



RIGHT INFRAUMBILICAL VERSUS LEFT INFRA /SUPRAUMBILICAL ACCESS FOR CREATING OPEN PNEUMOPERITONEUM IN LAPAROSCOPIC CHOLECYSTECTOMY: A PROSPECTIVE COMPARATIVE STUDY

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ABSTRACT

Introduction: Laparoscopic cholecystectomy is the standard treatment for symptomatic gallstone disease, and creation of pneumoperitoneum is a critical step for providing adequate intra-abdominal visualization and instrument manoeuvrability. The open technique is widely used for controlled peritoneal entry. However, comparative data regarding the simplest and most effective site for first-port creation by the open technique remain limited. The present study compared different first-port sites during laparoscopic cholecystectomy.

Objectives: To determine the simplest and most effective site for creation of the first port and pneumoperitoneum by the open technique during laparoscopic cholecystectomy, and to compare the approaches with respect to duration of port creation, surgeon position, complications, hospital stay and postoperative recovery.

Methodology: This prospective comparative study was conducted among 100 patients undergoing laparoscopic cholecystectomy. The study compared open first-port placement using the infraumbilical and supraumbilical approaches, with assessment of the right- and left-sided approaches as described in the study protocol. Demographic characteristics, surgeon position, duration of first-port creation, duration of hospital stay, port-site infection, port-site hernia, bowel injury, biliary tree injury and days to resumption of normal activity were recorded. Statistical analysis was performed using chi-square testing, with $p < 0.05$ considered statistically significant.

Results: The mean age of the study population was 51.92 ± 9.85 years, with 52% of patients belonging to the 51–60-year age group and 61% being female. There was no significant association between age and first-port site ($p = 0.673$), and sex was similarly not significantly associated with port-site selection. A significant association was observed between the side of the surgeon and the first-port site ($p < 0.001$). Duration of first-port creation was also significantly associated with port-site selection ($p < 0.001$); 29 patients in the infraumbilical group achieved first-port creation within 2 minutes compared with none in the supraumbilical group. Duration of hospital stay was significantly associated with port-site selection ($\chi^2 = 11.408$, $p = 0.001$), with longer hospital stay observed in the supraumbilical group. No significant association was found between first-port site and port-site infection ($p = 0.081$), port-site hernia ($p = 0.400$), or time to resumption of normal activity ($p > 0.05$). No bowel or biliary tree injury was documented.

Conclusion: The right-sided infraumbilical approach was the simplest and most efficient approach for routine creation of the first port by the open technique in the present study. It was associated with shorter access time and fewer technical difficulties, while postoperative complications and functional recovery were broadly comparable between the approaches. Left-sided infra-/supraumbilical access may be reserved for selected patients in whom conventional midline access is less suitable, particularly those with previous abdominal procedures or altered anatomy.

Keywords: Laparoscopic Cholecystectomy, Pneumoperitoneum, Open Technique, Hasson Technique, First-Port Placement, Infraumbilical Port, Supraumbilical Port.



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INTRODUCTION

Laparoscopic cholecystectomy has become the standard surgical treatment for symptomatic gallstone disease and offers several advantages over open cholecystectomy, including less postoperative pain, shorter hospital stay, and faster recovery. A crucial initial step in laparoscopic surgery is the creation of pneumoperitoneum, which provides adequate intra-abdominal working space, facilitates

visualization, and permits appropriate manoeuvrability of laparoscopic instruments. In laparoscopic cholecystectomy, therefore, safe and efficient establishment of pneumoperitoneum is an important component of the procedure.

Several techniques have been described for obtaining access to the peritoneal cavity and establishing pneumoperitoneum. The conventional closed technique involves blind insertion of a Veress needle followed by insertion of the first trocar, whereas the open technique described by Hasson involves direct access to the peritoneal cavity under vision and insertion of a blunt trocar. Other methods described in the literature include direct trocar insertion and optical trocar techniques. The choice of entry technique remains important because vascular or visceral injury may occur during the initial access to the abdominal cavity.

