Sutureless Laparoscopic Rectopexy for Procidentia

Technique and Implications

Irwin R. Berman, M.D.

From the Colon and Rectal Clinic and Southeast Georgia Regional Medical Center, Brunswick, Georgia

Procedures for treating rectal prolapse may constitute some of the best applications for colorectal laparoscopic techniques. Although the condition is benign, rectal prolapse is often debilitating and frequently progressive in terms of functional limitations. Moreover, many patients are elderly, medically unfit, or both. A technique that afforded relief of prolapse and of incontinence by laparoscopic rectal sacropexy, performed without sutures, using a newly designed laparoscopic sacral tacker and laparoscopic staples, is described. Indications, contraindications, technical details, and surgical implications are discussed. Laparoscopic pelvic suspension procedures are presented as realistic and appropriate objectives for colon and rectal surgeons. [Key words: Rectum; Laparoscopy; Rectal prolapse; Rectal sacropexy; Rectopexy; Sacral veins; Procidentia; Surgical technique]

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Laparoscopic procedures have been embraced with a combination of enthusiasm and circumspection by colon and rectal surgeons. Increasing availability of appropriate instrumentation and increasing technical facility have expanded the applications of these techniques, especially when a condition of equipoise has been perceived between traditional and laparoscopic approaches. The recent appearance in our surgical armamentarium of a commercially available titanium thumbtack[1] for use in managing presacral hemorrhage in open operations suggested to us that development of a laparoscopic tacker could provide a missing link to abdominal rectopexy in selected patients. The benefit of such a minimally invasive approach to procidentia becomes especially obvious in the elderly or physiologically disabled patient with prolapse. In our own practice, a patient with moderately severe cardiopulmonary disease was offered this procedure for rectal prolapse, complicated by incontinence.

A 59-year-old woman with advanced emphysema and cor pulmonale was followed for six months with marginal continence, associated with rectal procidentia. Although she initially responded to nonoperative measures, her prolapse increased during the succeeding months, with worsening of continence. Resting anal sphincter pressure was 40 mm Hg, with attenuated rectoanal inhibitory reflex. Perception of rectal volume, urge to defecate, and electromyographic activity of the pelvic floor were normal. She could not retain barium instilled for defecography. Surgical options, including laparoscopic approaches, were reviewed with her after study of the new instrumentation in animate models. In consideration of the patient's cardiopulmonary limitations, laparoscopic rectopexy was elected, with full bowel preparation.

TECHNIQUE

Four 12-mm laparoscopic ports were placed in diamond configuration (suprapubic, bilateral lower abdominal, and supraumbilical) around a central umbilical camera port. The pelvic structures and sigmoid colon were identified, with the sigmoid held on light tension using laparoscopic Babcock forceps. Mobilization of the distal sigmoid was started in the left colic gutter, as with open operations upon the sigmoid colon. Using the laparoscopic coagulation scissors, with appropriate traction and countertraction, the rectum was then dissected from the vagina by sharp dissection in the rectovaginal plane. This dissection was facili-

Dr. Berman has participated in the design, modifications, and commercialization of the laparoscopic sacral tacker (Laptack™) and the One Stop Procto Shop™.

Address reprint requests to Dr. Berman: 2301 Parkwood Drive, Brunswick, Georgia 31520.

tated by Trendelenburg's position and by vaginal obturation (Fig. 1). The plastic housing of a conventional 60-cc syringe may also suffice as an obturator. Exposure was further enhanced by retraction of the sigmoid using umbilical tape, passed through the mesentery of the distal sigmoid colon, the ends clipped together with metal clips to form a loop. The ends of the loop were then grasped with the laparoscopic grasper, allowing cephalad traction of the sigmoid during dissection of the rectum from the sacral hollow.

