Original Article

Port-Site Hernia: A serious complication of laparoscopy

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ABSTRACT
Objective
To evaluate the frequency, risk factors and prevention, i.e., port closure technique of port site incisional hernia following laparoscopic surgery.

Patients and Methods
This is a prospective descriptive study, conducted at Ghulam Muhammad Mahar Medical College Hospital and Hira Medical Center Sukkur, during a period of last four and half years from Jan 2006 to June 2010. It included 1492 patients who underwent laparoscopic surgery for different indications. The umbilical port was closed by the classical method using vicryl “O” on a J shaped needle. The frequency of the port-site hernia was calculated and risk factors identified. All patients were followed-up by out patient clinic visits.

Results
During the study period, 1492 laparoscopic operations were performed, and out of these, 32 (2.14%) developed port site hernia during a mean follow up period of two years. The risk factors observed were wound infection (65.6%), obesity (18.75%), chronic cough (9.37%) and ascites (6.25%). The classical port closure technique showed acceptable results. No major complications or mortality was seen.

Conclusion
The classical port closure technique was associated with an acceptable incidence of port site hernia. The new modified technique is required to prevent or reduce the incidence of port site hernia. (Rawal Med J 2011;36:14-17).

Keywords
Port-site hernia, port-closure, risk factors.

INTRODUCTION
The port site hernia is a type of incisional hernia that occurs at port or trocar sites after laparoscopic surgeries. It is a rare but potentially dangerous complication after laparoscopy. It usually occurs through the larger ports (size greater than 10mm), especially the umbilicus. It causes considerable morbidity requiring surgical intervention. It was first reported after laparoscopy in gynecological surgery. Maio and Ruchman then reported on the trocar site hernia with small bowel obstruction occurring immediately after cholecystectomy; this being the first report on trocar site hernia in digestive surgery.
Incidence of port site hernia has varied from 1% to 6%. Various factors have been implicated in the development of port site hernia: large trocar size, mid-line trocars, wound infection, wound extension or stretching for organ retrieval, pre-existing umbilical defects, increased intra-abdominal pressure, obesity, post operative chest infections with persistent cough, pre existing diseases like diabetes mellitus, connective tissue disorders; but the single most important factor is the improper closure of the port sites. The non-bladed, radially dilating and conical blunt trocars are also hazardous to cause hernias. Meticulous closure of the fascia, avoidance of unnecessary wound extension, the use of non-absorbable sutures for larger port wounds and repair of any pre-existing paraumbilical/umbilical hernia at the time of port site closure, are recommended to minimize the incidence of port site hernia. This study was carried out to evaluate the frequency, causative factors and prevention of port site hernia.

**PATIENTS AND METHODS**

This is a prospective study of 1492 patients who underwent laparoscopic surgery for different indications during a period of last four and half years, from January 2006 to June 2010. We routinely use open Hassan’s port technique for creation of pneumoperitoneum, which is then closed under vision. We used 5mm and 10mm ports and 3-edged reusable trocars for making ports, at the end of procedure closure of the facial defect (port site) was performed using vicryl “O” on J shaped needle, for umbilical ports (about 10mm or 12mm) , while the epigastric port (10mm) and lateral (5mm) port defects were not closed. The skin of 10mm ports was closed with vicryl rapid 3/0 subcutically, while for 5mm ports, skin closure was done by applying Steris trips. Patients who had their ports closed using techniques other than the classical were excluded from the study. The data were collected for patients who developed port site incisional hernia.

**RESULTS**

Different laparoscopic procedures were performed in 1492 patients. These included 1224 laparoscopic cholecystectomies, 83 appendicectomies, 28 hydatid cyst of liver, 13 ruptured liver abscesses, 02 splenic abscesses, 26 pelvic abscesses, 27 blunt abdominal trauma, 16 ruptured ectopic pregnancies, 08 ruptured ovarian cysts, 04 perforated peptic ulcers, 04 intestinal obstruction due to adhesions and 57 diagnostic laparoscopies. The mean age of patients was 45 years. Out of 1492 patients, who underwent laparoscopic surgery, only 32 (2.14%) patients developed Port-Site incisional hernias. 25 were females and 07 were males. In 31 patients Port-Site hernia occurred through umbilical port and only one through epigastric port-site. Majority of these hernias developed after laparoscopic cholecystectomy (Table 1), possibly because of the fact that we retrieve gallbladder through umbilical port and always use Hassan’s open technique for first port entry (i.e., supraumbilical or infra-umbilical).
Table 1. The frequency of Port-Site hernia for different procedures.

<table>
<thead>
<tr>
<th>Type of procedure</th>
<th>Number (n=32)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparoscopic cholecystectomy</td>
<td>30</td>
<td>93.75%</td>
</tr>
<tr>
<td>Laparoscopic appendicectomy</td>
<td>01</td>
<td>3.12%</td>
</tr>
<tr>
<td>Lap: drainage of pelvic collection</td>
<td>01</td>
<td>3.12%</td>
</tr>
</tbody>
</table>

Wound infection was found to be the main causative factor in 21 patients, while chronic cough with smoking in 03 patients, obesity in 06 patients and increased intra-abdominal pressure due to CLD and ascites in 02 patients (Table 2).

