

Diagnosis and treatment of gastrointestinal stromal tumor extending to prostate

A case report and literature review

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Abstract

Rationale: Gastrointestinal stromal tumor (GIST) is the neoplasm of gastrointestinal tract.

Patient concerns: The patient complained about the retention of urinary.

Diagnoses: GIST.

Interventions: radical prostatectomy and the imatinib therapy.

Outcomes: No recurrence and metastasis have been found during a 14-month follow-up.

Lessons: comprehensive treatment is necessary for the GIST treatment. Furthermore, we summarize a review of the literature of GIST occurring in the prostate gland treated by different methods and 4 kinds of rare diseases in prostate.

Abbreviations: GIST = gastrointestinal stromal tumor, MDT = multiple disciplinary team, MRI = magnetic resonance imaging, NCCN = National Comprehensive Cancer Network, PSA = prostate-specific antigen.

Keywords: case, gastrointestinal stromal tumor, literature review, prostate, surgery

1. Introduction

Gastrointestinal stromal tumor (GIST) is a specific group of mesenchymal neoplasms, which express the KIT protein, and occurs in the gastrointestinal tract almost exclusively.^[1,2] It is rare to initiate from the urinary syndrome such as dysuria, nocturia, and acute urinary retention, which always originated from the tumor of the anterior rectum wall or prostate.

Widely accepted, surgical resection is the mainstay of the treatment for rectum GSIT invading to the prostate. The local recurrence, distant metastasis, urethral injury as well as the limited operation field, however, are much attributable to the difficulties of the large tumor treatment. Thus, some reported the combination of

imatinib therapy and laparoscope-assisted procedures as an attractive approach for the treatment of rectal GIST with the invasion of the prostate.^[3,4] This method, which has only been reported by 2 papers, is hard to manage the tumor more than 10 cm though. In this report, we described a case of a huge rectal GIST extending to the prostate gland and bladder wall treated with the combination of imatinib therapy and laparoscopic procedure with a suprapubic incision and reported this rare GIST with the diameter of 11 cm. Moreover, we reviewed all documented cases for the rectum GIST adhesive to prostate and summarized characters of some of the rare prostatic malignant diseases.

2. Patients

The patient was a 67-year-old man who was examined in the urology department of our hospital due to the chief complaint of acute dysuria. With the catheter indwelled, bladder ultrasound indicated an extremely enlarged prostate. The patient's prostate-specific antigen (PSA) level was 2.01 ng/mL, and other laboratory values were normal. The GIST was first diagnosed on prostate needle biopsy. Furthermore, endoscopic ultrasound with colonoscopy and magnetic resonance imaging (MRI) of the pelvis revealed a tremendous tumor, measuring $11 \times 11 \times 8 \text{ cm}^3$, located anterior to the rectum compressing the prostate. The surgery was delayed, and the patient was on a neoadjuvant therapy with imatinib, which was administered in doses of 400 mg/d with a period of 3 months. After the therapy, MRI demonstrated the tumor was shrunk but still contiguous with the prostate and seminal vesicles. The patient then underwent the laparoscopic procedure with a suprapubic incision. As this study is only an observational case report, ethical approval is not necessary, and the consent of patient is obtained. This case report is following the CARE statement.^[5]

3. Treatment

The neoadjuvant therapy with imatinib (400 mg/d) was in a period of 3 months, after which surgery was carried out. Under

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laparoscopy, endopelvic fascia was incised bilaterally to expose the enlarged tumor. The mesorectum was dissected, and both seminal vesicles were visualized. Then, the tumor was separated from the wall of prostate, avoiding disruption of the tumor capsule using an ultrasonic coagulating device. Thus, the prostatic urethra was left uninjured. With the tumor peeled off from the tissue around and the operating field cleared, we did a suprapubic incision to incise the tumor as well as the rectal wall above the dentate line sufficiently distant from the tumor. Next, we extracted the tumor through the incision we made. Furthermore, colostomy was performed temporarily.

