Pediatric Case Reports

Pediatric Robotic Prostatectomy and Pelvic Lymphadenectomy for Embryonal Rhabdomyosarcoma

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We present the first published case of a pediatric robot-assisted prostatectomy and pelvic lymphadenectomy for refractory prostatic embryonal rhabdomyosarcoma. The patient is a 7-year-old male who had been treated with 3 cycles of chemotherapy and radiation, who underwent prostatectomy and lymphadenectomy for a recurrent mass. Surgery was uncomplicated and yielded negative surgical margins. We highlight the surgical technique and feasibility of utilizing robotic surgery for pediatric prostatectomy. UROLOGY ■■: ■■–■■, 2018. © 2018 Elsevier Inc.

CASE

The patient is a 7-year-old male with refractory prostatic embryonal rhabdomyosarcoma. He initially presented at the age of 4 with hematuria, dysuria, and incontinence and was diagnosed through workup of these symptoms. He was treated per the ARST0531 protocol with VAC (vincristine, dactinomycin, and cyclophosphamide) and VI (vincristine and irinotecan). Additionally, he received 41.4 gray of radiation for local treatment. Complete response was noted at the end of the first round of treatment. On surveillance magnetic resonance imaging 7 months after completion of primary therapy, there was a local recurrence detected. Chemotherapy was then administered per the SIOP-based CVE/IVE (carboplatin, epirubicin, vincristine, ifosfamide, etoposide, and vincristine) as he had recurrent rhabdomyosarcoma. Of note, he did not receive further local control in the form of radiation. Again, a complete response was noted at the conclusion of chemotherapy.

Surveillance magnetic resonance imaging and positron emission tomography scan 3 months following the second chemotherapy regimen noted a hypermetabolic focus in the right hemiprostate (Fig. 1), without evidence of metastatic disease. This recurrence was treated with 2 cycles of vinorelbine, cyclophosphamide, and temsirolimus. Subsequent imaging after the second cycle demonstrated disease progression in the prostate and further chemotherapy was not pursued.

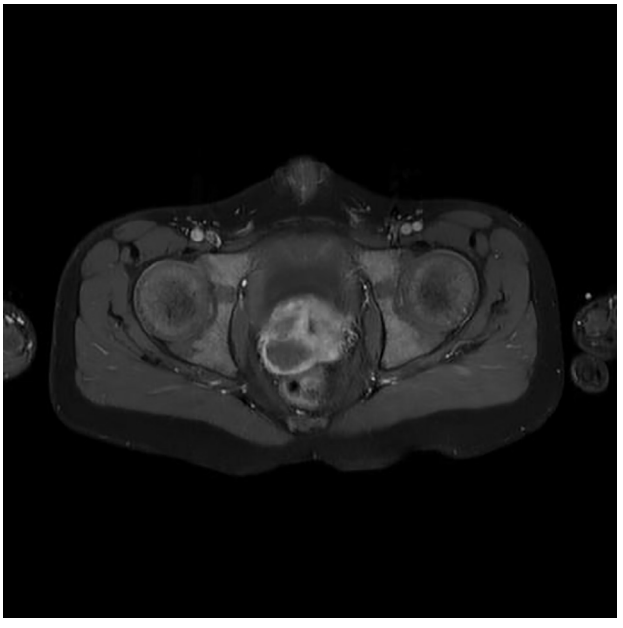

Figure 1. Magnetic resonance imaging of the third disease recurrence (contrast-enhanced axial T1 water-only sequence).

After multidisciplinary decision-making, it was felt that surgical management in the form of a prostatectomy and a limited pelvic lymphadenectomy was the next best step for management of the third recurrence. They were offered open prostatectomy at their local facility, but they wished for a minimally invasive option. They presented to our institution for robot-assisted radical prostatectomy and limited pelvic lymphadenectomy.

