Pediatric renal inflammatory myofibroblastic tumours: A case report and review of the etiology and management options

Michael Czerwinski, MD;[*] Sumit Dave, MD[†]

[*]Department of Urology, Dalhousie University, Halifax, NS; [†]Department of Urology, London Health Sciences Centre, Victoria Hospital, London, ON

Cite as: *Can Urol Assoc J* 2012;6(4):E150-E153. http://dx.doi.org/10.5489/cuaj.11120

Abstract

Inflammatory myofibroblastic tumours (IMTs) have been described in lung, bladder, spleen, breast, pancreas, liver, colon, spermatic cord, prostate, peripheral nerves, orbit and kidney. Traditionally believed as having a reactive pathogenesis, IMTs are now viewed more as a neoplasm. This report describes a case of a renal IMT in a 14-year-old girl with spina bifida associated neurogenic bladder and a history of recurrent urinary tract infections. This represents a unique case as pediatric renal IMTs are very rare in the literature. We discuss how this patient was managed and how she presented compared to other reported cases.

Introduction

Inflammatory myofibroblastic tumours (IMTs), previously believed to have an inflammatory or reactive pathogenesis, are now viewed as a neoplasm due to a propensity of local recurrence and metastasis.[1,2] These lesions, originally described in pulmonary tissue, represent a proliferation of spindle cells against a heavy inflammatory infiltrate.[1] IMTs are tumours of young adults and children and have been reported in the lung, bladder, spleen, breast, pancreas, liver, colon, spermatic cord, prostate, peripheral nerves, orbit and kidney.[3] There are fewer than 20 reported cases of renal IMT in the pediatric population.[4] We present an unusual, insidious presentation of a renal IMT in a girl with neurogenic bladder and a background of recurrent urinary tract infections (UTIs). We add to the current debate on the inflammatory versus neoplastic etiology of this lesion in the context of our patient's presentation and review the literature regarding management and follow-up of these lesions.

Case report

A 14-year-old girl with spina bifida associated neurogenic bladder, managed on clean intermittent catheterizations (CIC) and anticholinergic medications, presented with a febrile UTI. Blood work demonstrated thrombocytosis (1 118 000/mm^3), an elevated C-reactive protein (CRP) (43.3 mg/L, upper limit of normal: 5 mg/L), and anemia (hemoglobin 70 g/L).

A year prior, MAG 3 renogram showed bilateral non-obstructive hydronephrosis with equal differential function. A previous video-urodynamic study demonstrated a stable, poorly compliant bladder with a detrusor leak point pressure of 32 cm H_2O and no vesicoureteric reflux. Dimercaptosuccinic acid (DMSA) scan at admission demonstrated a cold defect in the left kidney with no function secondary to pyelonephritis. Her treatment began with intravenous antibiotics, bladder catheterization and a blood transfusion. A left perinephric collection measuring 55 × 44 × 25 mm was diagnosed and drained under ultrasound guidance. A subsequent computed tomography (CT) scan showed a mass lesion diagnosed as an abscess with associated pyonephrosis; a percutaneous nephrostomy was performed to drain the kidney and to assess recoverability of function. A nephrostogram revealed left ureteropelvic junction (UPJ) obstruction with no recovery of function on a 3-week post-nephrostomy renogram. The decision for a left nephrectomy was made. However, in the interim, the right kidney became acutely obstructed at the UPJ with progressive hydronephrosis and no urine output via the bladder catheter (Fig. 1). A right percutaneous nephrostomy was performed emergently and a right pyeloplasty was also planned. During nephrectomy, extensive perinephric adhesions led to a splenic capsular tear and significant blood loss requiring 10 units of transfusion and a simultaneous splenectomy. The right pyeloplasty was therefore deferred.