The safety of open access has been evaluated in comparison with blind entry. Bonjer et al., in their study comparing open and closed establishment of pneumoperitoneum, reported vascular and visceral injury rates of 0.075% and 0.083%, respectively, following closed laparoscopy, compared with 0.048% and 0% following open laparoscopy. Their analysis demonstrated a statistically significant difference in visceral and vascular injuries between the two techniques and concluded that open establishment of pneumoperitoneum could provide a safer alternative to the closed technique.¹

Similarly, Sigman et al. compared blind Veress needle access with open celiotomy for laparoscopic surgery. In their study, three small intestinal injuries and one left common iliac artery injury occurred in the blind-access group, whereas no vascular or intestinal injuries were reported in the open-access group. Although the difference in these injuries was not statistically significant, the authors emphasized that blind access may expose patients to the risk of undetected visceral or vascular injury.²

The open technique has also been compared with other approaches with respect to procedural simplicity and complications. Vaishnani et al. conducted a comparative study of open and closed pneumoperitoneum creation and evaluated the applicability, performance simplicity, duration of pneumoperitoneum creation, and frequency of complications. Their study included 100 patients, with 50 undergoing each technique. The authors reported a shorter duration for producing pneumoperitoneum with the open technique, although minor complications such as multiple attempts, gas leakage at the port site, and port-site haemorrhage were observed more frequently.³

The duration and technical ease of entry have also been evaluated for direct trocar insertion and Veress needle entry. Zakherah et al. compared these approaches in 1,000 patients undergoing diagnostic

laparoscopy. Direct trocar entry was associated with a significantly shorter procedure duration and lower gas consumption, while no significant major complications were observed in either group. Minor complications were also less frequent with direct trocar entry.⁴ These findings support the importance of considering not only safety but also simplicity and efficiency when selecting a method for establishing pneumoperitoneum.

Evidence-based assessment of laparoscopic entry techniques has similarly emphasized the importance of evaluating abdominal access as a distinct technical step. Bessoiff et al., in a systematic review of evidence-based surgery for laparoscopic appendectomy, considered abdominal entry and laparoscopic port placement among the principal operative steps requiring evaluation. Their review reported that direct trocar insertion was preferred for abdominal entry and pneumoperitoneum establishment, although the available evidence was of low quality.⁵ Reviews of laparoscopic entry have also considered the various techniques, technologies and complications associated with establishing access to the peritoneal cavity.⁶ The European Association for Endoscopic Surgery clinical practice guideline similarly addressed pneumoperitoneum and laparoscopic entry as important components of laparoscopic surgery.⁷

In laparoscopic cholecystectomy, the site selected for the first port may additionally influence the technical ease of access and the surgeon's ergonomics. The conventional first-port placement in the study protocol was an infraumbilical approach, while alternative left-sided infra- or supraumbilical positions have also been described. The thesis identified a lack of strong comparative data directly assessing the simplicity, safety and effectiveness of right- versus left-sided approaches for open pneumoperitoneum creation.

The anatomical characteristics of the umbilical region are also relevant to first-port placement. The umbilical ring represents an important anatomical landmark where the layers of the abdominal wall converge. The thesis describes the presence of the umbilical fascia, peritoneum, round ligament and other umbilical remnants, with variations in the extent and configuration of the umbilical fascia. Such anatomical variations may influence access to the peritoneal cavity and may also be associated with weaknesses of the umbilical region.

Although the open technique is generally considered useful for controlled peritoneal entry, the evidence regarding whether a particular port location is simpler or safer remains less definitive. Agarwal et al. specifically compared closed and open methods of creating pneumoperitoneum in laparoscopic cholecystectomy, while Shindholimath et al. examined factors influencing wound infection

following laparoscopic cholecystectomy.^{8,9} Furthermore, Chapron et al. reported that open laparoscopy did not necessarily eliminate the risk of major complications during the setup procedures for laparoscopy.¹⁰

Thus, the question is not only whether pneumoperitoneum can be established safely, but also which open first-port location permits the simplest, quickest and most practical access while maintaining acceptable postoperative outcomes and complication rates. The present prospective comparative study was undertaken to address this issue by evaluating different open first-port approaches used during laparoscopic cholecystectomy, with particular emphasis on the right-sided infraumbilical approach and the left-sided infra- and supraumbilical approaches. The study assessed the time required for first-port creation, technical ease and accessibility, complications, and postoperative outcomes in order to identify the simplest and most effective approach for establishing pneumoperitoneum.

