Case Report

Cytoreductive robot-assisted prostatectomy for systemic prostate rhabdomyosarcoma presenting as urinary retention

Takahiro Kirisawa,[1] Arinobu Fukunaga,[1] Hajime Takamori,[1] Aiko Maejima,[1] Yasuo Shinoda,[1] Motokiyo Komiyama,[1] Hiroyuki Fujimoto,[1] Kan Yonemori,[2] Akihiko Yoshida[3] and Yoshiyuki Matsui[1]

Departments of [1]Urology, [2]Medical Oncology, and [3] Diagnostic Pathology, National Cancer Center Hospital, Tsukiji, Tokyo, Japan

Abbreviations & Acronyms
CT = computed tomography
RAP = robot-assisted prostatectomy
RMSP = rhabdomyosarcoma of the prostate
VAC = vincristine, *d*-actinomycin, and cyclophosphamide

Correspondence: Yoshiyuki Matsui M.D., Ph.D., Department of Urology, National Cancer Center Hospital, 5-1-1 Tsukiji, Chuo-ku, Tokyo 104-0045, Japan.
Email: yomatsui@ncc.go.jp

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Introduction: In adults, rhabdomyosarcoma of the prostate is extremely rare and has an unfavorable prognosis. These patients frequently experience urinary obstruction, and cysto-prostatectomy is a mainstay treatment for localized disease. In contrast, treatment strategies for the primary site for metastatic disease remain controversial. To our knowledge, robot-assisted surgery for the primary tumor has not been reported.

Case presentation: A 26-year-old man complained of dysuria. Magnetic resonance imaging showed enlarged prostate and computed tomography revealed a pulmonary metastasis. Transurethral resection of the prostate led to the diagnosis of rhabdomyosarcoma. After chemotherapy, robot-assisted prostatectomy was performed to relieve obstructive urinary symptoms. Although disease progression in the metastatic site was observed after the surgery, urinary obstruction did not occur and quality of life was well maintained.

Conclusion: Robot-assisted prostatectomy may be beneficial both for local disease control and palliation of voiding impairment among selected patients with systemic rhabdomyosarcoma of the prostate.

Key words: prostate rhabdomyosarcoma, robot-assisted prostatectomy, systemic disease, urinary obstruction.

Keynote message

We report the first case of rhabdomyosarcoma of the prostate treated by cytoreductive robot-assisted prostatectomy that was performed to improve the patient's quality of life. This operative procedure may be suitable, especially for systemic rhabdomyosarcoma of the prostate, for eliminating obstructive voiding symptoms.

Introduction

Sarcoma of the prostate is extremely rare, and its incidence is only 0.1–2.0% among all prostate malignancies.[1] RMSP is relatively common in children, and over half of soft tissue sarcomas in children are RMSPs.[2] RMSP in adults is very rare, accounting for less than 1% of soft tissue sarcomas, and its prognosis is extremely poor.[3,4] One of the characteristic clinical problems of RMSP is obstructive voiding symptoms, which negatively impact patients.[5] Currently, there is little consensus regarding the treatment strategy for adult RMSP because of the rarity of this disease. However, complete radical surgical extirpation such as cysto-prostatectomy is the preferred treatment for nonmetastatic RMSP.[1] For systemic RMSP, the benefits of prostatectomy have not been clarified because of the limited number of cases.

Here, we report a case of an adult patient diagnosed with metastatic RMSP presenting with urinary retention.

Case presentation

A 26-year-old man complained of fatigue, dysuria, and pelvic pain. Urinalysis revealed microscopic hematuria and pyuria. The patient was initially diagnosed with acute prostatitis and

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treated with antibiotics. However, the symptoms did not improve and urinary retention occurred; therefore, an indwelling urinary catheter was inserted. Digital rectal examination revealed a solid mass compressing the rectum; however, mobility was good. Pelvic magnetic resonance imaging revealed a 110-mL heterogeneously enhanced mass fully replacing the prostate accompanied with infiltration to the seminal vesicle (Fig. 1a). Infiltration of the tumor to the rectum was unsuspected. Complete blood counts and laboratory findings were almost within the normal range.