Surgical pathology described a gross area of white fibrous tissue measuring 4.1 × 5.1 × 5.7 cm, which was obliterating

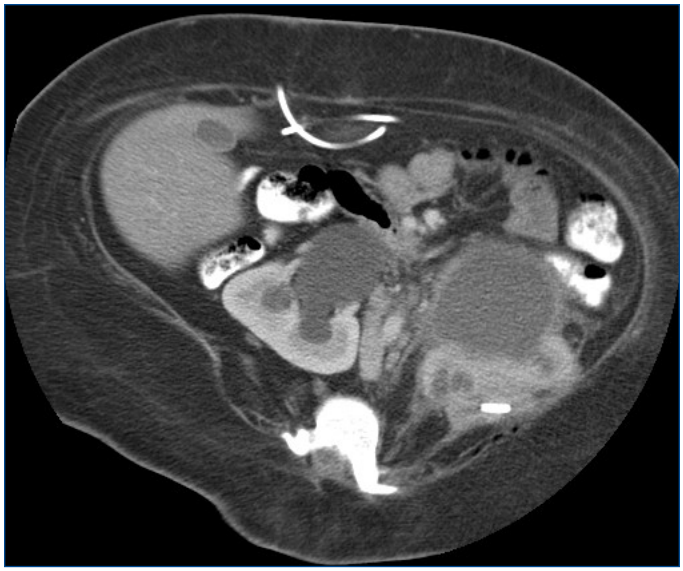

Fig. 1. A computed tomography scan showing bilateral hydronephrosis with left perinephric drain and hypo-attenuating lesion in the left kidney.

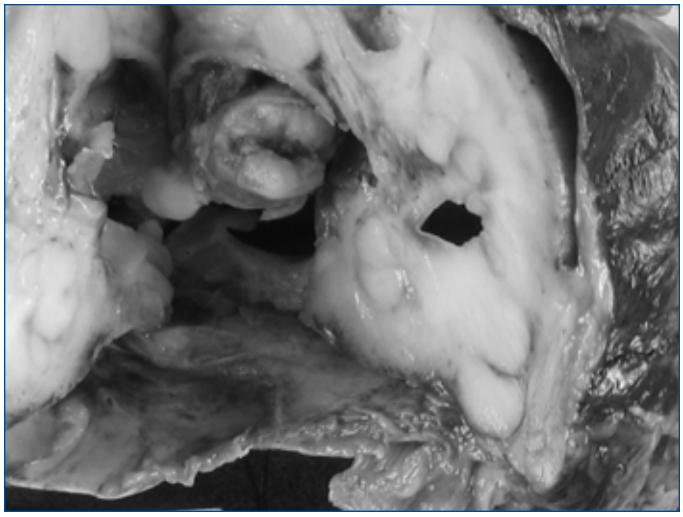

Fig. 2. Gross photograph of the left kidney. The normal homogenous parenchyma is replaced by the firm white nodular inflammatory fibroblastic tumour.

the cortex, medulla and the pelvis (Fig 2). Light microscopy demonstrated replacement of the parenchyma with nodular proliferations of compact spindle cells with aggregates of lymphocytes and plasma cells and occasional foam cells (Fig. 3). The cells were bland with no cytologic atypia or mitotic figures. The surrounding parenchyma showed global sclerosis, fibrosis and a dense interstitial lymphoplasmacytic infiltrate. These features were consistent with an IMT. Further, immunohistochemistry showed collections of histiocytes highlighted by CD68 and spindle cells positive for smooth muscle actin. The patient underwent a subsequent uneventful right pyeloplasty and was recurrence-free on serial ultrasounds at her 1-year follow-up.

Discussion

This case report documents a diagnosis of an IMT by surgical pathology after nephrectomy with negative margins. We analyzed whether our patient's clinical presentation may have raised suspicion for an IMT. Evidence of inflammation, like an elevated CRP, is non-specific, but thrombocytosis and microcytic anemia are two consistent features.[1,2,4,5] Imaging of renal IMTs have inconsistently described a well-circumscribed, polypoid, locally aggressive or infiltrating mass with no definite diagnostic criteria.[6] Park and colleagues characterized renal IMTs as a hypo- or heterogeneous echoic mass on ultrasonography, with intratumoral vascularity on Doppler sonography, or a low-attenuation mass on CT.[7] Abdominal CT imaging of the left kidney in our case revealed scant attenuation through the left cortical parenchyma and hypoattenuation through the medulla relative to the right kidney. Although this finding would have a vast differential on its own, when considered with the laboratory abnormalities, evidence for an IMT starts to take shape.

A preoperative needle biopsy is unlikely to diagnose the lesion.[2] In our patient, the history of recurrent UTIs and pyelonephritis were the presumed cause of loss in function necessitating the decision of a nephrectomy. This sequence of events brings to mind a "chicken or the egg" dilemma. Was the recurrent UTI involved in the pathogenesis of the IMT or did the IMT predispose the kidney to recurrent UTI secondary to a UPJ obstruction; or were the two events completely mutually exclusive? Furthermore, in the absence of a non-functioning kidney, we would have resorted to a left pyeloplasty or we would have observed this kidney, which may have altered the outcome if the lesion was locally infiltrative.