4. Results

The ultrasound colonoscopy and imaging features are shown in Fig. 1. The tumor resected was proved to be GIST pathologically. The tumor cells diffusely and strongly expressed CD117, CD34, Vim, DOG1, CalDes, and the nidus expressed the protein EMA locally (Fig. 2). It also showed Ki-67 labeling rates of 1% and no desmin (DES), glial fibrillary acidic protein (GFAP), cytokeratin, muscle-specific actin (MSA), smooth muscle actin (SMA), and

S100 were expressed in the tissue pathologic analysis. The resection margins were free of tumor cells histologically. No urinary dysfunction and injury were observed postsurgically. No local recurrence or distant metastasis was observed during the 14-month follow-up.

5. Discussion

Some previous studies have reported the GIST invasive to prostate. Among about the 20 published cases, however, only 2 were reported as primary prostatic GISTs by the final pathological analysis.^[6,7] The others are most from the rectum tissue, but not the prostate. The rectum is the third most common site for GIST (5%), following stomach (60%–70%) and small intestine (20%–25%).^[8] Pathologically, the majority of these tissues are spindle-shaped, cellular, mitotically active, and located within the muscularispropria.^[9] The malignancy standard was debatable, and the criteria accepted by most researchers are deep intramuscular, infiltration of muscularispropria, diameter of neoplasms >5 cm, presence of mitotic figures (one or more per 50 high-power field), and coagulative necrosis and

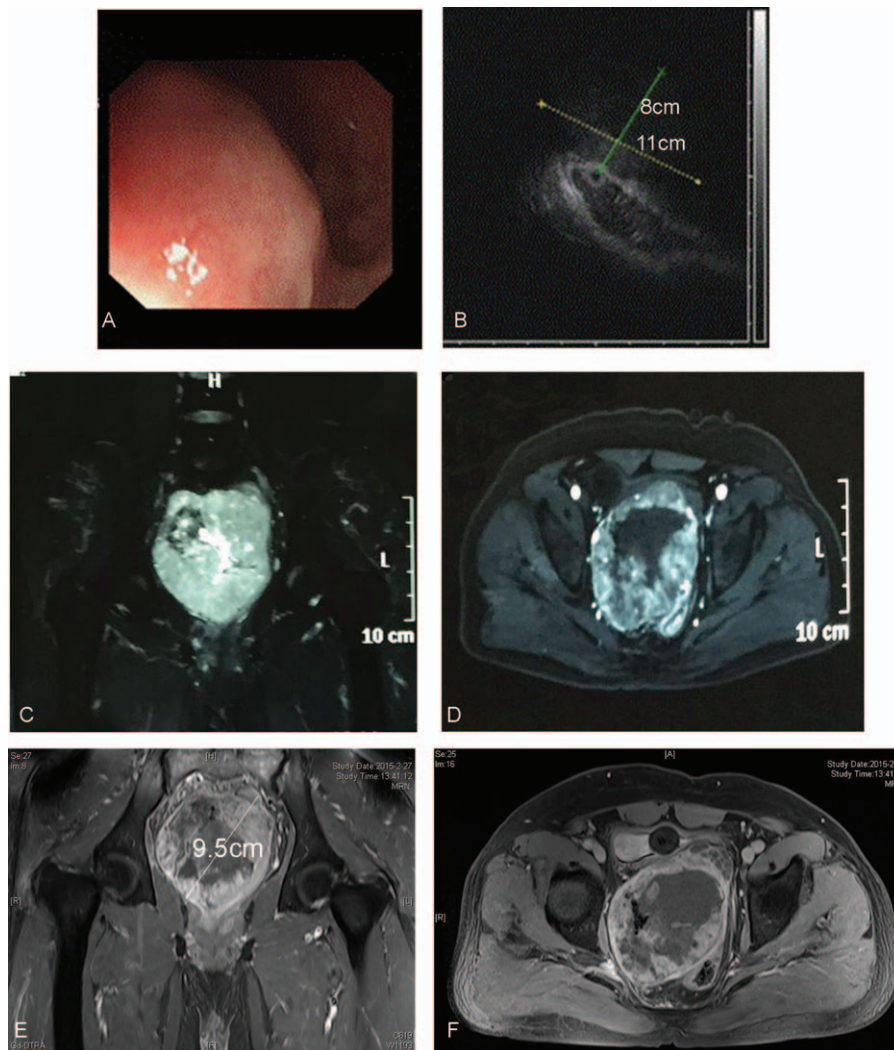


Figure 1. Preoperative examinations. (A) Enteroscopy analysis, (B) ultrasound analysis during the enteroscopy, (C and D) magnetic resonance imaging (MRI) analysis before the use of imatinib therapy, and (E and F) MRI analysis after the use of imatinib therapy with the 3-month period.