Histopathological analysis of the transurethral resection of the prostate specimens revealed typical hyperchromatic spindle cells in a sparsely and densely fascicular proliferated pattern, and the patient was diagnosed with rhabdomyosarcoma (Fig. 2a). Immunohistochemistry results showed that the tumor specimen was positive for desmin, myogenin (Fig. 2b), alpha-smooth muscle actin, and muscle actin (HHF35). The Ki-67 labeling index was 70%. CT revealed a solitary nodule, suggesting metastasis at the middle lobe of the right lung (Fig. 1b). The clinical stage was T2N0M1 and the tumor was classified as group IV in accordance with the criteria of the Intergroup Rhabdomyosarcoma Study Group.

The patient underwent chemotherapy using VAC. After three cycles of chemotherapy, CT showed partial remission for the primary tumor and complete remission for the lung nodule (Fig. 1c,d). The patient received an additional two cycles of chemotherapy. After the systemic chemotherapy, cystoscopy revealed normal findings of the bladder and there was no tumor invasion to prostatic urethra. RAP was conducted to control the primary regions. Operating time was 311 min and estimated amount of bleeding was 129 mL. The tumor was easily dissected from the rectum as well as the pelvic floor muscles, and therefore circumferential resection margin in the prostate was macroscopically negative. Histological examination based on hematoxylin and eosin staining revealed that most of the tumor specimen was replaced by necrotic tissue and only 7% of the tumor showed atypical hyperchromatic spindle cells in a fascicular- proliferated

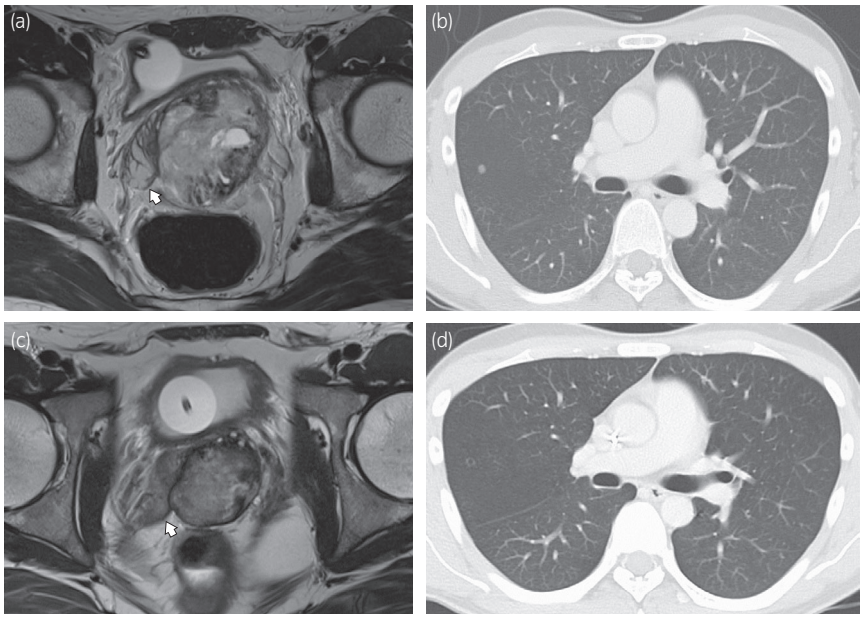

Fig. 1 Radiological images. (a) Magnetic resonance imaging revealed a 51 × 64 × 65-mm heterogeneously enhanced mass fully occupying the prostate accompanied with infiltration to the seminal vesicle (arrow). (b) CT revealed a 5 × 5-mm nodule, indicating metastasis at the middle lobe of the right lung. (c,d) CT after three cycles of VAC indicated partial remission (50 × 52 × 45-mm) for the primary tumor (c) and complete remission for the lung nodule (d). Arrow indicates seminal vesicle.