Preoperative cystoscopy was performed with a 10-French cystoscope. There was friable tissue in the prostatic urethra extending to the right bladder base consistent with known disease recurrence. The ureteral orifices appeared spared by the disease. A 14-French urethral

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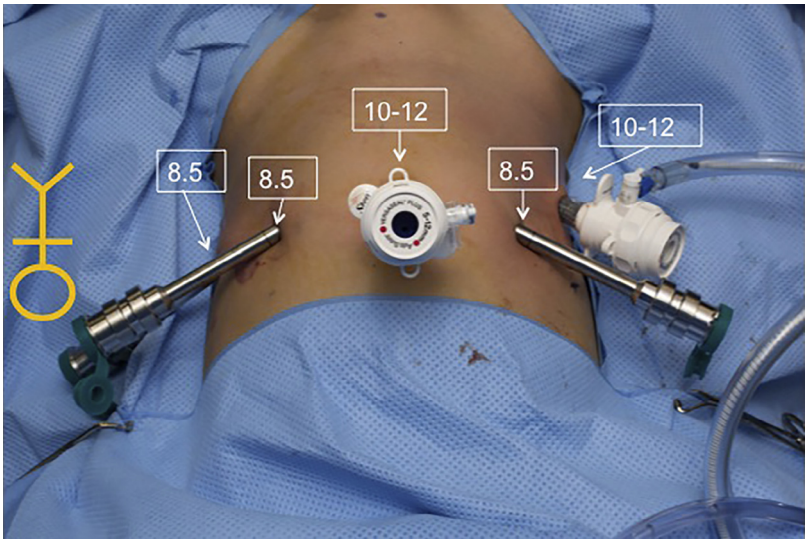

Figure 2. Port placement. (Color version available online.)

catheter was placed. A da Vinci Xi surgical robot (Intuitive Surgical, Sunnyvale, CA) was utilized for surgery. Port placement can be seen in Figure 2. A 12-mm port was utilized in the umbilicus for the camera and in the right lower quadrant as an assistant port, and 8.5-mm working ports were placed in the left lower quadrant, left midclavicular line, and the right midclavicular line. An anterior approach was used and the urachus was dissected with the bladder and dropped posteriorly. The puboprostatic ligaments and endopelvic fascia were dissected down, and subsequently the dorsal venous complex was ligated.

The bladder neck was isolated and opened, utilizing the indwelling catheter balloon. The ureteral orifices were visualized and cannulated with 5-French feeding tubes during dissection of the bladder neck, but were both grossly clear of tumor. The bladder neck was dissected widely given the extent of disease and intraoperative frozen sections were obtained to ensure negative margins. The bladder neck was then reconstructed. The left neurovascular bundle was spared and the right was widely taken given the right disease burden. The apex of the prostate was dissected with aid of a urethral catheter for identification and the vesicourethral anastomosis was performed with 3-0 quill suture in a running fashion. The anastomosis was tested to 60 mL and was water tight. A limited bilateral pelvic lymph node dissection was performed of the external iliac and obturator nodes, with care to preserve obturator and femoral nerves. None of the 9 nodes obtained were positive for metastatic disease. A 14-French urethral catheter and pelvic Jackson-Pratt drain were left in situ at the end of the case.

The pathology of the prostate demonstrated a cystic right hemiprostate with evidence of recurrent embryonal rhabdomyosarcoma (Fig. 3). The patient had difficulty with postoperative pain control around the drain site after the procedure and was dismissed on postoperative day 3. The Jackson-Pratt drain was removed on the day of discharge and the urethral catheter was removed on psotoperative day 14 after a negative cystogram. He regained continence 3 weeks postoperatively. On first postoperative

Figure 3. Gross pathology of prostate (bivalve). (Color version available online.)

imaging 3 months postoperatively, he had no evidence of disease recurrence.

