]. Probably umbilical port is the most commonly affected port due to the huge load of local microbes harboring in the umbilicus which was not removed properly by antiseptic cleaning. However using an endobag or extraction could be helpful in preventing PSI further, which was shown in one study that had a higher incidence of PSI when the endobag was not used (5.28%) compared to when endobag was used (0.2%) [28]. Laparoscopic cholecystectomy is associated with greater chances of intra-abdominal stone spillage and implantation as well as port-site contamination during retrieval of gall-bladder specimen (Ali and Siddiqui 2013) [29]. Reported incidence of gall-bladder spillage varies from 6% to 30% (Kang 2003; Kumar 2004). Ali and Siddiqui (2013) and Helme et al. (2009) stated that the best way to avoid complications of spilled gallstones and port site contamination is to use an endobag [30]. In the present study, 4% of our patients of Group-B developed umbilical port infection despite using an Endobag, possibly due to contamination of the outer surface of endobag, while the epigastric port-site infection is only 2% in group-A patients. Memon et al. (2013) also reported 5% umbilical port sepsis in patients with acutely inflamed gall-bladder specimen despite using endobag for its retrieval [31]. Scarless surgery is the Holy Grail of surgery [32]. One of the advantages of laparoscopic surgery is minimal scars over the abdomen, although it may be obvious in cases when the incision is extended for retrieving the gall bladder in difficult cases. In some of the patients, scars turn into hypertrophic scar or keloid which may be troublesome for patients in terms of cosmesis and other scar related complications. Hypertrophic scar and keloid are fairly common complications of abdominal wounds after surgeries [33], post-operative port site scar depends on tissue trauma and port site infection. Inthe present study, on follow up after 6 months of the postoperative period, the port site cosmetic appearance of the scar was reviewed. Only 1 patient developed keloid over the port site in group B and 2 patients with the hypertrophic scar in group A. These patients were treated according to standard scar reduction protocol. At follow up, all these patients were asked the question "Is the cosmetic appearance of the resultant scar is satisfactory or not". The result analyzed in terms of yes/no. In group A, 14 % of patients were satisfied and in group B, 90% of patients were satisfied with their port site scar. It indicates that the umbilical port is superior and better than the epigastric port in terms of cosmetics as the scar is hidden in the umbilical crease. The main weakness of the present study is that it is a very small series with relatively short follow-up. These patients warrant longer follow up in a larger series for establishing the umbilical site as a better port site for gall bladder retrieval.

Conclusion

This study thus indicates that in laparoscopic cholecystectomy, gall bladder retrieval through the umbilical port is a better alternative to gall bladder retrieval via an epigastric port in terms of post-operative pain and postoperative appearance of scar mark. Postoperative port site wound infection is low in epigastric port as compare to umbilical port.

What this study adds to existing knowledge?

This is a study of its kind describing postoperative pain, port site infection, and port site scar in gall

Bladder retrieval through the umbilical and epigastric port in laparoscopic cholecystectomy. There is no such study in the literature described previously and will provide information to improve the medical literature in port site selection for gall bladder retrieval.

Author's Contribution

Dr. Tarun Sainia: Formulated the aims and objectives with study design. **Dr. Vinay Kumar Golandaj:** Contributed to the preparation of the manuscript and data collection and analysis. **Dr. Vikas Kumar Malviya:** Supervised and guided for study

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