An unusual clinical presentation of rhabdomyomatous Wilms' tumor

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Wilms' tumor (WT) is the most common primary malignant renal tumor in children and usually presents as an abdominal mass. Rhabdomyomatous nephroblastoma is a rare histologic variant of WT. Herein we report an unusual case of WT with rhabdomyomatous differentiation presenting with hematuria and the passage of tissue via the urethra in a 2-year-old male.

Key Words: Wilms' tumor, pediatric renal neoplasm, rhabdomyomatous differentiation, hematuria

Introduction

Wilms' tumor (WT) is the most common primary malignant renal tumor in children and usually presents as an abdominal mass.[1] Presentation can also include abdominal pain and fever. Although not typically seen in the presentation of WT, hematuria can occur particularly if the renal pelvis is involved. However, the passage of tissue via the urethra is very rare and to our knowledge has not been previously reported.

Various stages of nephrogenesis are represented in the histology of WT indicating a failure in the differentiation of multipotential mesenchymal renal stem cells. Most tumors are comprised of blastemal, epithelial, and stromal elements giving rise to the classic triphasic pathological description. However, heterologous components such as muscle, cartilage, bone, and adipose tissue can be found in up to 10% of WT's. The unusual fetal rhabdomyomatous pattern of differentiation may be reflective of a tumor subtype that, along with the presence of WT1 mutations, is often poorly responsive to chemotherapy.[2,3] The rhabdomyomatous variant is thought to result from differentiation of more immature, malignant mesenchymal cells but is generally regarded as a favorable histologic subtype.

Following is a case of unilateral stage I WT with rhabdomyomatous differentiation who presented in an unusual manner and was treated with radical nephrectomy and postoperative chemotherapy.

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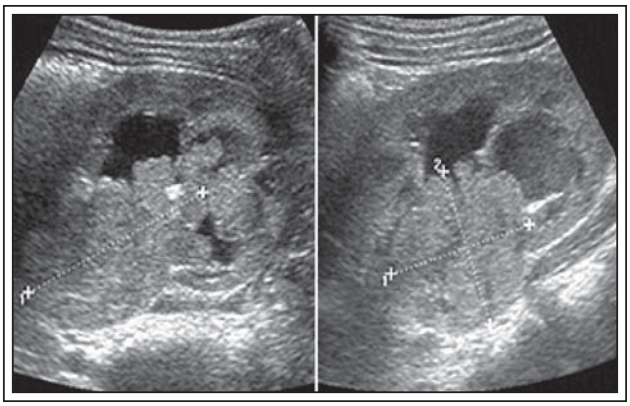

Figure 1. Ultrasound images demonstrating large heterogeneous mass in the collecting system of the left kidney without cortical involvement.

Case report

A 2-year-old male presented in 2003 with a 6 day history of mild hematuria and several episodes of passing what appeared to be tissue and blood clot through his urethra. Aside from increased fussiness with decreased appetite for the previous 2 weeks and a nonproductive cough for 4 months, he was otherwise healthy and the parents denied any febrile illnesses or weight loss. He was born full term and family history was negative for renal pathology. Physical exam revealed an elevated blood pressure of 123/66 and a small immobile flank mass on the left appreciated with deep palpation. His exam was otherwise normal. Routine laboratory testing revealed mildly elevated blood urea nitrogen (21 mmol/L) with normal creatinine (0.4 mg/dL), along with mild leukocytosis (12.3 cells/μL).

