



Collaborating with our adult colleagues: A case series of robotic surgery for suspicious and cancerous lesions in children and young adults performed in a free-standing children's hospital

^aBoston Children's Hospital,
Department of Urology,
Harvard Medical School,
Boston, MA, USA

Briony K. Varda ^a, Patricia Cho ^a, Andrew A. Wagner ^b,
Richard S. Lee ^a

^bBeth Israel Deaconess Medical
Center, Department of Urology,
Harvard Medical School,
Boston, MA, USA

Correspondence to: Briony K.
Varda, Department of Urology,
Boston Children's Hospital,
Harvard Medical School,
Hunnewell 390, 300 Longwood
Avenue, Boston, MA 02115, USA

briony.varda@childrens.harvard.edu (B.K. Varda)

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Summary

Background

In adult urologic oncology the use of robotics has become commonplace; in pediatric urology it is rare. Herein, we describe a collaboration between an adult and a pediatric urologist performing robotic surgery for children and young adults with suspicious or cancerous genitourinary (GU) lesions.

Objectives

To evaluate clinical and oncologic outcomes in children and young adults undergoing robotic surgery for suspicious or cancerous lesions of the GU tract; to describe our collaborative model between an adult and pediatric surgeon at a free-standing children's hospital.

Design

We retrospectively reviewed all robotic cases performed at our institution from 2014 to 2016 for patients with a GU malignancy or a suspicious mass. The surgeries were performed by a pediatric urologist with robotic experience and a fellowship-trained MIS adult urologist specializing in oncology. Perioperative and oncologic outcomes were recorded.

Results

A total of eight robotic cases were performed: four partial nephrectomies (PN) with retroperitoneal lymph node dissection (LND) (OT 269–338 min, EBL 5–300 mL, LOS 3–6

days), one adrenalectomy with LND (6.4 cm mass; OT 172 min, EBL 5 mL, LOS 3 days), one nephrectomy with pericaval LND (9.8 cm mass; 234 min, EBL 25 mL, LOS 3 days), and two retroperitoneal LNDs (OT 572 and 508 min, EBL 250 and 100, LOS 3 and 4 days). Patient weights ranged from 14 to 79 kg (mean 53.4 kg). There were no major complications (Clavien 3–5). Pathology results for PN included papillary RCC (AJCC pT1aNx) and two cases of segmental cystic renal dysplasia with nephrogenic rests. Bilateral template RPLNDs yielded paratesticular rhabdomyosarcoma (43 nodes; COG low risk group II stage I) and mixed non-seminomatous germ cell tumor (74 nodes; COG stage III). The nephrectomy yielded an undifferentiated sarcoma, low grade; the adrenalectomy favorable-type ganglioneuroma.

Discussion

In pediatrics, urologic oncology cases are often managed with open surgery. Our series demonstrates the feasibility of using the robotic approach in carefully selected cases. In doing so, the patient benefits from a minimally invasive surgery, while the surgeon benefits from robotic surgical dexterity. We seamlessly advanced these new techniques through a step-wise collaboration between an adult urologist who routinely performs robotic oncology procedures and a pediatric urologist experienced in robotics for benign conditions.

Conclusion

In this small series, we safely and effectively adapted adult robotic techniques for genitourinary oncology cases in children and young adults.

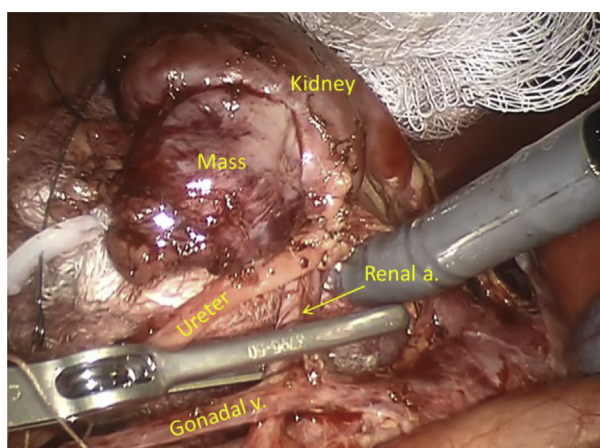


Figure View of renal hilum during partial nephrectomy in a 14-kg girl.