MATERIALS AND METHODS

This hospital-based comparative study was conducted in the Department of General Surgery, Calcutta National Medical College and Hospital, Kolkata, over a period of one year, following approval from the Institutional Ethics Committee. The study was undertaken to compare different approaches for creation of pneumoperitoneum by the open technique during elective laparoscopic cholecystectomy, with particular emphasis on the site and side of first-port placement. The study design was recorded in the thesis as a cross-sectional comparative study. The study population comprised patients admitted to the inpatient department and patients attending the outpatient department who were diagnosed with gallstone disease or other gallbladder-related conditions requiring elective laparoscopic cholecystectomy and who fulfilled the predefined selection criteria. A total of approximately 100 patients were included in the study. The final master data consisted of 50 patients in whom the first port was created at the right-sided infraumbilical site and 50 patients in whom the first port was created at the left-sided supraumbilical site. The side of the surgeon with respect to the patient was also recorded as part of the operative assessment.

Patients aged 18–65 years were eligible for inclusion. Patients diagnosed with gallstone disease or other gallbladder-related conditions requiring laparoscopic cholecystectomy were considered, and only elective laparoscopic cholecystectomy procedures were included. Patients with American Society of Anesthesiologists (ASA) physical status I or II and a body mass index (BMI) between 18 and

30 kg/m² were included. Patients with no previous major abdominal surgery likely to have resulted in significant adhesions and those who provided written informed consent were eligible for participation. Exclusion criteria included previous major abdominal surgery, particularly involving the umbilical or periumbilical region; umbilical or ventral hernia and other abdominal wall abnormalities; BMI greater than 30 kg/m²; ASA physical status III or higher; uncontrolled diabetes mellitus or hypertension; significant cardiac or respiratory disease; pregnancy; emergency laparoscopic cholecystectomy; coagulopathy or anticoagulant therapy that could not be safely discontinued; age below 18 or above 65 years; refusal to provide informed consent; and cases in which conversion to open surgery was anticipated before port placement.

The open technique for creation of the first port was performed under the operative protocol described in the thesis. For infraumbilical access, the patient was positioned supine with the arms tucked and the abdomen was prepared and draped. The umbilicus was lifted and a transverse incision was made approximately two fingerbreadths below the umbilicus. Subcutaneous tissue was dissected to expose the appropriate fascial plane, and the presence of preperitoneal fat was used as an indicator of correct entry. An artery forceps was introduced towards the left shoulder to gently dilate the fascial defect, following which a blunt trocar was inserted at approximately 90 degrees for controlled entry into the peritoneal cavity. The same basic technique was used for the left-sided infraumbilical approach when applicable. The thesis also described the supraumbilical technique, in which a 1.5–2 cm transverse or vertical incision was made approximately 1–2 cm above the umbilicus, followed by blunt dissection to expose the linea alba and facilitate peritoneal entry.

After successful peritoneal entry, a blunt trocar/cannula was positioned and carbon dioxide insufflation was initiated to establish pneumoperitoneum. In the standard open technique described in the thesis, CO₂ insufflation was started at a low pressure of approximately 10–12 mmHg, after which pneumoperitoneum was confirmed and the laparoscope was introduced. The remaining ports were subsequently placed under direct vision. The operative record documented the site of the first port, duration required for creation of the first port and pneumoperitoneum, and the number of attempts required. Intraoperative complications, including bowel injury, vascular injury and gas leakage, were also recorded.

Patient-related variables recorded included age, sex, BMI and relevant medical history. Postoperative assessment included pain evaluation, wound

infection, subcutaneous emphysema, port-site hernia and other port-site complications. Duration of hospital stay, wound healing, recovery and days required to resume normal activity were documented during follow-up. The surgeon's experience regarding ease, comfort and ergonomic advantages or disadvantages associated with the port site was also considered. A stopwatch or timer was used to record the duration required for creation of the first port.

Data were tabulated and categorical variables were compared according to the site and side of first-port placement. Associations between the first-port site and variables such as age, sex, surgeon position, duration of first-port creation, duration of hospital stay, port-site infection, port-site hernia and time to resumption of normal activity were assessed using the chi-square test. Statistical significance was

considered at a two-sided p-value of <0.05. The final analysis included 100 patients, with 50 patients in each of the two recorded first-port groups.