Posterior and lateral mobilization was accomplished much as with open operations, using blunt and sharp dissection and electrocoagulation as needed, the latter largely accomplished with the laparoscopic coagulation scissors (Fig. 1). After incision of parietal attachments on the left, counterincision in the right leaf of the mesentery allowed further access to the presacral space on the right. The left ureter was then identified and swept laterally as the rectum was mobilized still further from the presacral tissues. At the completion of this dissection, the pelvis was well visualized anteriorly and posteriorly, down to the levator musculature. In our patient, the lateral stalks were coagulated and divided but could themselves be used for suspension of the rectum.

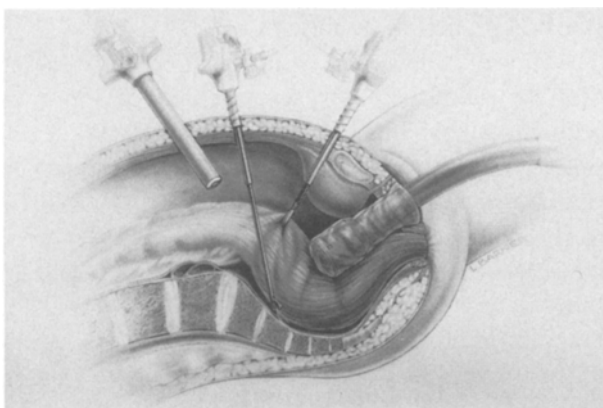

Figure 1. Laparoscopic rectal dissection using electrocoagulation scissors. A vaginal obturator facilitates anterior (rectovaginal) dissection.

At this point, a strip of Marlex® (C.R. Bard, Inc., Billerica, MA) mesh, approximately 4 by 10 cm, was rolled and introduced into the abdomen through the suprapubic port for horizontal placement in the presacral space. The laparoscopic sacral tacker (Fig. 2) was then introduced into the suprapubic port, with the tack fully recessed in the tacker housing. This angle was not well suited to flush seating of the tack against this patient's sharply angulated sacrum. For this reason, an additional 12-mm vaginal trocar was inserted, allowing excellent perpendicular alignment of the tacker with the anterior sacral table and fixation of the mesh in the midline below the sacral promontory. To eliminate slippage of the tacker while in contact with the sacrum, the tacker's distal end is serrated. The tack itself is 7 mm in diameter and double-headed, a configuration affording a mechanism for tack removal in case of malposition. Advancement of the tack into the sacrum is provided by a weighted sleeve impeller on the operator's end of the tacker, advancing its 7-mm-long ridged titanium spike into the sagittal plane of the mid sac-

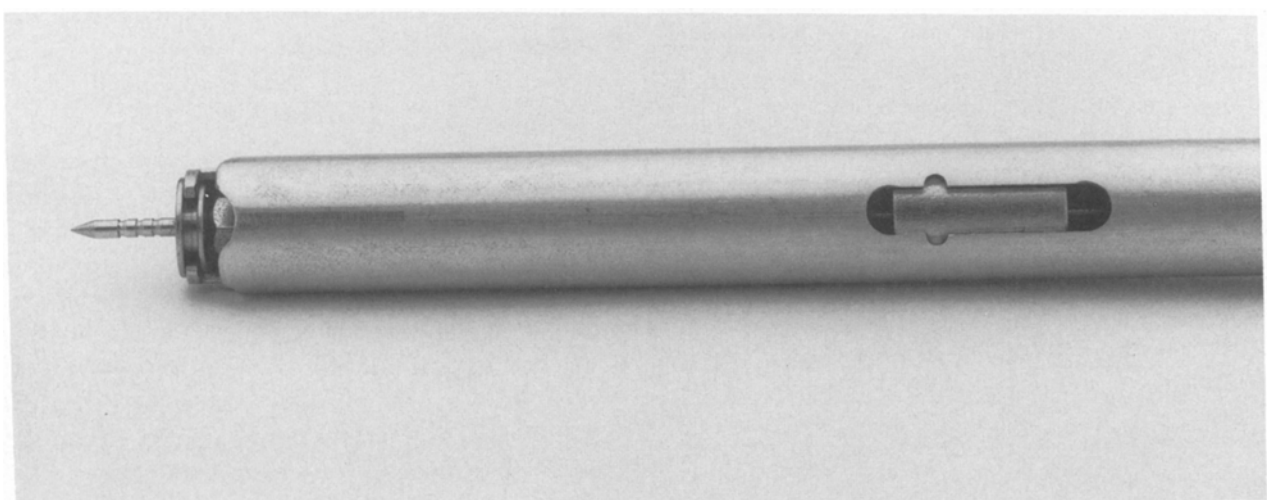

Figure 2. Laparoscopic sacral tacker showing fully advanced double-headed tack in the distal end of the tacker. A depth guide is visible on the face of the shaft, ensuring complete seating of the tack before removal of the instrument.

