Short-term Surgical and Functional Outcome of Laparoscopic Ventral Mesh Rectopexy for Management of Complete Rectal Prolapse

Mostafa B. Abdulwahab (MD);
Assistant professor of general surgery, faculty of medicine, Benha University.

Hussein Elgohary (MD);
Assistant professor of general surgery, faculty of medicine, Benha University.

Correspondence to: Mostafa B. Abdulwahab (MD); Assistant professor of general surgery, faculty of medicine, Benha University. villa35 Alnarges1, 5th settlement, New Cairo, Egypt. e-mail: mostbiomy@gmail.com.

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Abstract

Background: There is no clear treatment of choice for the problem of complete rectal prolapse. The treatment of CRP in adults is essentially surgical. Surgical management is aimed at restoring physiology by correcting the prolapse and improving continence and constipation with acceptable mortality and recurrence rates.

Objectives: To determine the safety and outcome of laparoscopic ventral mesh rectopexy (LVMR) for the management of CRP patients.

Patients & Methods: The study included 33 CRP patients; 20 females and 13 males. Females were significantly obese than males; however, males were significantly older. Four females had associated vaginal vault prolapse. All patients underwent LVMR. Surgical outcome included intraoperative (IO), postoperative (PO) and follow-up data. Functional outcome was assessed at 6-m and 12-m PO and compared versus preoperative evaluation for severity of fecal incontinence (FI) using Vaizey score, frequency and severity of constipation using Cleveland Clinic Constipation (CCC) score and impact of FI on patient's quality of life (QOL) using the Fecal incontinence quality of life scale (FIQL) score (11).

Results: All patients passed smooth uneventful operative and immediate postoperative course. No patient required conversion to laparotomy. Mean operative time was 151.9±31.6 (range: 120-240 min) and mean amount of IO blood loss was 75.2±16 (range: 50-130 ml). Laparoscopic surgery provided its usual advantages concerning low PO pain score, and early ambulation, oral intake, and hospital discharge. Only three patients (9.1%) developed immediate PO complications. All patients showed significant functional improvement manifested as a significant decrease of Vaizey FI and CCC scores with a significant increase of FIQL score at 6-m PO and these scorings were progressively improved till 12-m PO. Throughout 12 months PO follow-up; two female patients developed recurrent rectal prolapse for a frequency of 6.1%.

Conclusion: LVMR is a safe procedure for management of CRP within reasonable operative time and with minimal immediate PO morbidities. LVMR provided significant improvement of CRP-associated FI and constipation and its impact on patients QOL. LVMR is associated with low frequency of PO recurrence throughout 12-m follow-up.

Keywords: Complete rectal prolapse, Laparoscopic ventral mesh rectopexy, Functional outcome, Quality of Life.
Introduction

The term rectal prolapse includes three different entities; full thickness rectal prolapse, mucosal prolapse and internal prolapse (rectal intussusception). Complete rectal prolapse (CRP) is defined as the circumferential full-thickness protrusion of the rectal wall through the anus\(^1\). Straight rectum, a lack of rectal fascial attachments to the sacrum, a redundant sigmoid colon, levator ani diastasis, an abnormally deep Douglas pouch, and a patulous anus may be considered either anatomical predisposing factors for the development of CRP or the result of prolapsing rectum\(^2,3\).

The treatment of CRP in adults is essentially surgical. Surgical management is aimed at restoring physiology by correcting the prolapse and improving continence and constipation with acceptable mortality and recurrence rates\(^4\).

Numerous surgical procedures have been suggested to treat rectal prolapse; however, the controversy "which operation is appropriate?" cannot be answered definitely\(^5\). According to the approach used to repair the rectal prolapse, Surgical treatments can be divided into two categories; Abdominal procedures which are generally better for young fit patients and perineal procedures which are preferable for patients who are not fit for abdominal procedures such as elderly frail patients with significant comorbidities. The abdominal procedures have a lower recurrence and a higher morbidity rate than the perineal procedures\(^4\).

