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How I Do It

# A Case of Robotic Posterior Rectopexy for Full-thickness Rectal Prolapse

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**Abstract**
We describe our experience with robotic posterior rectopexy for a patient with full-thickness rectal prolapse. To our knowledge, this is the first report of such a case in the literature. A 94-year-old woman presented with a history of gradually worsening rectal prolapse. On examination, we found that the rectum was completely prolapsed, and we observed a prolapsed intestinal tract. Surgery was indicated and robotic rectopexy was performed without intraoperative complications. The postoperative course was uneventful, and she was discharged 10 days after the operation. One year later, there were no signs of recurrence. Robotic surgery has become common in recent years. We used robotic surgery for rectopexy, including the suturing procedure. Suturing in robotic surgery is easier than that in laparoscopic surgery, and we demonstrated that robotic rectopexy could be safely and easily performed. The trial was registered in the UMIN clinical trial registry (number 000040378).

**Keywords**
robotic surgery, rectopexy, rectal prolapse

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## Introduction

Full-thickness rectal prolapse (FTRP) is a circumferential prolapse of the rectal wall through the anus. This condition is embarrassing and socially debilitating, causing pain, fecal incontinence, difficulty in evacuating stools, mucous secretions, and bleeding[1]. Over 100 different techniques for the correction of rectal prolapse, including perineal and abdominal approaches, have been described without a consensus on optimal treatment strategies[2].

The perineal approach is traditionally chosen for elderly patients with moderate to severe comorbidities because it can be performed under local anesthesia and is usually well tolerated[3]. In contrast, the long-term recurrence rate favors abdominal surgery over perineal surgery[4]. Recently, minimally invasive laparoscopic rectopexy has become a popular treatment option for patients with rectal prolapse. However, the procedure requires suturing in a narrow pelvic space. The robotic procedure requires less space for suturing and is, therefore, beneficial in these cases. This study reports the first case of robotic posterior rectopexy (RPR) in a patient with FTRP.

## Case Report

A 94-year-old woman presented with a 1-year history of rectal prolapse. The condition worsened gradually, and she was referred to our department for medical treatment. On examination, the rectum was completely prolapsed. Fecal incontinence and mucus leakage from the prolapsed intestinal tract were also observed (Figure 1). Computed tomography and magnetic resonance imaging showed FTRP (Figure 2A,

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B). Surgery was indicated because FTRP reduced her quality of life. She had a pacemaker because of a complete atrioventricular block and no history of abdominal surgery. The study protocol was approved by the Ethical Advisory Committee of Fujisawa Shonandai Hospital before the study began. The study was registered with the Japanese Clinical Trials Registry (UMIN-CTR) as UMIN000006039 (http://www.umin.ac.jp/ctr/index.htm). Consent for the publication of this information, including photographs, has been obtained from the patient.

**Figure 1.** Physical findings show a 12-cm-long rectal prolapse.

Under general anesthesia, the patient was placed in the lithotomy position. An 8-mm robotic trocar was inserted umbilically, and all other robotic trocars were placed after insufflation to 12 mmHg with the AIR SEAL system (CONMED, Utica, NY, USA) (Figure 3). The trocar in the upper right abdomen was the AIR SEAL port, and a 5-mm assistant trocar was placed in the lower abdomen. Then, the patient was placed in a steep Trendelenburg position and tilted upward on her left side. The omentum and small intestine were positioned to allow for visualization and access to the pelvis and sacral promontory. The da Vinci patient cart (da Vinci Surgical System, Intuitive Surgical Inc., Sunnyvale, CA, USA) was docked near the patient's left hip, aligning the patient cart and camera port across the anterior superior iliac spine.

A peritoneal dissection was initiated by opening the right pararectal parietal peritoneum. This detachment was continued from right to left, with complete excision of the excess peritoneum. The detachment was performed using da Vinci monopolar scissors. Posterior dissection was performed until the sacral promontory was reached and was continued down to the pouch of Douglas. Dissection of the rectovaginal space was also performed. The upper part of the lateral rectal ligament was resected while preserving the midrectal vessels. During the dissection, the superior hypogastric nerves, the autonomic branches, and the pelvic autonomic nerve plexus were preserved. Mesh (Ventralight™ ST; CR Bard Inc., Warwick, RI, USA) was placed in front of the sacrum and secured to the promontory and sacrum with nine stainless steel studs (BARD® CAPSURE®, C. R. Bard, Inc.;