Current literature has shied away from the inflammatory pathogenesis model for IMTs. However, some researchers have reported associations between infections and IMTs specifically with organizing pneumonia, *Mycobacterium avium intracellulare, Corynebacterium equi, Campylobacter jejuni, Bacillus sphaericus, Coxiella burnetti,* Epstein-Barr virus*, and Escherichia coli.*[2] On the other hand, others view IMT as a true neoplasm, especially in light of tumours, which over express anaplastic lymphoma kinase gene (ALK).[1] These tumours have a chromosomal rearrangement and are found predominantly in the pediatric population with a higher propensity to recur and metastasize.[1] In a comprehensive review of 730 IMTs, Nonaka and colleagues reported a cure rate of 67% after total resection, a recurrence rate of 22% and a metastatic rate of 2.5% with tumours from various sites.[1] Features, which increased the likelihood of recurrence, included large tumor size, deep location, young patient age, DNA aneuploidy and ALK overexpression.[1] One case which demonstrated almost all of these risk factors was described

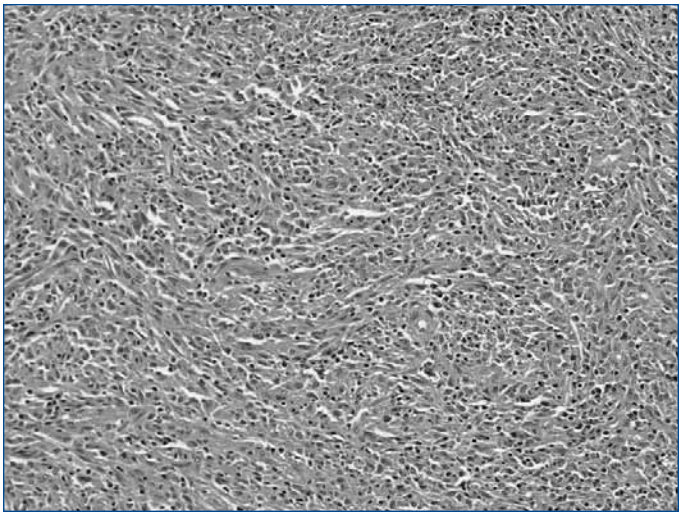

Fig. 3. Light microscopy of the inflammatory myofibroblastic tumour. Note the nodular proliferations of compact spindle cells with aggregates of lymphocytes, plasma and foam cells.

by Ernst and colleagues.[8] This report described a large pelvic IMT in a 13-year-old male with neurofibromatosis type 1, which presented with a pathologically confirmed liver metastasis and was positive for ALK expression.[8] The patient underwent primary resection of the mass and liver nodule and, despite receiving adjuvant chemotherapy with doxorubicin, cisplatin and methotrexate, he developed recurrence of the pelvic mass, additional liver metastases and peritoneal seeding.[8] Subtotal re-resection and additional chemotherapy with the same agents failed to achieve remission.[8] With the potential of a local recurrence, follow-up is essential for these patients. Recurrence usually occurs within a year of primary resection and imaging and blood work may be beneficial in monitoring.[2,5]

Based on a probable inflammatory etiology of these lesions, Li and colleagues documented resolution in 4 adults with bilateral renal IMTs treated with long-term corticosteroids.[9] All cases in which follow-up was documented had no disease recurrence.[9] While these data may support corticosteroid therapy for bilateral renal IMTs, the propensity for a subset of IMTs to recur and metastasize and the difficulty in reliably suspecting and diagnosing an IMT preoperatively may preclude the use of corticosteroids in unilateral lesions. However, in the case of bilateral renal IMT, corticosteroids are an attractive option which can biochemically and radiologically control the tumours, while preventing the need for bilateral nephrectomies and subsequent dialysis.[9] As described by Nonaka and colleagues, recurrence and metastasis were more likely in pediatric patients with tumour ALK overexpression.[1] Patient age, tumour laterality and ALK expression need to be considered before considering steroid therapy for renal IMT.

