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Case Report

Laparoscopic Total Pelvic Exenteration After Neoadjuvant Imatinib Therapy for Gastrointestinal Stromal Tumor of the Rectum: A Case Report

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Total pelvic exenteration (TPE) may be the only curative procedure for locally advanced rectal gastrointestinal stromal tumor (GIST) that is contiguous with the adjacent organs and pelvic wall. There is no previous report of laparoscopic TPE for advanced rectal GIST. Here, we describe our experience of performing laparoscopic TPE on a locally advanced rectal GIST after neoadjuvant imatinib chemotherapy. A 62-year-old Japanese man was diagnosed with locally advanced rectal GIST that was contiguous with the seminal vesicles, prostate, and left pelvic sidewall. He received imatinib mesylate for 5 months, after which the mass had shrunk but was still contiguous with adjacent organs. We therefore needed to perform TPE, and we accomplished the operation laparoscopically. The total operative time was 540 minutes and estimated blood loss was 280 mL. There were no intraoperative complications and not required conversion to open surgery. The patient had his first stool on the first postoperative day and discharged on the 21st postoperative day with no major complication. Pathologic examination of the resected specimen revealed negative margins. The patient had further adjuvant imatinib chemotherapy and had no recurrence for 20 months postoperatively. Laparoscopic TPE appears to be minimally invasive surgery and safe in the present case of rectal GIST. This is the first report of a case in the world that underwent laparoscopic TPE for advanced rectal GIST.

Key words: Laparoscopy – Pelvic exenteration – GIST – Neoadjuvant

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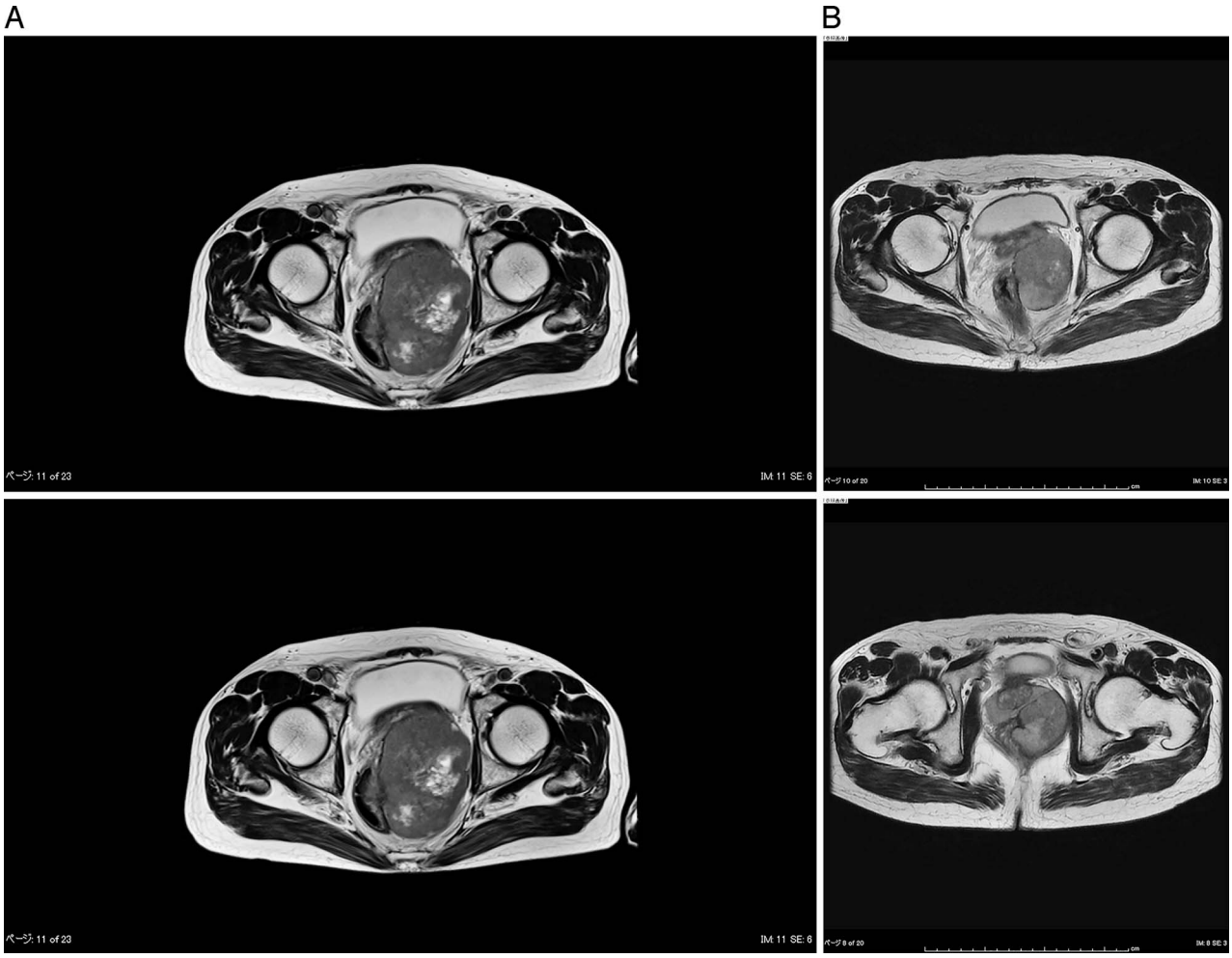