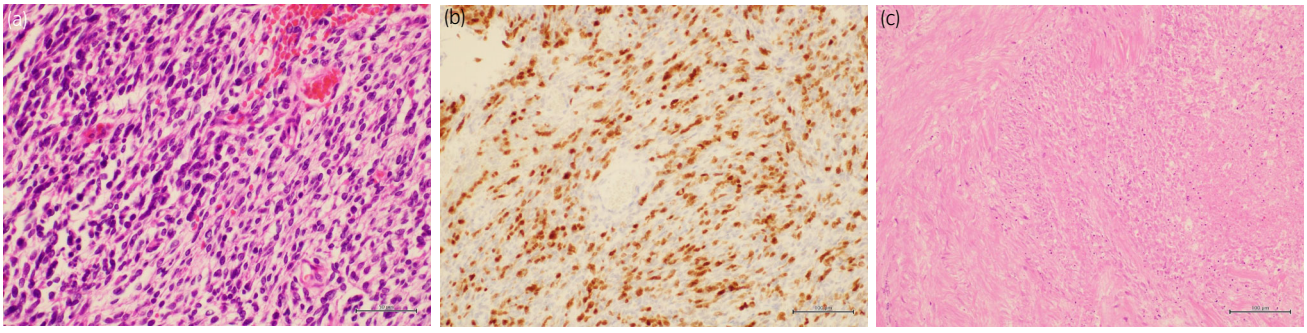

Fig. 2 Histopathological images. (a) Hematoxylin and eosin staining showed that the tumor predominantly consisted of fascicles of atypical spindle cells. (b) Immunohistochemistry revealed that the tumor cells showed widespread positive expression of myogenin. (c) In the resection specimen, >90% of the tumor volume displayed necrosis.

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pattern (Fig. 2c). The surgical resection margin status was negative and no tumor infiltration into the seminal vesicle was observed. Therefore, the primary tumor was completely resected. However, pulmonary metastasis developed again at the right lobe after the surgery. Systemic chemotherapy and proton therapy against lung metastasis were continued as multimodality therapy. There was no local recurrence at the exenteration site of the prostate, and after the operation, the patient had no obstructive voiding symptoms with using two pads per day 1 month after the operation. The patient's quality of life was well maintained.

Discussion

On the basis of the clinical course of the present case, we summarize here several important issues. First, RAP might be useful for selected cases of adult RMSP. Whether or not the disease shows metastases, systemic chemotherapy occasionally results in downsizing of the primary tumor and there may be a chance to completely resect the primary regions.[6] VAC is considered as the standard option for chemotherapy regimen for rhabdomyosarcoma.[7,8] In our case, after five cycles of VAC, the patient achieved 44% volume reduction of the primary tumor and complete resection (R0 resection) was achieved with robot-assisted surgery. In addition, there were less amount of bleeding compared to the conventional open surgery, no need of transfusion, and no perioperative complication, which lead to early reinduction of chemotherapy. In this regard robotic surgery is considered to have exhibited its advantage in the multidisciplinary treatment. Moreover, Izumi *et al*. suggested that surgical resection, regardless of the status of the surgical margins, may contribute to the best chance of survival in adult patients with urological soft tissue sarcoma.[9] Therefore, organ-confined or even systemic RMSP, which can achieve complete response after chemotherapy, may be a candidate for RAP to relieve obstructive voiding symptoms and improve the patient's quality of life, with an expectation of prolonging patient survival. This strategy may be further supported by previous reports that indicated that patients treated with local therapy to the primary tumor site of metastatic rhabdomyosarcoma showed significantly longer survival compared with those who did not receive local therapy.[10] Because each patient's condition is unique, the optimal treatment should be carefully determined on an individual basis.

Local therapy for RMSP may have benefits for both prolonged survival and curing obstructive voiding symptoms. Robot-assisted surgery is minimally invasive and may be an optimal treatment option for systemic disease.

Conclusion

RMSP is a very rare tumor and the prognosis of RMSP in adults is generally poor. Clinical symptoms such as dysuria and urinary retention are particularly distressing for these patients. In the current case, RAP was performed and the patient's obstructive voiding symptoms were completely eliminated. Robot-assisted surgery is a minimally invasive method, and therefore RAP for advanced RMSP patients who respond well to chemotherapy could be an optimal treatment strategy to eliminate these symptoms and improve patient's quality of life.

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Author contributions

Takahiro Kirisawa: Data curation; Investigation; Writing – original draft. **Arinobu Fukunaga:** Writing – review & editing. **Hajime Takamori:** Data curation. **Aiko Maejima:** Data curation. **Yasuo Shinoda:** Data curation. **Motokito Komiyama:** Data curation. **Hiroyuki Fujimoto:** Data curation. **Kan Yonemori:** Writing – review & editing. **Akihiko Yoshida:** Investigation. **Yoshiyuki Matsui:** Conceptualization; Supervision; Writing – review & editing.

Conflict of interest

The authors declare no conflict of interest.

Approval of the research protocol by an Institutional Reviewer Board

This report was approved by the Ethics Committee of National Cancer Center Hospital (Approval No. 2017-168).

Informed consent

Informed consent was obtained from the subject.

Registry and the Registration No. of the study/trial

Not applicable.

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