Laparoscopic rectal prolapse surgery including both rectopexy and resection rectopexy can cure prolapse with good results and can be performed safely in older and debilitated patients\(^6\). Although both techniques offer significant improvements in functional symptoms, laparoscopic resection rectopexy had a higher complication rate than did laparoscopic rectopexy\(^7\).

Because of the acceptable anatomical results, fewer complications, low recurrence rate, good functional results and low mesh-related morbidity in the short to medium term, laparoscopic ventral mesh rectopexy (LVMR) has been popularized in the past decade. (LVMR) is performed for patients with complete rectal prolapse (CRP) and internal prolapse\(^8\).

The current study aimed to determine the safety and outcome laparoscopic ventral mesh rectopexy (LVMR) for the management of patients presented with complete rectal prolapse (CRP).
Patients & Methods

The current prospective study was conducted at General Surgery Department, Benha University Hospital, and Al-Adwani General Hospital, Taif, KSA after obtaining approval from the local ethical committee and after fully informed written consent signed by the patient. This study was carried out on 33 consecutive adult patients with complete rectal prolapse since Jan 2012 till June 2016.

All patients underwent clinical examination including collection of demographic data and past medical history and obstetric history for females. All patients underwent laboratory and radiological workup for assuring the diagnosis and define other prolapsed organs, and to assure inclusion criteria and fitness for surgery. Then, patients were prepared and underwent preoperative flexible colonoscopy.

Patients with recurrent rectal prolapse, colorectal malignancy, ulcerative colitis, previous laparotomy for any previous cause, contraindication for abdominal insufflation, or bleeding diathesis were excluded from the study.

Operative procedure

All patients received general inhalational anesthesia with endotracheal intubation. Using the 4-port technique the camera is placed at the umbilicus and two 5-mm trocars are placed in the left and right lower quadrants at the midclavicular lines. A 12-mm trocar is inserted in the suprapubic region just to the right of the midline. After pneumoperitoneum conduction up to 15 mmHg; patients were positioned in Trendelenburg position and the small intestine is retracted cephalad. The rectosigmoid junction was identified and retracted to the left. A peritoneal incision was performed extending from the right side of the sacral promontory to the anterior peritoneal reflection distally (Fig. 1a); then the right hypogastric nerve and ureter were identified and safeguarded (Fig. 1b). Using combined blunt and sharp dissection, a wide plane was developed in the rectovaginal/rectovesical space (Fig. 1c). Prolapsed rectum was reduced, but no posterior rectal mobilization or lateral dissection was conducted (Fig. 1d). After completion of dissection (Fig. 1e), a strip of Prolene mesh (Ethicon Endosurgery, Blue Ash, Ohio, United States) about 3 × 17 cm, was prepared and inserted into the pelvic cavity through the 12-mm trocar site. One end of mesh was fixed to the anterior surface of the most distal part of the rectum and to pelvic floor muscle laterally using polypropylene sutures (Fig. 1f). Full thickness bite into the rectal wall was avoided to prevent mesh contamination. Finally, the proximal end of mesh was fixed to the sacral promontory using Tackers (Covidien, Dublin, Ireland). During
fixing the mesh avoid proximal traction on the rectum as the rectum should not be placed under tension). In females, the distal part of the mesh was also fixed to the posterior vaginal fornix for correction of vaginal vault prolapse if present. The peritoneum was then re-approximated to completely cover the mesh (Fig. 1g).

Fig 1a. Peritoneal dissection down to the sacral promontory

Fig 1b. Identification of the right (RT) ureter
Fig 1c. Dissection of the peritoneal reflection of the rectovesical pouch

Fig 1d. Reduction of the prolapsed rectum.
Fig 1e. Complete peritoneal dissection down to the sacral promontory and preparation of the cavity

Fig 1f. Application and spreading of the prolene mesh to the rectum
Study Outcome