DISCUSSION

Rhabdomyosarcoma is the most common type of pediatric genitourinary sarcoma, with the embryonal subtype being the most common in the bladder and prostate.[1] Chemotherapy and radiotherapy are preferred given long-term decrease in quality of life and function after cystectomy or prostatectomy, and new chemotherapy regimens led by multi-institutional work groups have led to high survival rates without surgical intervention.[2,3] However, despite these advances, there is a subset of patients with residual or recurrent masses who require surgical management.[1,2]

Surgical management for prostatic rhabdomyosarcoma is traditionally done in an open fashion. This is likely due to surgeon comfort with open approach and rarity of pediatric prostatectomy. Minimally invasive techniques, especially robotic-assisted surgery, are widely utilized in adult urologic oncology surgeries, and are gaining popularity in pediatric urology. There is a learning curve and some unique challenges in the pediatric patient, but as more pediatric urologists are gaining training and experience, robotic-assisted surgery is expanding.[4,5] Laparoscopic approach has been utilized in genitourinary rhabdomyosarcoma for lymph node sampling, but definitive management is conventionally done with an open approach.[6] With prostatectomy specifically, most prostatectomies for malignancy are done robotically. Robotic-assisted surgery is the predominant modality for adult prostatectomy due to improved visualization, dexterity, and surgeon comfort, in addition to possible benefits for continence and erectile function.[7]

We present the first reported robotic-assisted prostatectomy and pelvic lymphadenectomy in a pediatric patient. To successfully perform this surgery, multiple preoperative measures were taken. Given the rarity of pediatric prostatectomy, there is tremendous value in collaborating with a high-volume urologist specializing in robotic prostatectomy. In addition to an experienced pediatric robotic surgeon, an adult urologist who specializes in high-volume robotic prostate surgery was involved in this procedure. This allowed for improved efficiency of all steps of the prostatectomy given the familiarity with anatomy and technical precision in steps such as nerve sparing and vesicourethral anastomosis. An experienced surgical team, including circulating nurse, scrub nurse, and surgical assistant, familiar with robotic prostatectomy also was critical in allowing the case to run smoothly.

The use of robotic surgery was beneficial in this case. It allowed for easier dissection and visualization of the deep pelvis and dissection of the prostate. Specifically, the increased magnification allowed for better neurovascular bundle preservation. The lymph node dissection was not compromised by the robotic approach, and a more comprehensive pelvic lymph node dissection could be carried out through this approach, if needed. There was no difficulty obtaining margins intraoperatively, and there were no positive margins on final pathologic specimen.

CONCLUSION

Robotic-assisted prostatectomy and pelvic lymph node dissection is a feasible and reasonable approach in the pediatric patient for treatment of prostatic embryonal rhabdomyosarcoma. A highly skilled team including a pediatric urologist experienced in robotic surgery and a high-volume adult robotic surgeon specializing in prostatectomy.

References

1. Dasgupta R, Rodeberg DA. Update on rhabdomyosarcoma. *Semin Pediatr Surg*. 2012;21:68-78.
2. Kieran K, Shnorhavorian M. Current standards of care in bladder and prostate rhabdomyosarcoma. *Urol Oncol*. 2016;34:93-102.
3. Rodeberg DA, Anderson JR, Arndt CA, et al. Comparison of outcomes based on treatment algorithms for rhabdomyosarcoma of the bladder/prostate: combined results from the Children's Oncology Group, German Cooperative Soft Tissue Sarcoma Study, Italian Cooperative Group, and International Society of Pediatric Oncology Malignant Mesenchymal Tumors Committee. *Int J Cancer*. 2011;128:1232-1239.
4. Howe A, Kozel Z, Palmer L. Robotic surgery in pediatric urology. *Asian J Urol*. 2017;4:55-67.
5. Van Batavia JP, Casale P. Robotic surgery in pediatric urology. *Curr Urol Rep*. 2014;15:402.
6. Blackburn S, Smeulders N, Michalski A, Cherian A. Retroperitoneoscopic para-aortic lymph node sampling in bladder rhabdomyosarcoma. *J Pediatr Urol*. 2010;6:185-187.
7. Ficarra V, Novara G, Fracalanza S, et al. A prospective, non-randomized trial comparing robot-assisted laparoscopic and retropubic radical prostatectomy in one European institution. *BJU Int*. 2009;104:534-539.