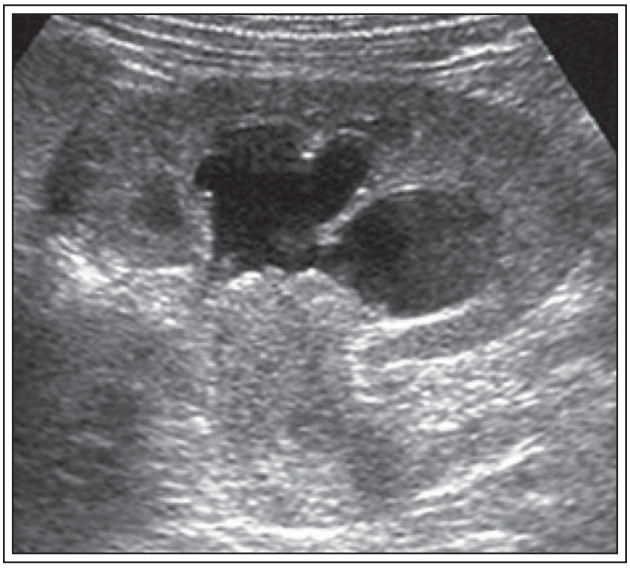

Figure 2. Ultrasound image demonstrating extension into the proximal ureter.

Abdominal ultrasonography demonstrated a renal mass obstructing the collecting system with extension into the proximal ureter on the left, Figures 1 and 2. The mass measured 4.5 cm x 3.4 cm x 3.4 cm and did not appear to involve the renal cortex. Computerized tomography of the abdomen and pelvis demonstrated findings consistent with that of the ultrasound, and was negative for lymphadenopathy or metastases, Figure 3. A chest x-ray was also negative for metastases. Pathological analysis of a sample of passed specimen revealed a primitive, undifferentiated, small blue cell tumor.

The patient underwent cystoscopy and a biopsy of an area of questionable involvement immediately inferior to the left ureteral orifice was taken. Exploratory laparotomy was done and left radical nephrectomy with partial ureterectomy was completed without complication. During laparotomy, the pelvis of the left kidney and proximal ureter were filled with tumor by palpation. Dissection and removal of the left kidney

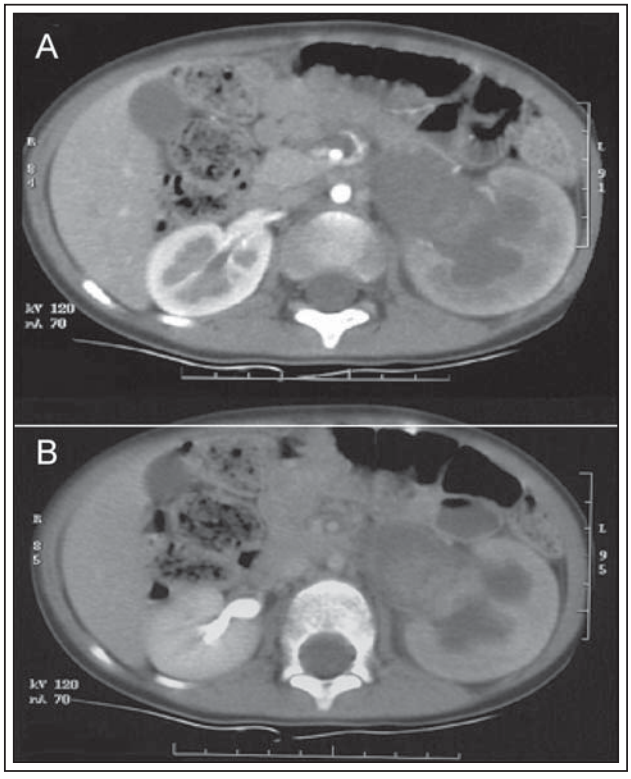

Figure 3. Computed tomography of the abdomen with contrast demonstrating a minimally enhancing, heterogeneous mass in the left renal pelvis on arterial phase (A) and excretory phase (B).

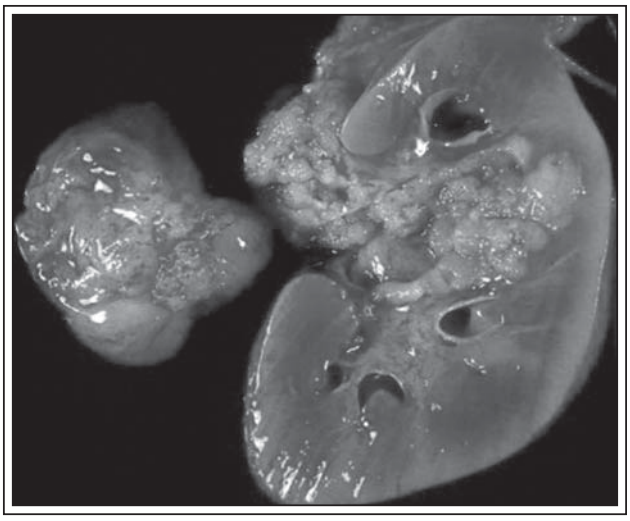

Figure 4. Gross pathology of Wilms' tumor involving renal collecting system.