A) Surgical outcome
- Intraoperative (IO) collected data included conversion rate to laparotomy, operative time, IO blood loss, and frequency of IO complications
- Postoperative (PO) data included pain assessment using 1-10 pain visual analogue scale (VAS) scoring, time till 1st ambulation and oral feeding resumption, PO hospital stay, and frequency of PO complication.
- PO follow-up extending for 12 months for frequency of recurrence; partial or complete

B) Functional outcome was assessed at 6-m and 12-m PO and compared versus preoperative evaluation for:
- The severity of fecal incontinence (FI) evaluated using Vaizey score (9) for a total score ranging between 0 (perfect continence) and 24 (total incontinence). Details of Vaizey score are shown in table 1.
- Evaluation of frequency and severity of constipation using Cleveland Clinic Constipation (CCC) score (10) for a total score ranging between 0 (no constipation) and 25 (severe constipation since long duration). Details of items are shown in table 2.
The impact of FI on patient's quality of life (QOL) using the FIQL \(^{(11)}\) which consists of four subscales: Lifestyle, Coping/Behavior, Depression/Self-perception, and Embarrassment including 29 questions. Responses to the questions are graded from 1 “strongly agree” to 4 “strongly” disagree. The obtained numerical values of all responses were added and then divided by the number of items. Higher scores indicate a better QOL.

**Statistical analysis**

Obtained data were presented as mean±SD, median, range, numbers, and percentages. Results were analyzed using One-way ANOVA with post-hoc Tukey HSD Test and Chi-square test \((X^2\) test). Statistical analysis was conducted using the SPSS (Version 15, 2006) for Windows statistical package. P value <0.05 was considered statistically significant.

**Table (1): Vaizey Incontinence score\(^{(9)}\)**

<table>
<thead>
<tr>
<th>Items</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Weekly</th>
<th>Daily</th>
<th>Items</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incontinence for solid stool</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>Need to wear a pad</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Incontinence for liquid stool</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>Taking constipating medicines</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Incontinence for gas</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>Lack of ability to defer defecation for 15 min</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Alteration in lifestyle</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Never: no episode in the past 4 wk; Rarely: 1 episode in the past 4 wk; Sometimes: >1 episode in the past 4 wk, but 1/week; Weekly: ≥1 episode/week, but <1 episode/day; Daily: ≥1 episode/day; Minimum score=0 (perfect continence); Maximum score=24 (totally incontinent).
Table (2): Cleveland Clinic Constipation score\(^{(10)}\)

<table>
<thead>
<tr>
<th>Items</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (times of bowel movements)</td>
<td>1-2 / 1-2 d</td>
<td>2/wk</td>
<td>1/wk</td>
<td>&lt;1/wk</td>
<td>&lt;1/m</td>
<td>-</td>
</tr>
<tr>
<td>Difficulty (Painful evacuation effort)</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
<td>Always</td>
<td>-</td>
</tr>
<tr>
<td>Feeling incomplete evacuation</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
<td>Always</td>
<td>-</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Usually</td>
<td>Always</td>
<td>-</td>
</tr>
<tr>
<td>Time (minutes in lavatory/attempt)</td>
<td>&lt;5</td>
<td>5-10</td>
<td>10-20</td>
<td>20-30</td>
<td>&gt;30</td>
<td>-</td>
</tr>
<tr>
<td>Assistance (type of assistance)</td>
<td>without</td>
<td>Laxative</td>
<td>Digital/enema</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Failure (unsuccessful evacuation attempts/24 hr)</td>
<td>Never</td>
<td>1-3</td>
<td>3-6</td>
<td>6-9</td>
<td>&gt;9</td>
<td>-</td>
</tr>
<tr>
<td>Duration of constipation (yr)</td>
<td>0</td>
<td>1-5</td>
<td>5-10</td>
<td>10-20</td>
<td>&gt;20</td>
<td>-</td>
</tr>
</tbody>
</table>

Results

The study included 33 patients had complete rectal prolapse (CRP) with a mean age of 59.5±14.5; range: 25-78 years. There were 20 females and 13 males with mean body mass index (BMI) of 27.4±2; range: 23.4-30.8 kg/m\(^2\). Females were significantly obese than males; however, males were significantly older. Four females had associated vaginal vault prolapse. Ten patients had additional morbidity with non-significantly higher frequency in females than in males. Details of patients' enrollment data are shown in table 3.

