Preserving the superior rectal artery in laparoscopic sigmoid resection for complete rectal prolapse

R. Bergamaschi, K. Lovvik, R. Marvik
National Center for Advanced Laparoscopic Surgery, Saint Olav University Hospital, Trondheim, Norway

Sigmoid resection is indicated in the treatment of complete rectal prolapse (CRP) in patients with prolonged colorectal transit time (CTT). Its use however has been limited due to fear of anastomotic leakage. This study challenges the current practice of dividing the mesorectum by prospectively evaluating the impact of sparing the superior rectal artery (SRA) on leak rates after laparoscopic sigmoid resection (LSR) for CRP. During 30 months data on 33 selected patients with CRP were prospectively collected. Three patients were withdrawn from the analysis, as they had neither resection nor anastomosis. Twenty-nine women and one man (median age 55 range 21-83 years) underwent LSR with preservation of SRA for a median CTT of 8 (3-15) cm. There were 20 ASA I and 10 ASA II patients. Ten patients had undergone previous surgery. Four patients complained of dyschezia, whereas incontinence was present in 26 patients. Anal ultrasound showed isolated internal sphincter defects in two patients.

Four young adults (21-32 years) had normal CTT, whereas 26 older patients had a median CTT of 5 (4-6) days. Defecography demonstrated 10 enteroceles, two sigmoidoceles, and one rectal hernia through the levator ani muscle. Mortality was nil. Median operating room time was 180 (120-330) min, suprapubic incision length 5 (3-7) cm, estimated blood loss 150 (50-500) ml, specimen length 20 (12-45) cm, solid food resumption 3 (1-6) days, and length of stay 4.5 (2-7) days.

Thirty-day complications were not related to anastomosis and occurred in 20% of the patients. Although the evidence provided by the present study suggests that sparing SRA has a favorable impact on anastomotic leak rates, these nonrandomized results need further evaluation.

The division of the mesorectum at the rectosigmoid junction seems not necessary, and its sparing should therefore be considered as it may contain anastomotic leak rates.

Key words: rectal, artery, laparoscopic, sigmoid

INTRODUCTION

Sigmoid resection can be indicated in the treatment of full-thickness rectal prolapse (CRP) in patients with a prolonged colorectal transit time. This procedure was first proposed in 19551, but its use has been limited due to fear of anastomotic leakage and related morbidity. In fact, an 18% rate of anastomosis-related complications was reported in a series of 113 patients undergoing sigmoid resection for CRP2. Division of the mesorectum at the colorectal junction is current practice, although a randomized study has shown that sparing the inferior mesenteric artery decreases leak rates after sigmoid resection for diverticular disease3. The aim of this study was to challenge the current practice of dividing the mesorectum by prospectively evaluating the impact of sparing the superior rectal artery on leak rates following sigmoid resection for complete rectal prolapse.

PATIENTS AND METHODS

During a 30-month period a prospective study was performed on consecutive patients with complete prolapse of the rectum in four hospitals. Rectal prolapse was defined as full-thickness external prolapse involving all layers of the rectal wall. It was measured from the perineal skin to the top of the prolapse asking the patient to increase straining in the squatting position4. Fecal incontinence was quantified according to a previously described incontinence score5. Dyschezia was defined as a defecation difficulty associated with a feeling of incomplete evacuation and a persistent desire to void leading to straining at stool6. Patients deemed unfit by the anesthesiologist to undergo general anesthesia were not included. Colorectal transit
time was evaluated according to a previously described method. Patient physical status was classified according to the American Society of Anesthesiologists. One surgeon in training carried out parts of the procedures under supervision. Operating room (OR) time included only the time required to perform surgery. Conversion was any laparotomy regardless of timing, incision length or cause. Mortality was any 30-day death in and out of hospital. Thirty-day morbidity was classified according to the Troidl classification. Patients were dismissed tolerating oral solid food intake with bowel movements and no evidence of sepsis.

**Surgical Technique**

LSR was performed with CO₂-induced pneumoperitoneum through five ports. Following identification of the right ureter the peritoneum was incised on the right side of the rectum slightly distal to the promontorium. Mobilization of the rectum was started posteriorly and then extended from the midline to lateral. The rectum was mobilized circumferentially from the sacral promontory down to the levator ani muscle with or without division of the lateral stalks. The mesorectum was dissected off the posterior rectal wall along a 4-5 cm length at approximately 14 cm from the anal verge. This distance was measured at intra-operative rigid proctoscopy on a fully mobilized rectum. The bowel was transected with an endoscopic linear stapler placed perpendicular to its longitudinal axis using one cartridge. The mesorectum was not divided. The visceral peritoneum of the mesentery of the intended sigmoid colon specimen was incised close to the bowel. The sigmoid vessels were divided close to the bowel preserving the superior rectal artery. The suprapubic skin incision was widened up horizontally. The two fascia layers were incised horizontally and the rectus abdominis muscles spread apart longitudinally. The trocar placed suprapubically in the midline was removed and the oral bowel end brought out through the suprapubic incision. Bowel resection was performed at a minimum, as the sigmoid colon was not mobilized. A purse-string suture was hand-sewn at the oral bowel end, tied around the notch of the anvil and the bowel was placed into the abdomen. A double-stapled colorectal anastomosis was performed in an open fashion without the need for re-establishing pneumoperitoneum. The anastomosis was checked by per-rectum irrigation of air or methylene blue after the application of a noncrushing intestinal clamp about two cm proximal to the circular staple line. The rectum was allowed to lie comfortably in the sacral curve. No rectopexy was performed. A vacuum drain was placed in the pelvis to be removed the following morning.