RESULTS

A total of 100 patients undergoing elective laparoscopic cholecystectomy were included in the final analysis, with 50 patients undergoing first-port creation through the right-sided infraumbilical approach and 50 through the left-sided supraumbilical approach, as recorded in the master data sheet.

The overall mean age of the study population was 51.92 ± 9.85 years. The largest proportion of patients belonged to the 51–60-year age group (42%), followed by 41–50 years (22%), >60 years (20%) and <40 years (15%). Females constituted 61% of the study population, while males constituted 39%.

Table 1. Baseline demographic characteristics of patients according to first-port site

Characteristic	Right infraumbilical approach (n=50)	Left supraumbilical approach (n=50)	Total (N=100)	P value
Age (years), mean $\pm$ SD	53.06 $\pm$ 9.61	50.78 $\pm$ 10.05	51.92 $\pm$ 9.85	0.249*
Age group, n (%)				0.673†
<40 years	6 (12.0)	9 (18.0)	15 (15.0)	
41–50 years	10 (20.0)	10 (20.0)	20 (20.0)	
51–60 years	19 (38.0)	20 (40.0)	39 (39.0)	
>60 years	15 (30.0)	11 (22.0)	26 (26.0)	
Sex, n (%)				0.838†
Male	20 (40.0)	19 (38.0)	39 (39.0)	
Female	30 (60.0)	31 (62.0)	61 (61.0)	

*Independent-samples t-test; †Chi-square test.

There was no statistically significant difference in age between the two groups. The distribution of age categories was also comparable between the two approaches ($\chi^2=1.539$, $p=0.673$). Similarly, sex

distribution did not differ significantly between the two groups ($\chi^2=0.042$, $p=0.838$). Thus, the two groups were broadly comparable with respect to baseline age and sex characteristics.

Table 2. Duration required for creation of the first port according to approach

Duration of first-port creation	Right infraumbilical approach (n=50)	Left supraumbilical approach (n=50)	Total (N=100)	P value
<2 minutes, n (%)	29 (58.0)	0 (0.0)	29 (29.0)	
≥ 2 minutes, n (%)	21 (42.0)	50 (100.0)	71 (71.0)	
Mean duration, minutes $\pm$ SD	1.98 $\pm$ 0.25	3.17 $\pm$ 0.27	2.58 $\pm$ 0.64	<0.001*

*Independent-samples t-test for mean duration; categorical comparison in the thesis: $\chi^2=40.845$, $p<0.001$.

The duration required to create the first port was substantially shorter with the right infraumbilical approach. The mean duration was 1.98 ± 0.25 minutes in the right infraumbilical group compared with 3.17 ± 0.27 minutes in the left supraumbilical group. The difference was statistically highly significant ($p<0.001$). In the right infraumbilical group, 29 patients (58%) had first-port creation

completed within 2 minutes, whereas none of the patients in the left supraumbilical group achieved port creation within 2 minutes. Conversely, all 50 patients (100%) in the left supraumbilical group required ≥ 2 minutes. The thesis reported a significant association between duration of first-port creation and port site ($\chi^2=40.845$, $p<0.001$).

Table 3. Duration of hospital stay according to first-port site

Duration of hospital stay	Right infraumbilical approach (n=50)	Left supraumbilical approach (n=50)	Total (N=100)	P value
<4 days, n (%)	25 (50.0)	9 (18.0)	34 (34.0)	
≥4 days, n (%)	25 (50.0)	41 (82.0)	66 (66.0)	
Mean hospital stay, days ± SD	3.56 ± 0.61	4.30 ± 1.02	3.93 ± 0.88	<0.001*

*Independent-samples t-test; categorical comparison reported in thesis: $\chi^2=11.408$, $p=0.001$.

Hospital stay was shorter among patients undergoing the right infraumbilical approach. Half of the patients in the right infraumbilical group were discharged within 4 days, compared with only 18% in the left supraumbilical group. Conversely, 82% of patients in the left supraumbilical group required ≥4 days of hospital stay compared with 50% in the right

infraumbilical group. The mean hospital stay was 3.56 ± 0.61 days for the right infraumbilical approach and 4.30 ± 1.02 days for the left supraumbilical approach. The difference was statistically significant; the thesis reported $\chi^2=11.408$ with $p=0.001$ for the categorical comparison.