All patients passed smooth uneventful operative and immediate postoperative course. No patient required conversion to laparotomy. All surgeries were conducted through a mean operative time of 151.9±31.6; range: 120-240 min. Laparoscopic surgery provided its usual advantages regarding low PO pain scores and a minimal number of patients requesting rescue analgesia (Fig. 2), and early ambulation, 1\(^{st}\) oral intake and hospital discharge as shown in table 4.
Table (3): Patients' enrolment data categorized according to gender

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Males</th>
<th>Females</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (%)</td>
<td>33 (100%)</td>
<td>13 (39.4%)</td>
<td>20 (60.6%)</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>59.5±14.5</td>
<td>66±11.3</td>
<td>55.4±15</td>
<td>0.037</td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>81.1±5.8</td>
<td>78±5.4</td>
<td>83.2±5.2</td>
<td>0.010</td>
</tr>
<tr>
<td>Body height (cm)</td>
<td>172±4.1</td>
<td>173.7±4.3</td>
<td>170.9±3.6</td>
<td>NS</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>27.4±2</td>
<td>25.9±1.8</td>
<td>28.5±1.5</td>
<td>0.001</td>
</tr>
<tr>
<td>Associated co-morbidities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaginal vault prolapse</td>
<td>4 (12.1%)</td>
<td>0</td>
<td>4 (20%)</td>
<td></td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>7 (21.1%)</td>
<td>2 (15.4%)</td>
<td>5 (25%)</td>
<td>NS</td>
</tr>
<tr>
<td>Hypertension</td>
<td>3 (9.1%)</td>
<td>2 (15.4%)</td>
<td>1 (5%)</td>
<td></td>
</tr>
</tbody>
</table>

Data are presented as numbers and mean±SD; percentages are in parenthesis; NS: Non-significant difference.

Table (4): Operative and immediate postoperative data

<table>
<thead>
<tr>
<th>Data</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative time (min)</td>
<td></td>
</tr>
<tr>
<td>≤180</td>
<td>26 (78.8%)</td>
</tr>
<tr>
<td>&gt;180</td>
<td>7 (21.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>151.9±31.6</td>
</tr>
<tr>
<td>Operative blood loss (ml)</td>
<td></td>
</tr>
<tr>
<td>≤100</td>
<td>31 (93.9%)</td>
</tr>
<tr>
<td>&gt;100</td>
<td>2 (6.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>75.2±16</td>
</tr>
<tr>
<td>Time till 1st ambulation (hr)</td>
<td></td>
</tr>
<tr>
<td>&lt;6</td>
<td>5 (15.1%)</td>
</tr>
<tr>
<td>6-12</td>
<td>25 (75.8%)</td>
</tr>
<tr>
<td>&gt;12</td>
<td>3 (9.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>10±2.3</td>
</tr>
<tr>
<td>Time till 1st oral intake (hr)</td>
<td></td>
</tr>
<tr>
<td>24-36</td>
<td>17 (51.5%)</td>
</tr>
<tr>
<td>12-24</td>
<td>9 (27.3%)</td>
</tr>
<tr>
<td>&lt;12</td>
<td>7 (21.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>40.7±13.4</td>
</tr>
<tr>
<td>PO pain</td>
<td></td>
</tr>
<tr>
<td>Immediate PO</td>
<td>Median VAS score</td>
</tr>
<tr>
<td>Number (%)*</td>
<td>1 (0-4)</td>
</tr>
<tr>
<td>6-hr PO</td>
<td>Median VAS score</td>
</tr>
<tr>
<td>Number (%)</td>
<td>2 (6.1%)</td>
</tr>
<tr>
<td>12-hr PO</td>
<td>Median VAS score</td>
</tr>
<tr>
<td>Number (%)</td>
<td>5 (15.2%)</td>
</tr>
<tr>
<td>24-hr PO</td>
<td>Median VAS score</td>
</tr>
<tr>
<td>Number (%)</td>
<td>13 (39.4%)</td>
</tr>
<tr>
<td>PO hospital stay (days)</td>
<td></td>
</tr>
<tr>
<td>2-3</td>
<td>26 (78.8%)</td>
</tr>
<tr>
<td>4-6</td>
<td>4 (12.1%)</td>
</tr>
<tr>
<td>&gt;6</td>
<td>3 (9.1%)</td>
</tr>
<tr>
<td>Total</td>
<td>3.6±1.9</td>
</tr>
</tbody>
</table>
Only three patients (9.1%) developed immediate PO complications; one diabetic patient developed hyperosmolar ketoacidotic coma on the 2\textsuperscript{nd} PO day and required admission to general ICU to receive intensive insulin therapy and was discharged from ICU after three days after proper adjustment of her blood glucose and was discharged uneventfully on the 8\textsuperscript{th} PO day. Another 67-year-old patient developed acute myocardial infarction necessitated immediate ICU admission; fortunately, the patient responded well to thrombolytic therapy and stayed for two days and completed his immediate PO care free of complications and was discharged on the 9\textsuperscript{th} PO day. The 3\textsuperscript{rd} patients had a delayed return of intestinal motility and developed manifestations of intra-abdominal infection. CT imaging defined pelvic collection that was drained laparoscopically. The patient was maintained on intravenous fluid and supportive therapy with appropriate antibiotic therapy, he responded to the applied therapy and constitutional manifestations completely resolved and he was discharged on the 10\textsuperscript{th} PO day to be re-evaluated for her prolapse. No operative or immediate PO mortality was reported.