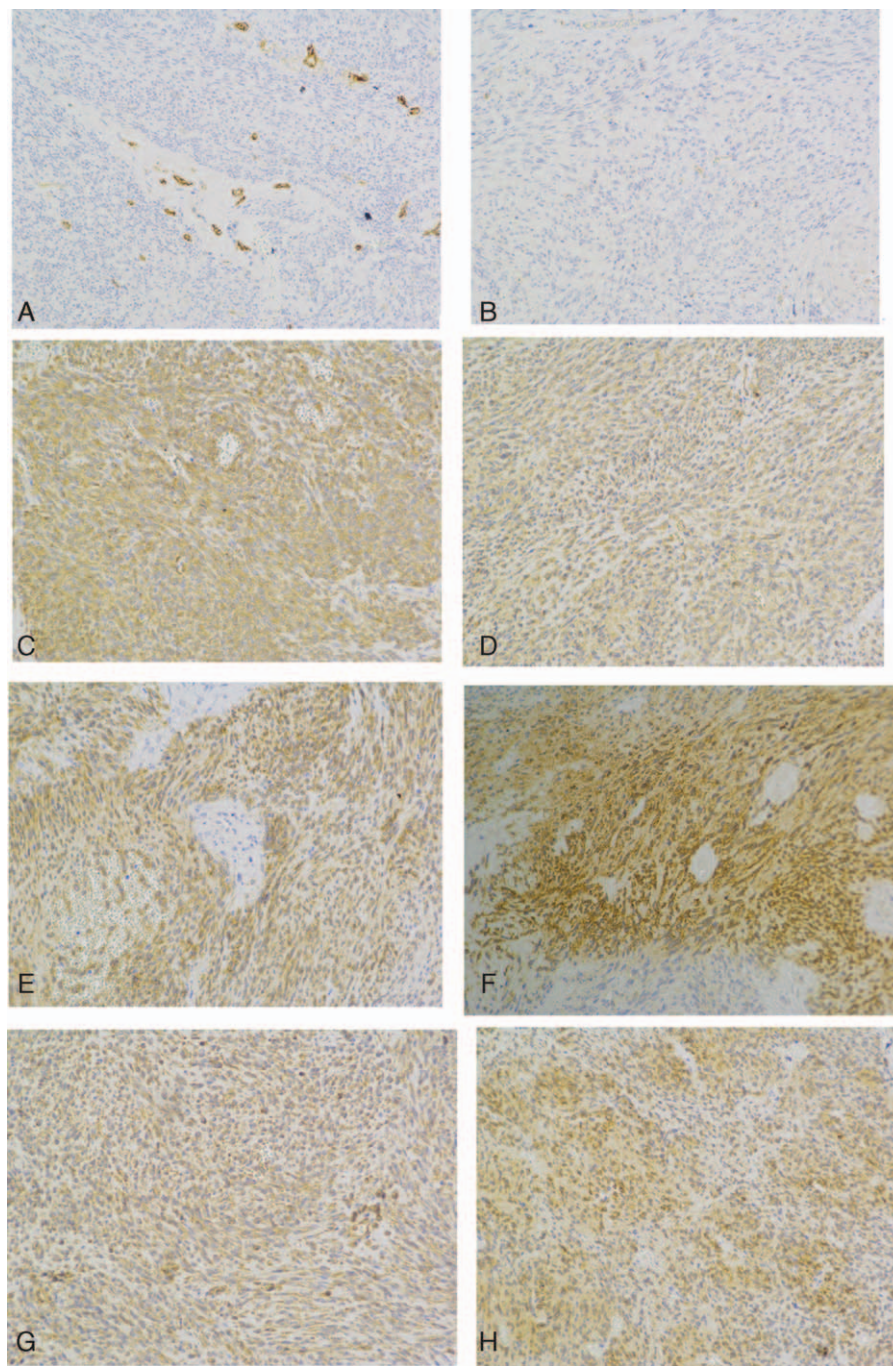


Figure 2. Pathologic analysis of the gastrointestinal stromal tumor (GIST). Immunohistochemical stainings of GIST (all 200×) showed negative immunohistochemical stainings of CD31 (A) and CK (B), positive stainings of caldesmon (C), CD34 (D), DOG-1 (E), EMA (F), vimentin (G), CD117 (H). CK = cytokeratin.