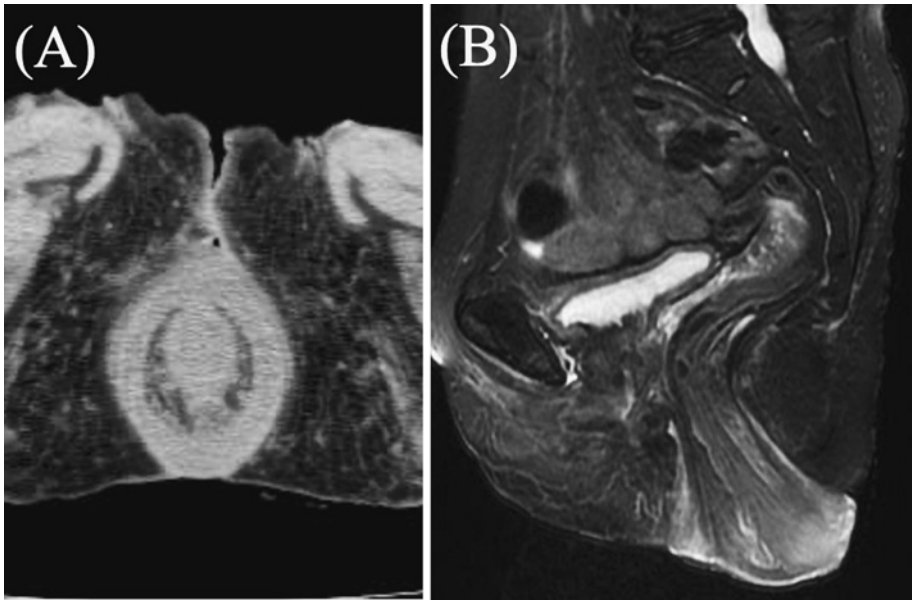


**Figure 2.** (A) Pelvic computed tomography shows rectal wall thickening and rectal prolapse. (B) Magnetic resonance imaging shows a rectal prolapse.

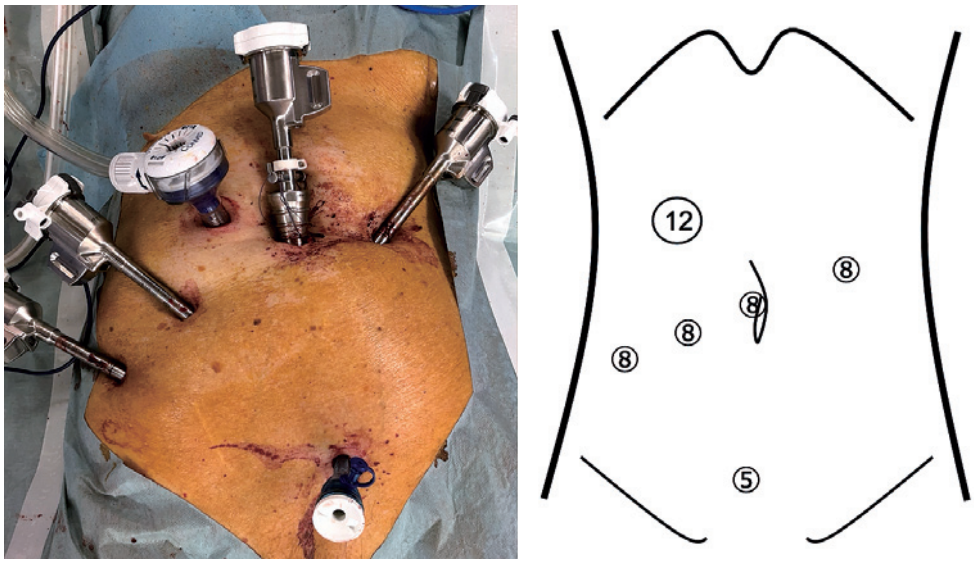


**Figure 3.** Port positioning for robotic posterior rectopexy.

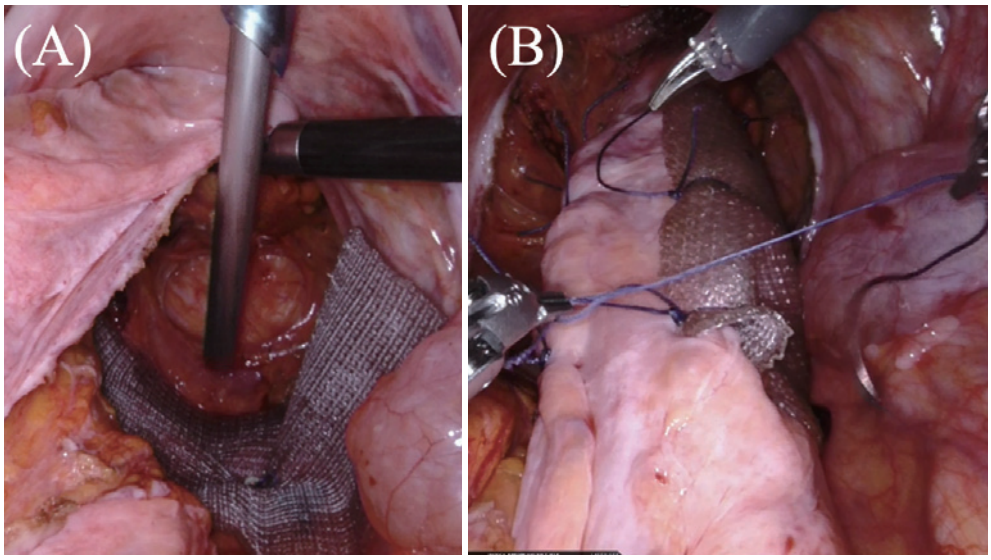


**Figure 4.** (A) Intraoperative findings. Mesh is placed on the promontorium. (B) Mesh is fixed to the rectum with a six-point suture.