along with the left gonadal vein was completed without complication. The ureter was taken 5 cm beyond any grossly visible dilation. Three para-aortic and one mesenteric lymph nodes were suspicious for metastatic involvement and were excised. The contralateral kidney was palpated and felt to be normal.

The mass measured 6.5 cm x 3.5 cm x 2.5 cm and the renal capsule was intact, Figure 4. Surgical pathology of the kidney was consistent with WT with favorable pathology without anaplasia or nephrogenic rests. The tumor contained blastemal, epithelial, and stromal components including rhabdomyomatous differentiation and eosinopilic foci suggestive of osteoid, Figures 5 and 6.

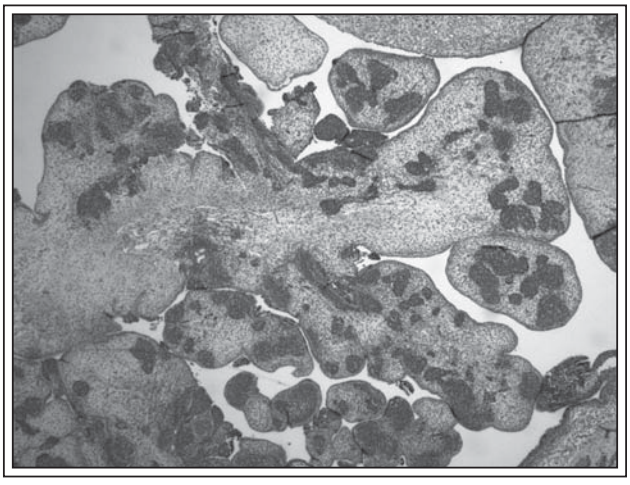

Figure 5. Papillary extension of Wilms' tumor projecting into renal collecting system demonstrating triphasic histology.

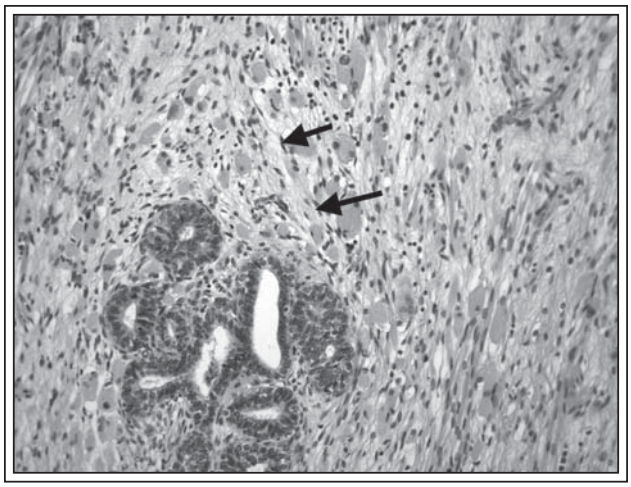

Figure 6. Higher magnification of Wilms' tumor demonstrating rhabdomyomatous histological components (arrows).

The renal vein, artery, and ureter were negative for tumor as were all nodes and the bladder biopsy. Thus the pathological stage of the tumor was stage I.

The patient received his first dose of chemotherapy consisting of actinomycin D prior to discharge via ported catheter placed during surgery. A single course of chemotherapy with actinomycin D and vincristine was completed without complication. It has been 54 months since his surgery and ultrasound follow up has been negative to date. Blood pressure normalized after nephrectomy.

Discussion

The incidence of WT is 7-10 cases per million, accounting for up to 7% of all childhood cancers. The last 25 years have seen dramatic improvements in the treatment and outcome of WT cases demonstrated by an increase in 5 year survival rates from 74% to 92%.[4] This success is due to better surgical techniques and the development of effective chemotherapeutic agents.