Table 4. Port-site complications according to first-port site

Complication	Right infraumbilical approach (n=50)	Left supraumbilical approach (n=50)	Total (N=100)	P value
Port-site infection				0.081
No	48 (96.0)	43 (86.0)	91 (91.0)	
Yes	2 (4.0)	7 (14.0)	9 (9.0)	
Port-site hernia				0.400
No	48 (96.0)	46 (92.0)	94 (94.0)	
Yes	2 (4.0)	4 (8.0)	6 (6.0)	

There were no recorded bowel injuries or injuries to the biliary tree in either group. Port-site infection occurred in 2 patients (4%) in the right infraumbilical group and 7 patients (14%) in the left supraumbilical group. Although infection was numerically more frequent following the left supraumbilical approach, the difference was not statistically significant ($\chi^2=3.053$, $p=0.081$).

Port-site hernia was observed in 2 patients (4%) in the right infraumbilical group and 4 patients (8%) in the left supraumbilical group. The difference was not statistically significant ($\chi^2=0.709$, $p=0.400$). Thus, although minor port-site complications were numerically more frequent in the left supraumbilical group, no statistically significant difference was demonstrated.

Table 5. Postoperative recovery according to first-port site

Postoperative outcome	Right infraumbilical approach (n=50)	Left supraumbilical approach (n=50)	Total (N=100)	P value
Days to resumption of normal activity				0.338
<10 days, n (%)	46 (92.0)	43 (86.0)	89 (89.0)	
≥10 days, n (%)	4 (8.0)	7 (14.0)	11 (11.0)	
Mean days to normal activity ± SD	8.42 ± 1.70	8.26 ± 1.77	8.34 ± 1.73	0.654*

*Independent-samples t-test; categorical comparison reported in thesis: $\chi^2=0.919$, $p=0.338$.

Most patients resumed normal activities within 10 days in both groups. In the right infraumbilical group, 46 patients (92%) resumed normal activities within 10 days, compared with 43 patients (86%) in the left supraumbilical group. The proportion requiring ≥10 days was 8% and 14%, respectively. The difference was not statistically significant ($\chi^2=0.919$, $p=0.338$).

Creation of pneumoperitoneum and establishment of the first port represent a critical step in laparoscopic cholecystectomy, as complications related to abdominal entry may occur before the actual operative procedure begins. The present prospective comparative study was undertaken to identify the simplest and most effective approach for creating pneumoperitoneum by the open technique. In the final analyzed dataset, 100 patients were included, with 50 patients undergoing right-sided

DISCUSSION

infraumbilical first-port placement and 50 patients undergoing left-sided supraumbilical first-port placement. The major parameters evaluated were surgeon position, duration of first-port creation, duration of hospital stay, port-site infection, port-site hernia and time to resumption of normal activity.

The demographic characteristics of the study population showed a mean age of 51.92 ± 9.85 years, with the largest proportion of patients belonging to the 51–60-year age group and females comprising 61% of the study population. There was no statistically significant association between age and the site of the first port ($p=0.673$), and sex also did not show a significant association with the selected port site. The absence of a significant difference in these baseline characteristics indicates that the observed differences in procedural parameters were unlikely to be explained simply by variation in age or sex distribution between the groups.

The safety of primary laparoscopic access has been an important subject of discussion since the introduction of minimally invasive surgery. Bonjer et al.¹, in their comparison of open and closed establishment of pneumoperitoneum, reported lower rates of vascular and visceral injury with open laparoscopy compared with closed access. In their analysis, vascular and visceral injury rates were 0.075% and 0.083%, respectively, with closed laparoscopy, compared with 0.048% and 0% following open laparoscopy. The authors therefore suggested that open establishment of pneumoperitoneum could provide a safer alternative to blind entry. Similarly, Sigman et al.² reported three small intestinal injuries and one left common iliac artery injury following blind access, whereas no vascular or intestinal injury occurred in the open-access group. Although the difference in complications was not statistically significant, their findings highlighted the potential risk associated with blind access.

The present study supports the practical value of the open technique because no bowel injury or injury to the biliary tree was documented in the analyzed patients. The thesis also specifically considered intestinal and vascular injury, gas leakage and other access-related complications as important safety outcomes. These findings are reassuring, although the relatively small sample size means that the study cannot adequately assess very uncommon major vascular or visceral injuries.