pleomorphism.^[11] National Comprehensive Cancer Network (NCCN) published that the multiple disciplinary team (MDT) was important for the treatment of GIST.^[10] The combination of iconography evidence and the pathologic analysis lead to the final diagnosis. Preoperatively, additional imaging studies as MRI are mandatory to evaluate the tumor size, contributing a lot to the operation preparation. In the immunohistochemical analysis, CD117 (the product of the *c-kit* gene and normally expressed in the interstitial cells of Cajal) and CD34 are valuable for the diagnosis of GIST. DOG1 is strongly expressed in the GIST while rarely expressed in other soft-tissue tumors. GFAP is negative in

GIST helping in differentiating from gastrointestinal schwannoma.^[11] As was reported, CalDes, SMA, MSA, Vim and DES, and neural marker S100 were helpful in the exclusion of other gastrointestinal mesenchymal tumors.^[12] Thus, diagnosis of the prostatic GIST should be made with great caution, and the huge prostate should be paid great attention for the distinguish of rectum GIST.

As far as we know, it is rare for the GIST violating prostate with the diameter over 10cm with the treatment of the combination of imatinib therapy and laparoscopic procedure with a suprapubic incision and rare GIST patients come to the

Table 1
Reviewed GIST adhesive to prostate.

Year	Authors	Age	Tumor size (cm)	Location	Treatment	Follow-up months	Recurrence metastases
2016	Reinke et al ^[14]	78	11 × 8 × 2 (resected prostate)	Anterior rectal wall, prostate	TURP + imatinib	12	No
2014	Babaya et al ^[15]	60	2.4	Between the prostate and the rectum	Laparoscopic dissection + imatinib	N/A	No
2014	Zhang et al ^[6]	31	6.0 × 6.1 × 6.5 cm ³ (prostate)	Prostate?	Imatinib + indwelling catheter	3	Died for MODS
2013	Sassa et al ^[16]	64	9.5 × 8.5	Pelvis	Imatinib + radical resection + imatinib	N/A	No
2012	Takahashi et al ^[17]	48	7	Prostate, seminal vesicles and rectum	Cystoprostatectomy and tumor excision	N/A	No
2011	Anagnostou et al ^[11]	60	7 × 5.8	Prostate and rectum	Tumor resection + imatinib	12	No
2010	Yanovsky et al ^[18]	79	N/A	Between rectum and prostate	RP	N/A	N/A
2008	Yaman et al ^[19]	58	N/A	Rectum, prostate	N/A	N/A	N/A
2008	Dickson et al ^[20]	72	N/A	Rectum, prostate	RP	N/A	No
2006	Herawi et al ^[21]	75	N/A	Rectum, prostate	TURP, RP	N/A	N/A
		64	5.4	Rectum, attached to prostate	RP	48	No
		50	7	Rectum (prostate effacement)	RP + CP	42	No
		61	7.4	Prostate, rectum, bladder, right seminal vesicle	RP	12	No
		51	1.7	Between prostate and rectum	Local excision	48	No
		42	8.5	Undetermined, attached to prostate	None (diagnosis on biopsy)	4	N/A
		48	1	Rectum submucosal	None (diagnosis on biopsy)	48	N/A
		65	N/A	N/A	None (diagnosis on biopsy)	N/A	N/A
		48	N/A	N/A	None (diagnosis on biopsy)	4	N/A
		N/A	N/A	N/A	None (diagnosis on biopsy)	N/A	N/A
2006	Lee et al ^[22]	75	6.7	Prostate	TURP, RP	6	No
2005	Van der Aa et al ^[23]	49	14.2	Prostate	None (diagnosis on biopsy)	25	Hepatic metastases
2005	Sandblom et al ^[24]	51	13	Rectum, prostate	CP + rectum	13	No
2004	Madden et al ^[25]	82	7.9	Rectum, prostate	TURP, pelvic exenteration	22	No
		54	5.5	Perirectal soft tissue	Pelvic exenteration (diagnosis on biopsy)	75	Hepatic metastases
		45	15	Adherent to rectum	CP + portion of rectum	51	Hepatic metastases
2002	Voelzke et al ^[26]	62	N/A	Anterior rectal wall, prostate, bladder base	Pelvic exenteration (diagnosis on biopsy)	14	Metastases to sigmoid colon and mesentery