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Table 1 Preoperative characteristics of eight pediatric and young adult patients referred for excision of suspicious or cancerous lesions.

Age (years)	Wt (kg)	Location of mass	Size of mass (cm)	Nephrometry score	Preoperative diagnosis
26	57	Renal	3.5	8A	Suspicious mass
13	79	Renal	3.2	9A	Suspicious mass
3	14	Renal	2.1	5A	Suspicious mass
12	33	Renal	1.5	8A	Suspicious mass
17	75	Retroperitoneal	2.0	–	Mixed NSGCT RP mass w LN
16	78	Retroperitoneal	na	–	Paratesticular RMS
7	31	Adrenal	6.4	–	Suspicious mass Elevated catecholamines
19	60	Renal	9.8	–	Suspicious mass, RP LN

Wt = weight; NSGCT = non-seminomatous germ cell tumor; RP = retroperitoneum; LN = lymphadenopathy; RMS = rhabdomyosarcoma.

Introduction

Since the first report of a robotic radical prostatectomy in 2001 [1], the use of robot-assistance in urologic oncology has expanded. In fact, for radical prostatectomy and partial nephrectomy (PN) the number of annual robotic cases has surpassed that of the open approach [2,3]. The use of robotic surgery for cystoprostatectomy has also been gaining momentum [4], with several institutions reporting experience with intracorporeal ileal conduit and neobladder creation [5,6]. Most recently, the use of the robotic platform for retroperitoneal lymph node dissection has been shown to be safe and feasible in carefully selected adult patients [7].

Despite the widespread dissemination of robotic surgery in adult urologic oncology, the use of robotics in pediatric urologic oncology has been slow to progress. In the current literature, there are only four case reports of robotic techniques for cancers with pathology similar to adults in adolescent patients, namely renal cell carcinoma [10] and two non-seminomatous germ cell tumors [11], and one report of robotic nephrectomy being used safely for Wilms' tumor in an adolescent patient [12]. The reasons for this are multifactorial: 1) genitourinary (GU) malignancies in pediatric patients are rare, making it difficult to amass case volume, 2) when they do occur, many are too large or complex for minimally invasive techniques, 3) the current management strategies for pediatric GU cancers are largely successful, therefore the incentive to test new management approaches is limited, and 4) a majority of pediatric GU oncology cases are managed by general surgeons [8,9] who generally have lower rates of robotic utilization than urologists.

At our institution, we collaborated with a fellowship-trained minimally invasive (MIS) urologist with 10 years of attending-surgeon experience with adult urologic oncology cases. This collaboration led to the successful transfer of surgical techniques for our adolescent patients, as well as the thoughtful adaptation of the adult techniques for our smaller children. Herein we present a series of eight cases of suspicious and malignant masses managed with robotic surgery in children and young adults.

Materials and methods

Patient population

Robotic cases performed at Boston Children's Hospital between 2014 and 2016 were retrospectively reviewed. Patients with a preoperative diagnosis of a malignancy or suspicion for malignancy were included. Prior to surgery, each patient was also seen by a medical oncologist. Robotic surgery was then chosen via a multidisciplinary, patient-centered approach.

Partial nephrectomy

Four patients were referred for management of suspicious small renal masses. Median age was 12.5 years (range 3–26) with a median weight of 45 kg (range 14–79). Nephrometry scores ranged between 5 and 9. Table 1 provides the individual preoperative characteristics.

Retroperitoneal lymph node dissection

Two patients were referred for RPLND. The first was a 17-year-old male (75 kg) with a history of a mixed



Figure 1 Enlarging aortocaval lymph node in a 17-year-old male with a history of mixed NSGCT managed initially with orchietomy and surveillance.

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