rum, 2 to 3 cm caudal to the sacral promontory. Depth of placement during advancement and seating of the tack is ensured by a depth guide on the shaft of the tacker (Fig. 2). A simple rotation of the proximal tacker mechanism then allows disengagement and withdrawal. Proper placement of the tack results in central fixation of the horizontal mesh strip to the midportion of the sacrum (Fig. 3).

After fixation of the mesh, the rectum was held on light tension using the laparoscopic Babcock forceps. The right limb of the mesh was positioned and secured to the adventitial tissue of the rectum using a box-configuration laparoscopic stapler, with *shallow* staple placement. Staples were placed only along the superior and inferior mesh edges (Fig. 4). The rectum was then retracted to the right, and the left limb of the mesh was brought around the rectum and secured to the rectal adventitia in similar fashion at the upper and lower mesh edges. Care was taken to provide a wide anterior rectal hiatus in the mesh cradle thus created (Fig. 4), avoiding even the slightest encirclement of the rectum by the mesh. Excess anterior mesh was finally trimmed on either side of the rectum, after which the vaginal trocar puncture was sutured laparoscopically with a 3-0 Vicryl® (Ethicon, Inc.; Somerville, NJ) suture on a "ski" needle, secured with an extracorporeal knot, the knot then advanced with a knot pusher to the site of suture. The laparoscopic ports were then removed, followed by closure of the defects. Perioperative antibiotics were employed.

This patient's postoperative course was entirely benign, with rapid resumption of normal bowel function. In addition, preoperative incontinence disappeared in the early postoperative period. Only three weeks postoperatively, anal sphincter resting pressure was 25 percent higher than preoperative values. However, this was not accompanied by any demonstrable postoperative improvement in attenuated rectoanal inhibitory reflex. "Inappropriate" stimulation of the rectoanal inhibitory reflex by rectal prolapse is perceived to have contributed to the patient's worsening preoperative incontinence.[2] Improvement in resting pressure, but not in the reflex, was evident after correction of the prolapse.