**Results**

From August 1999 to December 2001, 33 patients were operated on laparoscopically. Three of 33 patients were withdrawn from the analysis as neither resection nor anastomosis was performed. One patient underwent laparoscopic suture rectopexy with no resection as she had a short sigmoid colon, while two others had a laparoscopic Hartmann procedure due to severe incontinence. There were twenty-nine women and one man with a median age of 55 (21-83) years and median weight of 61.5 (40-79) kg. There were 20 ASA 1 patients and 10 ASA 2. Six patients had undergone previous conventional abdominal surgery (appendectomy in two, hysterectomy in three, illeocolic resection in one), while posterior colporrhaphy had been performed in four patients. Four patients complained of dyschezia, whereas incontinence was present in 26 cases with a median score of 4 (2-16). Anal ultrasound showed an isolated internal sphincter defect in two cases. Anal manometry showed a median rest pressure of 19.6 (0-73) mmHg, squeeze pressure of 43 (12-110) mmHg, first sensation at a median of 18.5 (5-86) ml, first urge to defecate at a median of 110 (60-200) ml, and a median 15 (5-40) ml minimal volume to elicit rectal inhibitor reflex. Diverticulosis was found in two of 25 patients who underwent barium enema, four patients had no findings at colonoscopy, and a 22-year old patient underwent rigid proctoscopy only. Four young adults aged 21-32 years had normal CTT, whereas 26 older patients had a median CTT of 5 (4-6) days. Defecography demonstrated enterocele in 10 cases, sigmoidocele in two, and a rectal hernia through the levator ani muscle in one. There was no 30-day mortality. Thirty patients with a median external prolapse of 8 (3-15) cm underwent laparoscopic-assisted high anterior resection with no rec-

**Table 1**

<table>
<thead>
<tr>
<th>Variable</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating room time</td>
<td>180 (120-330)</td>
</tr>
<tr>
<td>Suprapubic incision length</td>
<td>5 (3-7)</td>
</tr>
<tr>
<td>Estimated blood loss</td>
<td>150 (50-500)</td>
</tr>
<tr>
<td>Specimen length</td>
<td>20 (12-45)</td>
</tr>
<tr>
<td>Solid food resumption</td>
<td>3 (1-6)</td>
</tr>
<tr>
<td>Length of stay</td>
<td>4.5 (2-7)</td>
</tr>
</tbody>
</table>

**Table 2**

<table>
<thead>
<tr>
<th>STAGE</th>
<th>COMPLICATION</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>pneumonia</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>urinary infection</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>urinary refutation</td>
<td>1</td>
</tr>
<tr>
<td>IV</td>
<td>wound infection</td>
<td>2</td>
</tr>
</tbody>
</table>
topexy. Nine of 30 procedures were carried out in part by a trainee with a median OR time of 273 (220-330) min. OR time was 175 (120-240) min in the remaining 21 patients. Table 1 shows details on the postoperative outcome. There were no conversions to conventional surgery. Lateral ligaments were divided in all but four patients with preoperative dyschezia. The mesorectum including the superior rectal artery was preserved in all patients. Thirty-day complications were not related to anastomosing and occurred in 20% of the patients (Table 2).

DISCUSSION

Fear of anastomotic leakage and related morbidity suggests, with reason, caution in the use of sigmoid resection for CRP in patients with prolonged CTT. In fact, a large series from the mid 1980s reported an 18% rate of anastomosis-related complications. Not surprisingly, this rate differed depending on the distance of the anastomosis from the anal verge: 38% after low versus 8% after high anterior resection. In the present study, we have been performing colorectal anastomoses at approximately 14 cm from the anal verge at intra-operative rigid proctoscopy. Two randomized studies have shown that sigmoid resection is associated with lower rates of postoperative constipation. However, one study, indeed, reported a 13% rate of anastomosis-related complications. In an effort to minimize leak rates after sigmoid resection for CRP, the present study addressed the question of whether preserving the superior rectal artery is safely feasible and reproducible, and has an impact on leak rates. The former was addressed by dissecting the mesorectum off the posterior rectal wall along a 4-5 cm length at the rectosigmoid junction. This allowed bowel transection obviating to the need for division of the mesorectum. Moreover, the procedure was also carried out by a trainee, a fact in support of its safe reproducibility. Although the evidence provided by the present study suggests that sparing the superior rectal artery has a favorable impact on anastomotic leak rates, these nonrandomized results need certainly further evaluation. Nevertheless, the division of the mesorectum at the rectosigmoid junction seems not necessary, and its sparing should therefore be considered as it may contain anastomotic leak rates.

BIBLIOGRAPHY