A palpable abdominal mass is present in approximately 90% of WT cases. In our case, the patient presented with hypertension, episodes of hematuria, and the passage of tumor fragments due to the extensive involvement of the renal pelvis, Figure 4. The hypertension may have been caused by renal obstruction by tumor however this is conjecture on our part. The passage of tissue via the urethra is very rare and necessitates further investigation. Although not usually part of the WT workup, this highly unusual presentation prompted cystoscopy in order to rule out any possible lower tract involvement as a transitional cell tumor could not be ruled out.

Gross hematuria is relatively unusual in young children and also warrants investigation. The more common causes include benign urethrorrhagia, trauma, urinary tract infection, and congenital urologic anomalies including vesicoureteral reflux, posterior urethral valves, ureteropelvic junction obstruction, ureterocele, caliceal diverticulum, and hypospadias. Less frequent causes are urolithiasis and tumors including bladder transitional cell carcinoma and WT.[5]

WT treatment is based on both tumor histology and surgical findings.[6] Early nephrectomy is advocated with adjuvant chemotherapy and radiation for higher stage tumors. Based on the NWTS 5 treatment protocol, our patient underwent one round of chemotherapy with actinomycin D and vincristine post-operatively, with an expected 4 year disease free and overall survival rate of 89% and 96%, respectively.[7] However, the significance of the rhabdomyomatous histology should be stressed as it is thought to portend a less favorable response to chemotherapy.[2,3] The risk of recurrence in otherwise similar cases treated with nephrectomy only has been shown to be 13.5% at 2 years after diagnosis.[8]

In the present case, preoperative imaging studies suggested extension of the mass into the proximal ureter. This finding was corroborated intraoperatively by gross palpation of the intact renal pelvis and ureter. On pathological examination however, the ureter was negative for tumor involvement and the enlargement and firmness of the ureter appreciated during the surgery was the result of chronic inflammation. Similarly, the suspicious para-aortic and mesenteric lymph nodes that were excised intraoperatively were consistent with complexes of epithelial cells and Tamm-Horsfall protein within nodal sinuses or inclusions of metaplastic calyceal urothelium, Figure 7. These "pseudometastases" have been previously described with WT, and their recognition is essential in order to avoid over staging and unnecessary and potentially harmful therapeutic interventions.[9]

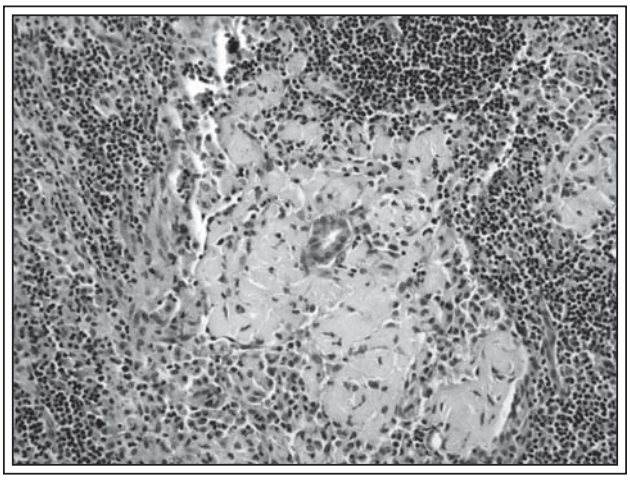

Figure 7. Photomicrograph of a lymph node containing a central tubular epithelial structure surrounded by eosinophilic material consistent with Tamm-Horsfall proteins. The central tubule lacks atypia and similar complexes were seen in the non-neoplastic kidney adjacent to tumor. This is, therefore, consistent with "pseudometastasis," a recognized occurrence in regional lymph nodes seen in resection specimens of Wilms' tumor.

Conclusion

Rhabdomyomatous differentiation in WT may signal poorer responsiveness to chemotherapy. Four year disease free survival was achieved via radical nephrectomy with partial ureterectomy and one course of dual agent chemotherapy. □

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