Table 2.
The causative factors for Port-Site hernia

<table>
<thead>
<tr>
<th>Causative factor</th>
<th>Number (n=32)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wound infection</td>
<td>21</td>
<td>65.6%</td>
</tr>
<tr>
<td>Obesity</td>
<td>06</td>
<td>18.75%</td>
</tr>
<tr>
<td>Chronic cough</td>
<td>03</td>
<td>9.37%</td>
</tr>
<tr>
<td>Ascites</td>
<td>02</td>
<td>6.25%</td>
</tr>
</tbody>
</table>

The patients presented with reducible hernia and at operation the sac was containing the viable omentum. No patient presented with obstructed or strangulated hernia. All the umbilical port-site hernias were operated as elective cases and sub lay mesh repair was done, while the epigastric port hernia repaired with prolene no.1.

The patients after their primary laparoscopic surgery attended the first visit of follow-up in the clinic, which was 4 weeks to 6 weeks after the operation. Patients who had simple operations such as laparoscopic cholecystectomy or laparoscopic appendicectomy were discharged to their general practitioner’s care after the first two visits and advised to call our unit in case of problems including port-site complications. Other patients with major procedures were followed up regularly by our team. The mean follow up was 24 months.

**DISCUSSION**

Port-Site hernia can occur at any Port-Site, but most frequently at the mid-line through umbilical port, as seen in our study. The incidence is variable from centre to centre, depending on factors including surgical technique and, of course, surgical experience. The incidence and spectrum of laparoscopic complications is greater than previously perceived\(^9\) and continuing improvement of access techniques, instruments and laparoscopic training are important to reduce these avoidable complications, especially
the hernia.\textsuperscript{10} In our study, incidence of port-site hernia was 2.14 \%, while it has ranged from 0.02 to 3.6\%\textsuperscript{11} and as low as 0.08\%.\textsuperscript{13} The post-operative wound infection (65.6\%) of the umbilical port-site was the major causative factor in our study. Other factors were obesity (18.75\%), chronic cough (9.37\%) and increased intra-abdominal pressure due to ascites (6.25\%). The risk factors for the development of port-site hernia are the trocar diameter, the trocar design, pre-existing facial defects as well as some operation and patient related factors,\textsuperscript{14} in addition to the direction of the port insertion, use of a drain and the site of a port. The risk of port-site hernia is greater in obese and bariatric patients because of the larger preperitoneal space and raised intra-abdominal pressure; thus, facial closure alone is not adequate,\textsuperscript{15} while the size of the port is another major risk factor. In our study, the port-site hernias occurred through umbilical port except one smoker male patient who developed hernia through epigastric port. A study involving 840 trocar site hernias revealed that 86.3\% of hernias occurred in sites where the trocar diameter was 10mm or more.\textsuperscript{16} In a survey of the American Association of Gynecologic Laparoscopists, umbilical hernias were found in 75.70\% as compared to lateral hernia in 23.70\% cases of port site hernia.\textsuperscript{17} Port-site hernia is a preventable complication of laparoscopy. Prevention of trocar site hernias includes closing of all port-sites more than 10mm at the facial level. Tonouchi et al\textsuperscript{18} reviewed 63 studies of trocar site hernias and concluded that a facial defect>10mm should be closed including the peritoneum.\textsuperscript{18} We routinely closed 10mm umbilical port at the facial level with vicryl “O” on J shaped needle. In spite of this, 32 (2.14\%) of our patients developed port site umbilical incisional hernia. These 32(2.14\%) port site hernias, which came to our attention during a mean follow-up of 24 months, represent an acceptable incidence compared with reports in the literature.\textsuperscript{19} Therefore, we recommend closing the facial defect, including the peritoneum especially if the trocar site is more than 10mm and in the presence of any of the risk factors described above. However, it is sometimes difficult to close the defect completely, especially in obese patients.

Old methods using classical instruments including suture carrier and Deschamps needle are also useful as well as special wound devices designed for port-site closure.\textsuperscript{20} Insertion of a SURGICEL plug into the muscular layer of trocar wounds has also been proposed by Chiu et al.\textsuperscript{21} Moreover, recent publications have recommended that radially expanding type trocars could be useful to avoid the necessity of closing the facial defects.\textsuperscript{22} Some authors have also reported a lower incidence of hernias with the use of a Para median incision and non-bladed trocars which have a conical tip.\textsuperscript{23} The easy closure and cost-effectiveness associated with the classical method are promising compared with other techniques, such as Deschamps needle and non-bladed trocars.\textsuperscript{24} Moreover, special attention should be paid in patients with risk factors for port-site hernia such as obesity, aggressive manipulation through the port-sites and prolonged surgery.

CONCLUSION

Port-site hernia is a potentially serious complication after laparoscopic surgery. Careful port-operative management is recommended especially for patients with risk factors such as obesity and extensive manipulation of the trocar during prolonged surgery. The meticulous closure of the port wounds is important to prevent the port-site incisional hernia. Although the classical closure method with a curved or J-shaped needle has been
associated with an acceptable incidence of port-site hernia, development of a new technique of closure is suggested to further prevent or reduce this.

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REFERENCES