A particularly important finding of the present study was the significant association between the side of the surgeon and the site of the first port ($p<0.001$). This finding emphasizes the role of surgical ergonomics and familiarity with the access route. The thesis identified surgeon comfort, positioning and ease of access as important components of the comparison. The conventional infraumbilical route

is anatomically familiar to most surgeons and lies close to the midline, making identification of the relevant fascial planes relatively straightforward. The thesis conclusion similarly noted that familiarity with the infraumbilical anatomy and its proximity to the midline made this approach easier for most surgeons.

The duration required for creation of the first port was significantly associated with the site of access ($\chi^2=40.845$, $p<0.001$). In the infraumbilical group, 29 of 50 patients had first-port creation completed in less than 2 minutes, while 21 required 2 minutes or more. In contrast, all 50 patients in the supraumbilical group required 2 minutes or more. Thus, the right infraumbilical approach demonstrated a clear advantage in terms of speed of access in the present study. This finding is relevant because even though the absolute duration of primary access is short, a simpler and faster entry technique may improve procedural efficiency and reduce repeated manipulation during the initial stage of laparoscopy.

The findings are comparable in principle with studies examining other methods of primary laparoscopic entry. Zakherah⁴, in a randomized clinical trial involving 1,000 patients, reported a significantly shorter mean procedure duration with direct trocar entry compared with Veress needle entry, with fewer minor complications in the direct trocar group. Similarly, Prieto-Díaz-Chávez et al.¹⁵ reported shorter laparoscope insertion time and fewer complications with direct trocar insertion compared with Veress needle entry. Yerdel et al.¹⁴ also compared direct trocar insertion with Veress needle insertion during laparoscopic cholecystectomy. Although these studies evaluated different entry techniques from the present investigation, their results support the broader observation that technical simplicity and rapid establishment of abdominal access are important considerations in laparoscopic surgery.

Vaishnani et al.³ compared open and closed techniques for creation of pneumoperitoneum and reported that the open technique required less time for establishing pneumoperitoneum, although minor problems such as multiple attempts, gas leakage and port-site haemorrhage were more frequent. They nevertheless concluded that the open technique was an effective alternative to the closed method. Chotai et al.¹² and Jamil et al.¹³ similarly evaluated open and closed approaches for establishing pneumoperitoneum. These studies provide additional support for the continued use of open access where the surgeon considers controlled entry preferable.

The present study also demonstrated a statistically significant association between the site of first-port placement and duration of hospital stay. The chi-

square value was 11.408, with $p=0.001$. In the infraumbilical group, 25 patients stayed for less than 4 days and 25 stayed for 4 days or more, whereas in the supraumbilical group, 9 patients stayed for less than 4 days and 41 required 4 days or more. Therefore, prolonged hospital stay was more frequently observed in the supraumbilical group. The thesis similarly described a longer hospital stay with the supraumbilical approach. However, this finding should be interpreted cautiously because hospital stay may be influenced by several perioperative and patient-related factors, and the present study was primarily designed to evaluate the technical aspects of first-port creation.

Port-site infection was another important postoperative outcome. In the present study, port-site infection was recorded in 4 patients overall, with 2 cases occurring in the infraumbilical group and 4 cases in the supraumbilical group according to the reported cross-tabulation. The difference was not statistically significant ($\chi^2=3.053$, $p=0.081$). Thus, although infection was numerically more frequent in the supraumbilical group, the study does not demonstrate a statistically significant relationship between first-port site and port-site infection. Shindholimath et al.⁹ specifically evaluated factors influencing wound infection after laparoscopic cholecystectomy, emphasizing that postoperative wound infection is influenced by multiple factors rather than simply the location of a laparoscopic port.

Port-site hernia also did not demonstrate a significant association with the site of the first port. The reported chi-square value was 0.709 and the p -value was 0.400. This is consistent with the discussion in the thesis, which reported no significant relationship between port-site hernia and the first-port site. The absence of a significant difference suggests that, within the limitations of the present sample, neither approach demonstrated a clear advantage with respect to this late port-site complication. Krishnakumar and Tambe¹⁹ emphasized that entry-related complications can occur at different stages of laparoscopic access and that appropriate attention to technique remains essential.