All patients showed progressive improvement of their functional complaints. FI evaluated using Vaizey incontinence score showed a progressive significant decrease compared to preoperative scoring. At end of 12-m PO follow-up, only 5 patients
(15.2%) were still complaining of liquid and gas incontinence that occurred rarely but for fear of soiling they were still taking constipating drugs and wear pads. Details of frequency among incontinence scores determined at 6-m and 12-m PO compared to preoperative frequency are shown in table 5. Total incontinence scores calculated at 6-m and 12-m PO were significantly decreased compared to preoperative score with significantly lower 12-m PO score compared to 6-m score as shown in figure 3.

Table (5): Patients' frequency according to Vaizey Incontinence score determined at 6-m and 12-m PO compared to preoperative frequency

<table>
<thead>
<tr>
<th>Time Score item</th>
<th>solid stool incontinence</th>
<th>Liquid stool incontinence</th>
<th>Incontinence for gas</th>
<th>Lifestyle alteration</th>
<th>Need for pad</th>
<th>Taking constipating medicines</th>
<th>Inability to defer defecation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre 6-m</td>
<td>12-m</td>
<td>Pre 6-m</td>
<td>12-m</td>
<td>Pre 6-m</td>
<td>12-m</td>
<td>Pre 6-m</td>
</tr>
<tr>
<td>Never</td>
<td>21 33 33</td>
<td>5 26 28</td>
<td>0 14 23</td>
<td>4 19 24</td>
<td>20 27 28</td>
<td>12 26 28</td>
<td>23 33 33</td>
</tr>
<tr>
<td>Rarely</td>
<td>12 0 0</td>
<td>6 7 5</td>
<td>13 13 10</td>
<td>14 13 8</td>
<td>Yes 13 6 5</td>
<td>21 7 5</td>
<td>10 0 0</td>
</tr>
<tr>
<td>Sometimes</td>
<td>0 0 0</td>
<td>7 0 0</td>
<td>10 6 0</td>
<td>8 1 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekly</td>
<td>0 0 0</td>
<td>5 0 0</td>
<td>10 0 0</td>
<td>7 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily</td>
<td>0 0 0</td>
<td>10 0 0</td>
<td>0 0 0</td>
<td>0 0 0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Twenty-three patients (69.7%) complained of preoperative constipation with varying degrees of difficulty in evacuation and sense of incomplete evacuation since a median duration of constipation of 3 years; range: 0-13 years. Postoperatively, all patients showed progressive improvement of their constipation and at end of 12-m follow-up, only 14 patients (42.4%) still having constipation of score one and ten of them (30.3%) still had an occasional failure of evacuation and 6 of them (18.2%) were still using laxatives. Details of frequency among Cleveland Clinic Constipation (CCC) scores determined at 6-m and 12-m PO compared to preoperative frequency are shown in table 6. Total CCC score calculated at 6-m and 12-m PO were significantly decreased compared to preoperative score with significantly lower 12-m PO score compared to 6-m score as shown in figure 3.