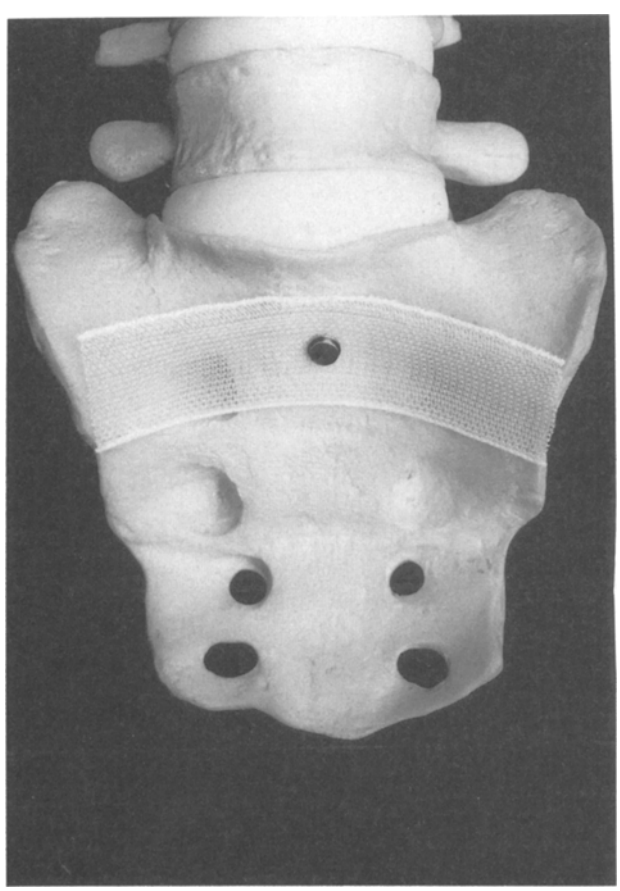

Figure 3. Illustration in a model of mesh fixation by the midline titanium tack below the sacral promontory. Tack insertion (or withdrawal) may be accomplished using a weighted sleeve impeller on the shaft of the tacker.

DISCUSSION

Goldberg and Madoff's[3] landmark symposium on rectal prolapse outlines almost all theoretical and practical considerations in this multifaceted disease, exclusive of laparoscopic rectopexy, herein described. Abdominal rectopexy using a mesh prosthesis has been largely popularized by Ripstein.[4] Although such procedures have been asso-

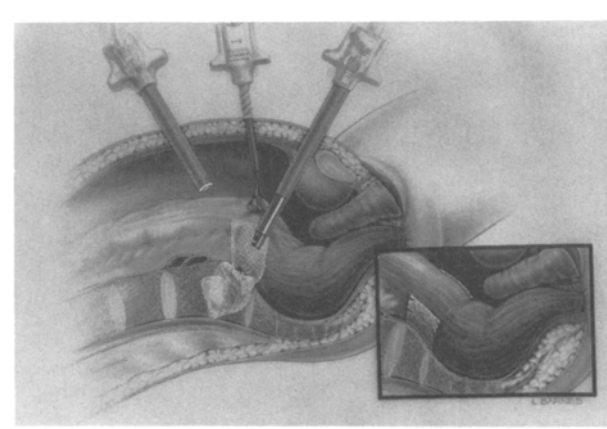

Figure 4. Laparoscopic fixation of mesh to the sacrum with the sacral tack *via* suprapubic or vaginal trocar. Mesh may be secured to the rectum by sutures or staples.

ciated with a low incidence of recurrence, they have been plagued by worsening constipation in patients who were constipated preoperatively. For this reason, other abdominal, perineal, and transanal options have evolved. Of abdominal approaches in constipated patients with prolapse, lateral stalk fixation with sigmoid colon resection is often the most appropriate. Perineal procedures for rectal procidentia are also appropriate for many constipated patients but may not be ideal for the active, ambulatory patient, whose tendency toward recurrence may be increased. Abdominal rectopexy was elected for our patient because she was incontinent but never constipated and was relatively young and active. Her chronic productive cough contributed to this decision. However, significant cardiopulmonary limitation also suggested that conventional laparotomy might provide a significant morbidity factor for her in the postoperative period. Hence, laparoscopic rectopexy was offered as a therapeutic option.

Increasing facility among colon and rectal surgeons with laparoscopic procedures and the current availability of a laparoscopic sacral tacker make laparoscopic abdominal rectopexy an attractive and minimally invasive option for patients with rectal prolapse who might not be physiologically matched to an open abdominal procedure. We believe that this procedure represents the first description of sutureless laparoscopic rectopexy, an option made possible by the availability of the laparoscopic sacral tacker and stapler. Use of the tacking device avoids potential uncertainties of laparoscopic presacral suture placement, including presacral hemorrhage.

Stolfi and associates[1] recently described a titanium sacral thumbtack for management of presacral hemorrhage during surgery on the pelvic colon. Its multiply ridged 7-mm shaft withstood significantly more force for sacral extraction than did conventional smooth shafts. These authors further demonstrated that the 7-mm depth could be safely used in all sacral vertebrae. A malleable tack applier for presacral venous bleeding was developed for open operations. By contrast, the laparoscopic sacral tacker developed for our procedure is designed for use through a suprapubic or vaginal port, depending upon the degree of angulation of the anterior sacral table. Its possible application to presacral hemorrhage in other laparoscopic (or open) procedures is also anticipated by its design.