Conclusion

This case highlights an unusual presentation of a pediatric renal inflammatory myofibroblastic tumour on a background of neurogenic bladder and recurrent UTI. In this patient population, it is likely that some UTIs were missed given the history of CIC and the absence of classic UTI symptoms. The contribution of these missed and untreated episodes on the pathogenesis of this lesion is questionable. Established follow-up recommendations have not been solidified. Presently, with more than 18 months follow-up, our patient has shown no evidence of recurrence and the contralateral kidney showed resolution of hydronephrosis post-pyeloplasty. Follow-up blood work monitoring has not shown thrombocytosis, anemia or an elevated erythrocyte sedimentation rate or CRP, which supplement the imaging findings. From a surgical perspective, the best prognosis results from aggressive and complete resection of the tumour.[2,4,5,10,11] A word of caution relates to the challenging operative procedure given the extensive and dense adhesions demonstrated in our case. In the absence of a preoperative suspicion of IMT, the surgeon may not adhere to oncological principles of complete excision with negative margins, thereby compromising the outcome. Surgical pathology confirming clear resection margins is therefore important to obtain in all retrospective situations like our case. To summarize, renal IMT should be considered in patients presenting with a history of recurrent UTIs and a hypoattenuating renal lesion mimicking a renal abscess, especially in the presence of thrombocytosis.

Competing interests: None declared.

This paper has been peer-reviewed.

References

1. Nonaka D, Birbe R, Rosai J. So-called inflammatory myofibroblastic tumour: a proliferative lesion of fibroblastic reticulum cells? *Histopathology* 2005;46:604-13. http://dx.doi.org/10.1111/j.1365-2559.2005.02163.x
2. Karnak I, Senocak ME, Ciftci AO, et al. Inflammatory Myofibroblastic Tumor in Children: Diagnosis and Treatment. *J Pediatr Surg* 2001;36:908-12. http://dx.doi.org/10.1053/jpsu.2001.23970
3. Kovach SJ, Fischer AC, Katzman PJ, et al. Inflammatory Myofibroblastic Tumors. *J Surg Oncol* 2006;94:385-91. http://dx.doi.org/10.1002/jso.20516
4. Boo YJ, Kim J, Kim JH, et al. Inflammatory Myofibroblastic Tumor of the Kidney in a Child: Report of a Case. *Surg Today* 2006;36:710-3. http://dx.doi.org/10.1007/s00595-006-3225-6
5. Souid AK, Ziemba MC, Dubansky AS, et al. Inflammatory Myofibroblastic Tumor in Children. *Cancer* 1993;72:2042-8. http://dx.doi.org/10.1002/1097-0142(19930915)72:6<2042::AID-CNCR2820720641>3.0.CO;2-I
6. Dogra VS, Bhatt S. Inflammatory Pseudotumor of the Kidney. *Ultrasound Q* 2009;25:69-70. http://dx.doi.org/10.1097/RUQ.0b013e3181a79353
7. Park SB, Cho KS, Kim JK, et al. Inflammatory Pseudotumor (Myoblastic Tumor) of the Genitourinary Tract. *Am J Roentgenol* 2008;191:1255-62. http://dx.doi.org/10.2214/AJR.07.3663

8. Ernst CW, Van Der WerffTen Bosch J, Desprechins B, et al. Malignant transformation of an abdominal inflammatory myofibroblastic tumor with distant metastases in a child. *JBR-BTR* 2011;94:78-80.
9. Li JY, Yong TY, Coleman M, et al: Bilateral renal inflammatory pseudotumor effectively treated with corticosteroid. *Clin Exp Nephrol* 2010;14:190-8. http://dx.doi.org/10.1007/s10157-009-0242-y
10. Bonnet JP, Bassett T, Dijoux D. Abdominal Inflammatory Myofibroblastic Tumors in Children: Report of an Appendiceal Case and Review of the Literature. *J Pediatr Surg* 1996;31:1311-4. http://dx.doi.org/10.1016/S0022-3468(96)90262-6
11. Tarhan F, Gul AE, Karadayi N, et al. Inflammatory pseudotumor of the kidney: A case Report. *Int Urol Nephrol* 2004;36:137-40. http://dx.doi.org/10.1023/B:UROL.0000034662.23919.0b

Correspondence: Dr. Sumit Dave, Department of Urology, London Health Sciences Centre – Victoria Hospital, 800 Commissioners Rd East, PO Box 5010, London, ON N6A 5W9; sumit.dave@lhsc.on.ca