With respect to functional recovery, the majority of patients in both groups resumed normal activities within 10 days. The association between first-port site and time to resumption of normal activity was not statistically significant. This finding is consistent with Sigman et al.², who similarly reported no significant difference in postoperative recovery and return to normal activity between blind and open access groups. Therefore, although the infraumbilical approach demonstrated an advantage in the speed of initial access and was associated with shorter hospital stay in the present dataset, this did

not translate into a statistically demonstrable difference in subsequent functional recovery.

The overall findings indicate that the right infraumbilical open approach was technically simpler and faster for routine first-port creation in the present study. The thesis attributed this advantage to greater surgeon familiarity, the regular anatomical features of the infraumbilical region and its proximity to the midline. At the same time, the thesis recognized that alternative left-sided infra-/supraumbilical access may have a role in selected patients, particularly those with previous abdominal procedures or midline scars where avoiding potentially adherent midline structures may be advantageous. Thus, the findings should not be interpreted as suggesting that one access site is appropriate for every patient.

The present observations are also consistent with the broader recommendations concerning individualized laparoscopic entry. Vilos et al.²² emphasized the importance of considering different entry techniques and their associated complications, while Varma and Gupta¹⁷ highlighted the technical, clinical and medicolegal importance of appropriate laparoscopic entry. Neudecker et al.⁷ similarly addressed pneumoperitoneum as a key component of laparoscopic surgery. The present study adds to this body of evidence by focusing specifically on the anatomical location of the first port when the open technique is used.

The study has some limitations. It was conducted in a single centre with a relatively small sample of 100 patients, limiting the ability to detect differences in uncommon major complications. In addition, surgeon experience, individual ergonomic preference and patient-specific anatomical characteristics may influence the duration and ease of port creation. The observed association between port site and hospital stay may also be affected by factors not specifically controlled for in the present analysis. Larger multicentric studies with standardized operative protocols and stratification according to BMI, previous abdominal surgery, surgeon experience and abdominal wall anatomy would help to validate these findings.

In conclusion, the present study demonstrates that the site of first-port placement has a significant influence on the technical duration of open access and is also associated with surgeon positioning and duration of hospital stay. The right infraumbilical approach was faster and technically simpler in the present study, while port-site infection, port-site hernia and return to normal activity did not show statistically significant differences between the approaches. The findings therefore support the right infraumbilical open route as a simple and practical approach for routine laparoscopic cholecystectomy, while alternative left-sided access may remain

useful in selected patients where conventional midline access is less suitable. This approach is in keeping with the thesis conclusion that the infraumbilical route was generally quicker, simpler and associated with fewer technical difficulties, while alternative access could be reserved for selected anatomical or surgical circumstances.

CONCLUSION

The present prospective comparative study evaluated different sites for creation of the first port by the open technique during laparoscopic cholecystectomy. Among the 100 patients studied, the right-sided infraumbilical approach demonstrated significant advantages in terms of technical simplicity and speed of first-port creation. The duration required for creation of the first port was significantly shorter with the infraumbilical approach compared with the left-sided supraumbilical approach ($p < 0.001$). Surgeon position was also significantly associated with the selected first-port site ($p < 0.001$), highlighting the importance of ergonomics and familiarity with the access route. The infraumbilical approach was additionally associated with a significantly shorter duration of hospital stay ($p = 0.001$). However, no statistically significant association was demonstrated between first-port site and port-site infection, port-site hernia, or time to resumption of normal activity. No bowel injury or injury to the biliary tree was documented. Overall, the right infraumbilical open approach appeared to be the simplest and most efficient method for routine creation of pneumoperitoneum in laparoscopic cholecystectomy within the study population.

Recommendations

The right-sided infraumbilical open approach may be preferred for routine first-port creation during elective laparoscopic cholecystectomy because of its shorter access time and technical familiarity. Alternative left-sided infra-/supraumbilical access may be considered in selected patients where conventional midline access is less suitable, particularly in the presence of previous abdominal procedures or altered anatomy. The choice of entry site should be individualized according to patient anatomy, previous surgical history, surgeon experience and ergonomic considerations. Larger prospective multicentric studies are recommended to validate these findings and to adequately assess uncommon major vascular and visceral entry-related complications.

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