<table>
<thead>
<tr>
<th>Score</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time Items</td>
<td>Pre 6</td>
<td>12</td>
<td>Pre 6</td>
<td>12</td>
<td>Pre 6</td>
</tr>
<tr>
<td>Frequency</td>
<td>12</td>
<td>1</td>
<td>19</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Difficulty</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Incomplete evacuation</td>
<td>0</td>
<td>6</td>
<td>18</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>15</td>
<td>8</td>
<td>25</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Time (minutes/attempt)</td>
<td>18</td>
<td>1</td>
<td>6</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Assistance</td>
<td>12</td>
<td>1</td>
<td>0</td>
<td>27</td>
<td>8</td>
</tr>
<tr>
<td>Failure evacuation</td>
<td>15</td>
<td>1</td>
<td>7</td>
<td>22</td>
<td>11</td>
</tr>
<tr>
<td>Duration of constipation</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>-</td>
</tr>
</tbody>
</table>

Complete rectal prolapse associated FI and constipation had bad impact on patient's quality of life (QOL); however, the applied surgical procedure induced significant improvement of patient's QOL as manifested by significantly higher FIOL score determined at 6-m and 12-m PO compared to preoperative FIOL score with
significantly higher score at 12-m compared to score determined at 6-m PO as shown in figure 3.

Throughout 12 months PO follow-up; two patients developed recurrent rectal prolapse for a frequency of 6.1%. One female patient developed recurrent vaginal vault prolapse, cystocele and partial rectocele secondary to committing an obstructed labor despite the instruction not to have a vaginal delivery. Another female patient developed recurrence of complete rectal prolapse secondary to getting excessively obese due to her sedentary life. One male patient died secondary to developing acute myocardial infarction that failed to respond to treatment.

Discussion

The current study reported a significantly higher frequency of females among studied patients and four females (20%) had associated vaginal vault prolapse. The reported higher frequency of complete rectal prolapse (CRP) among female patients could be attributed to previous obstetric trauma inducing weakness of pelvic floor with subsequent laxity of suspensor ligaments leading to pelvic descent and organ prolapse. The reported association of vaginal vault prolapse and CRP goes in hand with Adjoussou *et al.* (12) who reported that colorectal symptoms, such as defecation dysfunction and anal incontinence, occurred in 25.1% and 18.5%, respectively, of women with genital prolapse. Also, Meister *et al.* (13) identified the duration of pushing during vaginal delivery, and infant births weight as significant risk factors for sustaining laceration and obstetric anal sphincter injury; predisposing to genitourinary and rectal prolapse (RP).

Interestingly, studied females were more obese with significantly higher BMI than males; this implies a relationship between obesity and development and/or aggravation of RP. In support of this concept, Cucchi *et al.* (14) found that after a mean BMI reduction of 10 kg/m², the prevalence of pelvic floor dysfunction decreased to 48% and the rate of resolution of urinary and fecal incontinence (FI), and pelvic organ prolapse was 84%, 85%, and 74%, respectively. Also, multiple recent studies (15, 16, 17) documented that urinary incontinence, FI, and sexual dysfunction are more prevalent in patients with obesity and weight loss by surgical and non-surgical methods plays a major role in the improvement of these symptoms in such patients.