Fig. 1 Magnetic resonance images. (A) Before imatinib therapy, the tumor widely involves the seminal vesicles, prostate, and left pelvic sidewall. (B) After neoadjuvant imatinib therapy, the tumor has reduced markedly in size; however, invasion of the seminal vesicles and prostate is still present.

Gastrointestinal stromal tumor (GIST) is the commonest mesenchymal neoplasm that arises in the gastrointestinal tract. The rectum is the third most common site for GISTs, accounting for about 5% of all GISTs.[1] Thus far, the main treatment for rectal GISTs is surgery, including local excision, anterior resection, abdominoperineal resection,[2] and total pelvic exenteration (TPE) by laparotomy.[3] Complete surgical resection of localized GISTs is the most effective means of reducing the rate of recurrence and improving the outcome.[4] Recently, neoadjuvant tyrosine kinase inhibitors, particularly imatinib mesylate (Glivec, Novartis, Basel, Germany), has been used increasingly for locally advanced GISTs.[5]

Laparoscopic surgery, an accepted treatment option for colorectal cancer, is increasingly performed worldwide. As surgeons have gained experience, the range of laparoscopic procedures for rectal cancer have gradually been extended, now including TPE[6] and abdominosacral resection.[7] However, there are few reports of laparoscopic surgery for rectal GIST and none on laparoscopic TPE for this tumor. Here, we report the first case in the world which underwent laparoscopic TPE after neoadjuvant imatinib therapy for advanced primary rectal GIST.

Case Report

A 62-year-old Japanese man was referred to another hospital for melena. Colonoscopy showed an ulcerated submucosal tumor 5 cm from the anal verge. A biopsy was positive for c-kit and CD34, but not for

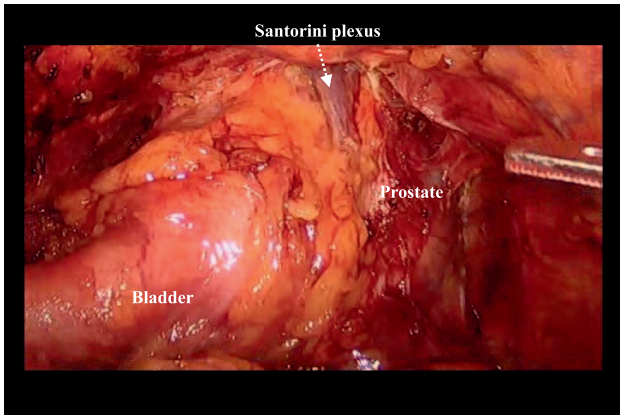

Fig. 2 Laparoscopic view of anterior side of prostate. The Santorini plexus has been exposed.