Figure 4A). The mesh was sutured to the lateral sides of the rectum with three sutures per side (Figure 4B). The left peritoneum opened was not closed to create a dead space. The fascia in the AIR SEAL port site was closed with Vicryl™. The total operation time was 158 min and the estimated blood loss was 5 mL. The operation was completed without intraoperative complications. The postoperative course was uneventful. She was discharged 10 days after the operation. One year postoperatively, there were no signs of recurrence.

## Discussion

The FTRP is defined as the protrusion of all rectal wall layers through the anus. This condition may lead to anal sphincter damage and increased defecation difficulties. Therefore, patients with FTRP experience anal incontinence or constipation. Women are more susceptible, and half of the female patients are over the age of 70 years[5].

The purpose of treatment is to eliminate prolapse, correct associated incontinence or constipation dysfunction, and prevent new bowel dysfunction. The PROSPER trial revealed a 30% recurrence rate with transanal procedures. Therefore, this approach is generally chosen for high-risk patients with significant comorbidities[6]. Methods using an abdominal approach can be divided into three procedures.

The first method, suture rectopexy, includes complete mobilization of the rectum to the level of the levator ani mus-

cle. Then, sutures or staples are used to secure the rectum to the sacral promontory. New-onset constipation has been reported in 0%-40% of patients[7], and a study reported a recurrence of FTRP in nine patients (12%) within 1 year postoperatively[8].

The second procedure is ventral mesh rectopexy. Dissection is anterior to the rectum, preserving the lateral ligaments, and the rectovaginal septum is dissected to the pelvic floor, avoiding mobilization of the midrectum. The rectum is attached to the sacrum by a mesh sutured as distally as possible to the anterior side of the rectum. This procedure preserves the autonomic nerves and improves constipation in most patients. Newly developed constipation was found in 0%-6% of patients[7].

The third type is posterior mesh rectopexy. After the rectum is fully mobilized, a mesh is inserted between the sacrum and the posterior rectum, sutured to the rectum, and secured to the promontory. The mortality rates ranged from 0% to 1.2%, and the recurrence rates of FTRP ranged from 0% to 4%. New-onset constipation has been reported in 5%-44% of patients[7]. The surgical robot is good at suturing but we opted for this procedure because the recurrence rates are lower than those of suture rectopexy.

Recently, a laparoscopy-based abdominal approach has emerged as an effective tool for the treatment of rectal prolapse. Previous studies have pointed out that laparoscopic surgery has many short-term advantages over open surgery, including reduced pain and blood loss, shorter hospital stays, and faster recovery[9]. Therefore, FTRP can be safely treated using a laparoscopic approach, even in elderly patients.

Postoperative constipation is an important functional problem frequently encountered after a rectopexy procedure. The exact mechanism of constipation after rectal fixation remains unclear, but several factors have been suggested to contribute to this phenomenon. Redundant or twisted sigmoid colons can cause delayed transport and cause functional obstruction[10]. In addition, constipation may occur because of nerve injury during full mobilization. To avoid these technical problems, we selected robotic rectopexy because of the anatomical proximity between the mesorectum and the pelvic nerves and the difficulty in identifying tiny anatomical structures, such as the nerves of the inferior hypogastric plexus in the narrow pelvis[11].

Key advantages of the robotic approach include localized visual acuity, a stable camera platform, and improved access to the narrow pelvis. This improves visualization and avoidance of pelvic nerve damage[12]. Kim et al.[13] demonstrated favorable urogenital outcomes in robotic rectal surgery than in laparoscopic rectal surgery. In fact, the patient in this study did not develop constipation.

Most robotic surgeries require a significantly longer operative time than laparoscopic surgeries because robotic surgery requires time for docking and device replacement. However, most posterior rectopexy procedures involve rectal mobilization and suturing. Suturing with a robotic surgical system is much easier and safer than with a laparoscopic system, and RPR tends to be fast. Comparing the cost and benefits of a newly introduced treatment technology is critical. Robotic surgery was previously considered to be more expensive than laparoscopic surgery. Regarding the treatment of rectal prolapse, robotic surgery, which results in favorable urogenital outcomes, is cost effective compared with laparoscopic surgery, which results in long-term medication use because of associated postoperative defecation and urination disorders. The initial cost of robotic surgery is certainly more than that of laparoscopic surgery but we believe that it is acceptable given the cost in the long run.

As demonstrated in this study, RPR is indicated for patients, even elderly patients, with FTRP. However, more cases need to be investigated, and we need to further evaluate whether RPR causes constipation in patients.

Conflicts of Interest

There are no conflicts of interest.

Author Contributions

Shinsuke Suzuki performed the collection, analysis, and interpretation of the data. All authors contributed to the writing, review, and final approval of the report.

Approval by Institutional Review Board (IRB)

The study protocol was approved prior to initiation by the Ethical Advisory Committee of Fujisawa Shonandai Hospital and the institutional review board of each participating hospital (Registry number as 2-04).

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