All surgeries were conducted uneventfully with no intraoperative morbidities, mortality or conversion to laparotomy within appropriate operative time (151.9±31.6
min) and with minimal blood loss (75.2±16 ml). Moreover, laparoscopic surgery provided its usual advantages concerning low PO pain score, and early ambulation, oral intake, and hospital discharge. Similarly, Magruder et al.\textsuperscript{(18)} reported that patients who undergo laparoscopic rectopexy have a shorter length of hospital stay and lower surgical site infection rate than patients who undergo other abdominal procedures for RP repair. Bjerke & Mynster\textsuperscript{(19)} reported a median operative time of 135 min (range 90-215), a median length of stay of 2 days (range 1-14) and 30-day morbidity and mortality rates of 15% and 4% after LMVR.

The reported surgical data coincided with that recently reported by Chandra et al.\textsuperscript{(20)} who reported a median operative time of 200 min (range, 180-350 min), median PO hospital stay of 4 d (range, 3-12 d) and no operative mortality or mesh-related complication was encountered after LVMR. Also, Pucher et al.\textsuperscript{(21)} documented that LVMR had safety learning course and is an effective and safe treatment for RP with in-hospital morbidity and mortality rates of 3.2 % and 0%, respectively. Keskin et al.\textsuperscript{(22)} also documented that laparoscopic rectopexy should be considered as the first option in the treatment RP owing to its favorable early-term outcomes and acceptable rate of long-term recurrence.

In support of the favorable outcome of LMVR, Liu et al.\textsuperscript{(23)} retrospectively compared laparoscopic versus open mesh rectopexy for total RP and reported insignificant inter-group differences in operative duration, postoperative complication, rate of long-term recurrence and improvement of incontinence and constipation, but perioperative blood loss, time to first flatus and hospital stay were significantly shorter in laparoscopic rectopexy group.

Moreover, the applied surgical procedure induced significant functional improvement manifested as a significant decrease of fecal incontinence (FI) and Cleveland clinic constipation (CCC) scores with significant increase of FI quality of life (QOL) score at 6-m PO and these scorings were progressively improved till 12-m PO. The reported functional improvement goes in hand with Consten et al.\textsuperscript{(24)} in their report; the rates of FI and obstructed defecation decreased significantly after LVMR compared to the preoperative incidence (11.1% vs 37.5% for FI and 15.6% vs 54.0% for constipation) and concluded that LVMR is safe and effective for the treatment of different rectal prolapse syndromes.

The obtained results are also in line with that recently documented in literature wherein Chandra et al.\textsuperscript{(20)} reported that at a median follow-up of 22 mo ;Wexner constipation score improved significantly from 17 to 6 and FI severity index (FISI)
score from 24 to 2 with no de novo constipation or FI during the follow-up and all patients expressed satisfaction with the outcome of their treatment; so Chandra et al. (20) concluded that LVMR is an effective surgical option for CRP especially in patients having a bulky redundant colon. Also, Tsunoda et al. (25) reported improved incontinence and constipation in 77% and 59% of patients, respectively, significantly reduced FISI and Constipation Scoring System scores and significantly improved scale scores on the three kinds of QOL instruments compared with the preoperative scores at one year after LVMR, and concluded that LVMR improves both generic and symptom-specific QOL with good functional results. Moreover, Horisberger et al. (26) documented that 2-years after LVMR, constipation, and QOL improve significantly in patients with complex pelvic organ prolapse.

In support of the reported advantages of LVMR; Bloemendaal et al. (27) documented that laparoscopic RP correction following emergency admission is both feasible and safe, so it can be considered for both recurring cases and cases with multiple co-morbidities. Also, Ahmed GM (28) reported improvement in incontinence and constipation in 60% and 75% of patients with no recurrence detected 6 months after single-port LVMR.

From the obtained results we conclude that LVMR is a safe procedure for the management of CRP within reasonable operative time and minimal immediate PO morbidities. LVMR provided significant improvement of CRP-associated FI and constipation and its impact on patients QOL. LVMR is associated with low frequency of PO recurrence throughout 12-m follow-up.

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