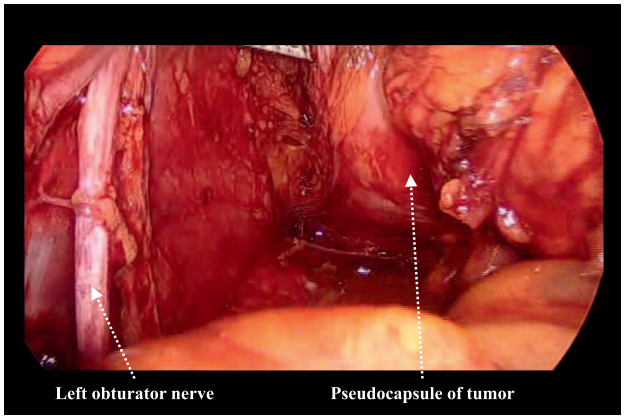

Fig. 3 Laparoscopic view of left side of rectum after lateral pelvic lymph node dissection. The left obturator nerve and pseudocapsule of the tumor have been exposed.

smooth muscle actin or S-100 protein. The mitotic count was zero in 20 high-power fields. Based on these findings, a diagnosis of rectal GIST was made. Initial computed tomography (CT) and magnetic resonance imaging (MRI) showed a 10×7 cm tumor contiguous with the seminal vesicles, prostate and left pelvic sidewall without evidence of lymph node or distant metastasis (Fig. 1A). After the patient had received oral imatinib mesylate chemotherapy (400 mg once daily) for 2 months, his mass shrank from 10 cm to 6 cm and he was referred to our hospital for surgery. Imatinib mesylate chemotherapy was continued for another 3 months, during which the tumor did not shrink further. Abdominal CT and MRI showed that it was still contiguous with the seminal vesicles, prostate and left pelvic plexus (Fig. 1B). Eventually, because neoadjuvant chemotherapy with imatinib had not achieved sufficient tumor regression to justify preserving adjacent structures, we elected to perform TPE to maximize the chance of achieving complete resection.

The patient was placed in the lithotomy position under general and epidural anesthesia. Five ports were placed as follows: a 12-mm port at the umbilicus for the scope and four 5-mm ports in the upper and lower bilateral abdominal quadrants. Medial-to-lateral retroperitoneal dissection was performed and the superior rectal and sigmoid arteries divided. After resection of its mesentery, the sigmoid colon was transected with a linear stapler at the level of the sacral promontory. Dorsal dissection was then performed in the avascular plane between the mesorectum and parietal pelvic floor. The hypogastric nerves were divided bilaterally at their bifurcations from the superior hypogastric plexus. The ureters were exposed and dissected down to the level of the ureterovesical junction, after which they were clipped and transected at this point. The peritoneum overlying the external iliac artery was incised down to the level of the vas deferens, which was then ligated. The paravesical and retropubic space were dissected down to the level of the endopelvic fascia (Fig. 2).

We performed *en bloc* resection of the pelvic plexus and exposed all relevant anatomical landmark in the lateral pelvic area. The lateral, medial, cranial, caudal, and dorsal anatomic borders of this region are the external iliac artery, pelvic plexus, bifurcation of the common iliac artery, levator ani muscle, and sciatic nerve, respectively. The superior and inferior bladder vessels were ligated at their bifurcation from the internal iliac artery. The obturator vessels were divided, but the obturator

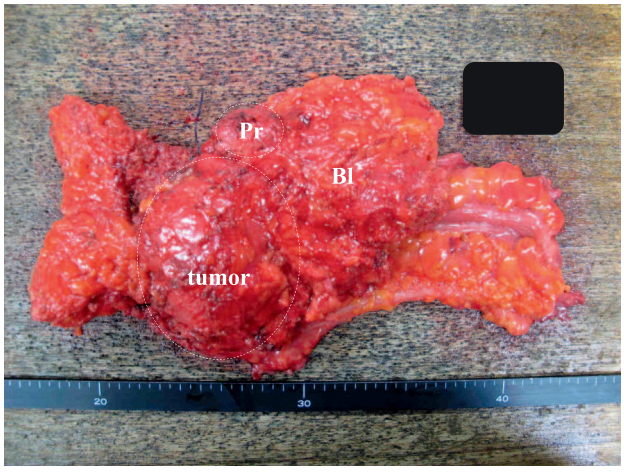

Fig. 4 Resected specimen. Bl, bladder; Pr, prostate.

nerve preserved (Fig. 3). The planes of retrorectal and lateral dissection were connected by dividing the pelvic splanchnic nerves. The vascular pedicles of the bladder were then resected at a practicable level, thus completing the intraperitoneal approach.