Use of the laparoscopic sacral tacker in its present straight configuration may be a limiting factor in some male patients, in whom the anatomic luxury of the second perineal option would not be afforded. Use of the vaginal trocar in our patient was a maneuver of necessity that, coincidentally, maintained excellent pneumoperitoneum during the remainder of the operation and excellent perpendicular alignment of the tacker with the anterior sacral table. Videoculdoscopy, performed for tacker alignment as described in this patient, may have still other applications for surgical laparoscopy, including improved exposure for laparoscopic repair of anterior abdominal wall hernias.

As noted, our procedure employed a midline posterior tack and a horizontal mesh cradle, allowing suspension of the rectum in the posteriorly placed cradle (Fig. 4). Mesh encirclement of the rectum was fastidiously avoided, as it likely contributes to postoperative constipation. Indeed, size of the posterior cradle could be significantly reduced and still be effective in suspension by this means. Other options for the tacker would permit *lateral stalk* fixation, either by sutures to a posterior mesh strip or with smaller mesh pledgets and *bilateral* tacks. Theoretically, placement of mesh may invite infection if sigmoid resection is elected at the time of rectopexy, as for patients with advanced diverticular disease or very redundant sigmoid colon. In this context, lateral stalk fixation with high sacral tacks (without mesh) would likely accomplish the desired objective. Unlike the central tack placement described in our patient, greater sensitivity to sacral foramina and neural structures must attend bilateral tack placement.

Patients with normal bowel habit (or diarrhea) and no history of constipation or obstructed defecation are probably ideal candidates for laparoscopic rectopexy without resection, especially if there is no significant redundancy of the sigmoid colon. In patients with massive procidentia, the presence of a large mesorectum and redundant sigmoid will more likely mandate a resective procedure. One of the strongest secondary observations in the course of our procedure was the ease of exposure and visualization of the pelvis during dissection. Conceivably, laparoscopic dissection of the rectum may also have a role in selected patients whose low anterior or abdominoperineal resection will be otherwise accomplished by open operation.

Additional investigation with the laparoscopic

sacral tacker also suggests its use for *vaginal* suspension in cases of combined rectal and vaginal prolapse, especially in patients with synchronous enterocele, as described by Sullivan *et al.*[5] The author has performed laparoscopic attachment of a vertically placed prosthetic mesh to the posterior vagina in sheep, using a "knifeless" modification of intraluminal intestinal staplers.[6] The cranial end of the vertical mesh is then fixed to the sacrum with the laparoscopic sacral tacker, as described in our patient. Finally, the rectum is secured in suspended position by staples to the lateral mesh edges.[5] Since staple fixation of mesh to the vagina would likely be applicable only to patients who are not sexually active, other methods are being investigated to provide predictable *suture* fixation of the caudal end of the mesh to the posterior vaginal wall or perineum.

SUMMARY AND CONCLUSIONS

A case of sutureless laparoscopic rectal sacropexy is presented, as performed for a patient with normal bowel habit and rectal procidentia complicated by incontinence. This procedure was made possible using a laparoscopic sacral tacker and mesh fixation to the sigmoid colon with laparoscopic staples. Indications, contraindications, and laparoscopic technique are detailed in the context of anatomic and physiologic variables that influence choice of a surgical procedure for patients with rectal prolapse. Rectopexy procedures without resection should probably be limited to patients who are clearly not constipated preoperatively, since constipation will often worsen in such patients after rectopexy.

Laparoscopic pelvic suspension procedures are realistic options for colon and rectal surgeons, affording minimally invasive means for relief of benign but often debilitating disease. Secondary lessons suggested by this exposure indicate a possible value for videoculdoscopy in other laparoscopic procedures. Moreover, enhanced visualization of the pelvic colon during laparoscopic dissection suggests a possible role for laparoscopic rectal dissection preparatory to open resection in selected patients. This perceived technical benefit will clearly need to be weighed on the "scales of equipoise" in terms of predictability of field clearance when colorectal cancer is the problem.

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Narrated videotape available through ASCRS Film Library.

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