Journal of Pediatric Urology (2009) 5, 416—419

Journal of Pediatric urology

CASE REPORT

Prechemotherapy laparoscopic nephrectomy for Wilms' tumor

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Received 3 October 2008; accepted 5 January 2009
Available online 27 March 2009

KEYWORDS
Wilms' tumor;
Pediatrics;
Laparoscopy

Abstract Laparoscopic radical nephrectomy is emerging as the treatment of choice for localized renal malignancies in adults. Despite the widespread use of laparoscopic nephrectomy for benign renal disease in infants and children, the laparoscopic approach has not been employed for pediatric Wilms' tumor except following systemic chemotherapy. We report the results of laparoscopic radical nephrectomy for removal of unilateral Wilms' tumor prior to the administration of systemic chemotherapy in two patients.

Wilms' tumor is the most common primary malignant renal tumor in children. In the US, initial management is most often radical nephrectomy followed by adjuvant chemotherapy, and possibly external beam radiation, based on extent of disease and tumor histology. Where primary nephrectomy is not possible due to the extent of disease, neoadjuvant chemotherapy is administered with the hope of reducing tumor burden and making surgical resection possible. Traditionally, radical nephrectomy for Wilms' tumor has been performed via an open approach, using either a chevron or transverse abdominal incision.

Abroad, the approach to Wilms' tumor differs primarily by the administration of neoadjuvant chemotherapy followed by nephrectomy. With advancements in minimally invasive surgery, reports of laparoscopic post-chemotherapy radical nephrectomy in patients with Wilms' tumor have emerged [1,2]. We report the successful laparoscopic removal of two unilateral Wilms' tumors prior to the administration of chemotherapy.

Case reports

Case 1

A 14-month-old African-American female (9.75 kg, 76.5 cm) presented with a palpable abdominal mass. CT imaging revealed an $8.0 \times 6.8 \times 6.6$-cm left renal mass nearly

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1477-5131/$36
doi:10.1016/j.jpurol.2009.01.011

replacing the kidney, composed of soft-tissue density with a few areas of cystic density, consistent with localized Wilms' tumor (Fig. 1A). The contralateral kidney was free of tumor and the largest left hilar lymph node was 3 mm in diameter. No visceral metastases or involvement of adjacent organs was noted. Subsequently, the patient was taken for laparoscopic left radical nephrectomy. A transabdominal approach was utilized. Positioning was in a modified right lateral decubitus position, using a roll to elevate the left flank approximately 30 degrees. Three trocars were placed (two working and one camera). A 10-mm camera port was placed infra-umbilically; 5-mm trocars were placed in the left lower quadrant midaxillary line and midline epigastrium respectively. Following mobilization and reflection of the descending colon, the initial dissection was directed toward the left renal hilum but was challenging due to the tumor size. Therefore, attention was turned toward identification of the ureter and dissection of the lower pole of the kidney. Following dissection of the lower pole of the kidney, the renal hilum was visualized and the renal vessels were ligated with surgical clips. No tumor spillage occurred and the ipsilateral adrenal gland was left intact. Following completion of the nephrectomy and lymph node biopsy, the specimen was removed via a Pfannenstiel incision. Operative time was 252 min. Intraoperative blood loss was 25 cc.

Postoperatively, the patient had an uneventful course and was discharged on postoperative day 2. Pathology revealed complete resection of a 12.4-cm-long, 284-g kidney containing a multifocal Wilms' tumor of favorable histology. Review of the case by the Children's Oncology Group Renal Tumor Pathology center identified extensive involvement of hilar fat by nephroblastomatosis thus upstaging the tumor to Stage II. The lymph node biopsy returned no nodes. Tumor cytogenetics were 46, XX, der(16)t(1;16)(q21;q12.1). Following recovery from surgery, the patient was started on adjuvant dactinomycin and vincristine per National Wilms' Tumor Study Group (NWTSG) V protocol for Stage II disease [3]. Five months postoperatively, the patient continues to do well and has had no evidence of tumor recurrence.

Case 2

A 16-year-old female was found to have an incidental 8 $\times$ 6.8 $\times$ 6.4-cm central right renal mass with hydronephrosis on an abdominal CT scan following a motor vehicle collision (Fig. 1B). There was no contralateral kidney tumor, metastasis or lymphadenopathy noted.

A transperitoneal laparoscopic nephrectomy was performed. The patient was positioned over the kidney rest in a right modified lateral decubitus position elevating the right flank on a roll. Trocar positioning was performed in an identical fashion to the first case. The ascending colon and hepatic flexure were mobilized medially. With the increased intra-abdominal space in this older child, the right renal hilar dissection was achieved with some minimal blood loss. The right renal artery and vein were ligated with surgical clips and polyglactin ties. No intraoperative tumor spill was noted. The adrenal was left *in situ* and the kidney specimen was withdrawn via a Pfannenstiel incision. Operative time was 304 min. Blood loss was 300 cc. No intraoperative or postoperative blood transfusion was needed. The patient was discharged home on postoperative day 3.

Final pathology revealed anaplastic histology with extracapsular tumor extension and invasion of the hilar lymphatics, but negative surgical margins. Thus, this tumor was NWTSG Stage II. The patient subsequently underwent local external beam radiation therapy and two-agent systemic chemotherapy with vincristine and dactinomycin. Sixteen months postoperatively, the patient remains recurrence free.

Discussion

With the development of multimodal treatment for Wilms' tumor, survival rates are now in excess of 90% for those patients with low-stage (Stage I and II), favorable histology tumors [4—6]. As survival rates have increased, attention has begun to focus on minimizing patient morbidity without negatively impacting event-free survival. In the last 15 years, laparoscopy has been introduced into the treatment armamentarium for pediatric benign renal disease. Unlike adult urology, which rapidly transitioned to laparoscopic radical nephrectomy as standard of care for malignancies of the kidney, pediatric laparoscopic nephrectomy for malignancy has rarely been reported.

Concerns raised over the laparoscopic treatment of Wilms' tumor have included: (1) an increased risk of tumor rupture due to decreased tactile feedback and the fragile nature of the tumor capsule, and (2) inadequate abdominal exploration for complete staging. While these are certainly

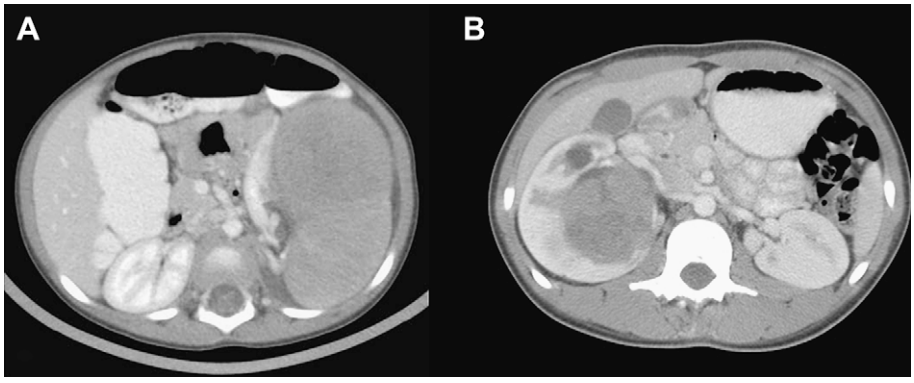

Figure 1 A. Preoperative CT image from case 1 showing a large left renal mass involving the entire kidney. B. Preoperative CT image from case 2 showing right renal mass.