CP = cystoprostatectomy, MODS = multiple organ dysfunction syndrome, N/A = not available, RP = radical prostatectomy, TURP = transurethral prostatectomy.

hospital with the chief complaint of urinary symptoms. Though the GIST sources from gastrointestinal tract, the incidence of GIST in the rectum is particularly low, especially for the tumor in the anterior wall adhesive to the prostate. These patients complain for the urinary symptoms frequently. The image shows an enlarged prostate or huge pelvic masses. In our case, the tumor was closely adhered to the prostate, and the DSA indicated no dominate vessels for the large tumor. The operating field was limited. Thus, the laparoscope was used for separating the tumor off the prostate. For the small GIST, laparoscopic procedure is dominant for its clear exposure and minimally invasive. It is, however, not encouraged in the treatment for the large GIST by the guidelines.^[1,3] Thus, in order to combine the average of the two methods and to reduce the operation time and bleeding, open surgery was carried out in our late-course surgery. As was recommended in the NCCN guidelines,^[10] imatinib sandwich therapy was suggested in the GIST treatment, while low-risk

tumor tended to be managed by surgery alone. For the big tumor more than 10cm, adjuvant therapy was necessary for the preoperative treatment of the tumor. Though some of the early publication reported the diagnosis by CD117 positivity will lead to prompt imatinib mesylate introduction and avoidance of the surgical treatment,^[11] it is hard for the only imatinib treatment for the huge GIST.

Review of the literature revealed 26 published cases of GIST treatment (Table 1). Some did transurethral prostatectomy for the tumor because of the huge prostate and the postoperative pathologic analysis present the GIST originated from rectum. Interestingly, the most of the GIST related to prostate shows a normal PSA level, which may be a differential point for the GIST and the real prostate neoplasm. Actually, there are many kinds of rare malignant prostatic diseases affecting the plasma PSA levels which are difficult to distinguish. We summarized the characteristics of the primary lymphoma of the prostate, sarcoma of the

Table 2
Reviewed rare prostatic diseases compared with the prostatic cancer.

	Source	Age	PSA	Iconography	Metastasis
Primary lymphoma of the prostate ^[27]	Mesenchymal tissue	Young	Normal	Massive enlargement	Bone, osteolytic
Prostate sarcoma ^[28]	Mesenchymal tissue	Young	Normal	Massive enlargement	Bone, osteolytic
GIST adhesive to prostate ^[1]	Mesenchymal tissue	>50	Normal	Massive enlargement	Liver
Prostatic cancer ^[29]	Epithelium	>50	High	Enlargement, peripheral zone	Bone, osteogenic

GIST = gastrointestinal stromal tumor, PSA = prostate-specific antigen.

prostate, GIST related to prostate, and the regular prostate carcinoma (Table 2).

For the limitations, this case was not the first GIST involved in prostate and the patient number is really small. Every previous author tried to report their cases in different ways, including the diagnosis, medical treatment, and pathological analysis. There exists a recommended therapeutic schedule for it in GIST guideline. However, the surgical type and method differ from each other in different individuals, which is because of the big variation of GIST in the different patients. Thus, personalized surgery should be present for them according to the tumor size and the location. Our report did not present a novel method for it but enriched the surgical method according to the patient own situation. For the diagnosis, it may be the first time using ultrasonic colonoscopy for the diagnosis and we observed that it was usable for the location measurements and recognizing of relation to the rectum. All of the above contribute to the surgery choose. Most importantly, the literature review may be helpful for the further study and personalized treatment design.

In conclusion, the diagnosis of the GIST to prostate should be cautious and distinguished carefully with iconography and pathologic analysis. Furthermore, the MDT is important for the treatment. It may be a good choice using the radical operation combined with the sandwich imatinib for the huge GIST invasive to prostate.

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