For the perineal approach, the patient was placed in a jack-knife position and the anus closed. The skin was incised around the anus, after which dissection was carried out laterally, including dividing the pelvic floor musculature and anteriorly ligating the urethra and Santorini plexus. The entire specimen was removed *en bloc* through the perineal wound, achieving negative resection margins (Fig. 4). The perineal wound and defect were closed primarily. At the end of the procedure, the patient was again placed in the lithotomy position and an ileal conduit reservoir was constructed extracorporeally through the right lower abdominal incision, which had been designed to accommodate a urostomy, and sigmoid colostomy was constructed through the left lower abdominal incision in the same way.

The total operative time was 540 minutes; estimated blood loss was 280 mL. There were no intraoperative complications and not required conversion to open surgery. The patient had first stool on the next day and had clear fluids on the first postoperative day and a soft diet from the fifth postoperative day. Although urinary tract infection and requiring treatment with antibiotics occurred, the patient was discharged on the 21st postoperative day with no perineal wound or pelvic dead space infection. Pathologic examination showed that an encapsulated tumor that had spread from the muscularis propria without direct infiltration of adjacent structures. Most of the tumor was hyalinized and the cellular density was very low. Immunostaining of the tumor was positive for c-kit and CD34. No metastases were found in the resected lymph nodes. The mitotic count was fewer than 1 per 50 high-power fields. To date, the patient has been receiving continuous imatinib treatment for and 20 months since surgery and has no evidence of tumor recurrence.

Discussion

Surgical resection is the standard therapy for primary localized GIST and the only means of cure. We here report our experience of laparoscopic TPE after neoadjuvant imatinib therapy for locally advanced primary rectal GIST. Although TPE remains an important means of managing advanced pelvic malignancies, it has historically been associated with high morbidity and mortality. Most recently, Yang *et al* reviewed the current evidence regarding clinical outcomes in patients who had undergone open pelvic exenteration and reported high complication rates ranging from 37% to 100%.[8] Moreover, the mean blood loss was usually over 1 litter in most literatures.[9–11] Laparoscopic surgery (minimally invasive surgery) has some advantages over open surgery, including less postoperative pain, less blood loss, and good magnified visualization. Although rectal surgery can present major technical difficulties, the magnified view obtained by laparoscopy allows more precise dissection. In our case, estimated blood loss was only 280 mL, so required no blood transfusion, and no major complication occurred. The few reports of laparoscopic surgery for rectal GIST illustrate its potential benefits; namely, low anterior resection and intersphincteric resection.[12–14] However, there is no previous report of laparoscopic TPE for GIST. To the best of our knowledge, this is the first report of laparoscopic TPE for advanced rectal GIST.

The main principle governing surgical treatment for GIST is to achieve complete resection with preservation of an intact pseudocapsule and avoidance of tumor rupture, thus minimizing the recurrence rate and improving outcome.[4] On the other hand, lymphatic metastases are uncommon in GIST and there was no suspicion of lateral lymph node metastases in this case; lateral lymph node dissection was considered unnecessary. However, to ensure a safe resection margin and avoid unintentional tumor rupture or injury to important structures such as the obturator nerve or ureter, relevant anatomic landmarks in the lateral pelvic area comprised the origins of major arteries and veins, all of which were all safely exposed and transected.

Complete resection is the primary treatment for GIST; however, approximately 50% of patients developed recurrences or metastases within 5 years of primary resection.[4] Imatinib can further improve patient outcomes when administered as neoadjuvant therapy.[5] Because, primary tumors are fragile and hypervascular, preoperative imatinib therapy may decrease the risk of bleeding, postoperative complications, and tumor rupture. In our case, the tumor shrank after preoperative chemotherapy, but preservation of adjacent organs would have compromised oncologic safety. Thus, TPE was required and was accomplished safely with achievement of negative margins on pathologic examination.

In conclusion, it is reasonable to consider the combination of preoperative imatinib therapy and surgical resection for advanced rectal GISTs. Despite beneficial effects from imatinib therapy, some patients still require TPE. Laparoscopic TPE is safe and feasible for patient with locally advanced rectal GISTs.

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