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Case Report

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Laparoscopic Heminephrectomy in Paediatric Duplex Kidney : A Case Report

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Abstract

Duplex kidney is one of the most common anomalies of the urinary tract. Early detection has dramatically increased due to advance in technology of imaging to detect the anomalies during antenatal period; however, numbers of undiagnosed adult still exist. It may remain asymptomatic, but may cause repeated urinary tract infections or calculi. This case report presents a case of a 10-year-old female who had right sided duplex collecting systems. This patient has repeated symptoms throughout the years, referred to several medical specialties. Then ultrasonography and computed tomography showed that she had complete duplex collecting system on her right kidney. She was then undergone laparoscopic heminephrectomy on right side and removal of dilated rigjt ureter. Congenital anomaly of the urogenital system should be considered in patients with chronic infection. Multimodal imaging technique such as ultrasonography, computed tomography, or magnetic resonance imaging should be done to confirm the diagnosis especially before surgical management.

Introduction

The incidence of duplex renal collecting system ad ureter ranges from 0.5% to 3%. Complete ureteral duplication is more rarely seen compared to single ureter or partial duplication.

Complete duplicated systems are those where 2 ureters arise from the same kidney and drain separately into the bladder, while partial duplication is where 2 proximal branches drain the same pelvis but join together distally to form 1 common ureteric branch prior to emptying into the bladder.[1,2] Along the length of the ureter, there are 3 segments that in physiologically narrow: the ureteropelvic junction, the ureterovesical junction, and where the ureter cross the common iliac vessels.[2,3] Duplications of the ureter represent one of the most common anomalies of the urinary tract.

One consequence of a nonfunctional renal collecting system is ureteric orifice malpositioning, such that the ureter of the inferior pole implants with a shorter tunnel into the bladder, thereby predisposing to vesicoureteral reflux. On the other hand, the positioning of the ureter of the superior pole of the kidney makes it more prone to ureteroceles and obstruction at the ureterovesicular junction.[4] The prevalence of duplication of ureter is higher in female than male.[5] Childhood detection of such renal anomalies has dramatically increased; however, a

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significant number of undiagnosed adult still exist.[4] Although duplication of ureter may remain asymptomatic, it may cause repeated urinary tract infections (UTIs) or calculi, also get injured during pelvic surgeries [6]. The presence of recurrent UTI, most commonly due to vesicoureteral reflux and urinary incontinence in females occurs in cases of ectopic ureter entering the vagina, urethra, or vestibule.[5] We introduce a case of unilateral complete ureteral duplication with recurrent UTI, which was treated by laparoscopic heminephrectomy with excision of dilated ureter on right side.

Case report

A 10-year-old girl admitted with right-sided loin pain which is dull aching, constant, non-radiating, mild to moderate in severity, with no definite aggravating or relieving factor. There is no history of fever with chills & rigor, hematuria, pyuria, calcuria. Physical examination revealed that she weighed 28 kg and was 102 cm tall. Vital signs were normal and on abdominal examination no organomegaly & renal angles are non tender. Investigation revealed that she had normal serum creatinine, but had evidence of infection in the urinalysis result. Other laboratory results were unremarkable. Abdominal ultrasound was done (Figs. 1-4). The ultrasound shows duplication of right pelvicaliceal system and severe hydroureteronephrosis on upper poles of right kidney .

CT urogram was done (Figs.2) an excretory phase image is shown. On the right kidney shows duplex ureter coming out from the superior and inferior renal pelvis. The ureter exiting the superior pole was dilated, tortuous, reaching the urethral base while the ureter exiting the inferior pole shows normal excretion phase.

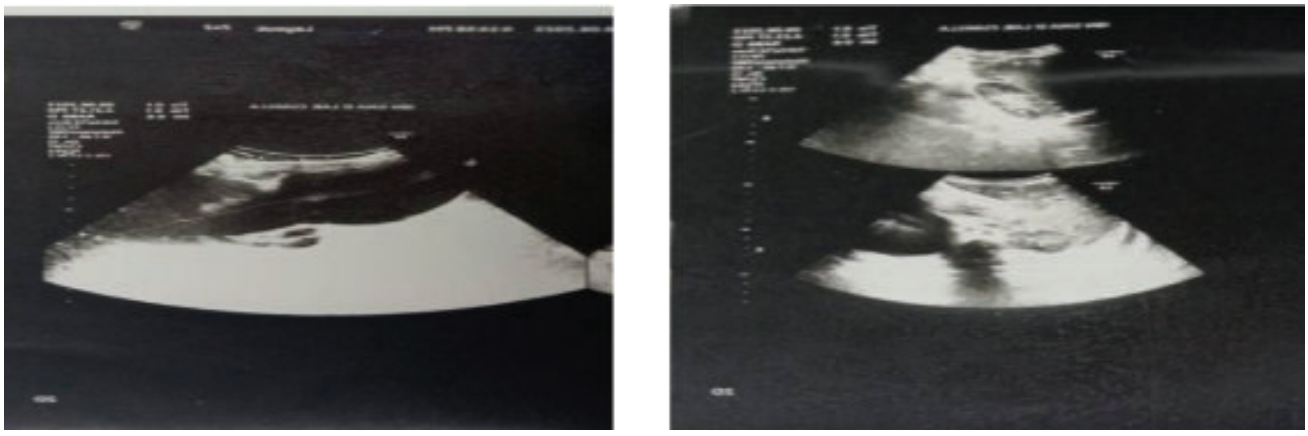

Fig. 1 – *Ultrasonography longitudinal (A) and transverse (B) view with schematic drawing of the right kidney.*

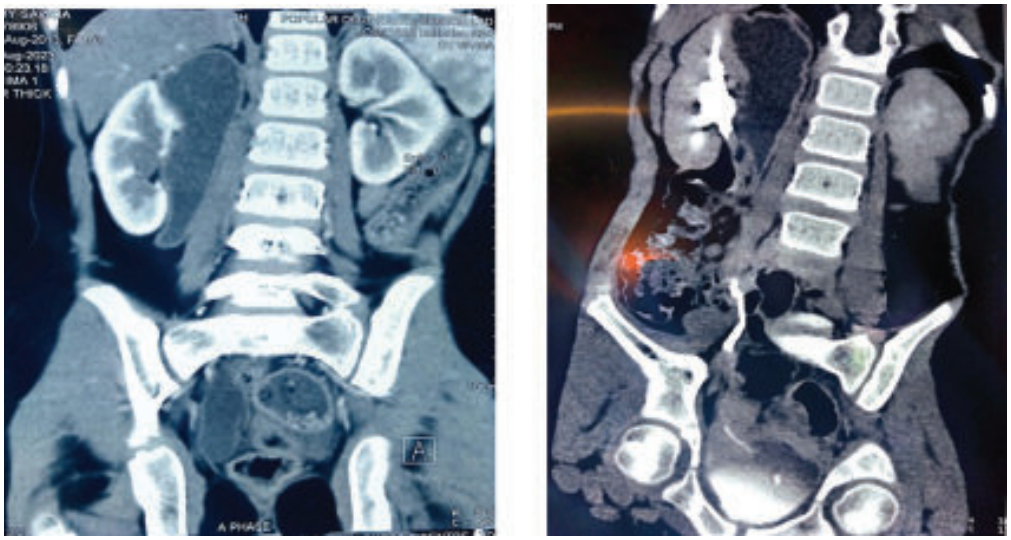

Fig. 2 *Multiplanar urogram-phase CT serial images coronal view shows dilatation of the upper moiety with thin cortex and no contrast enhancement on right. Dilated upper-polar ureter .*

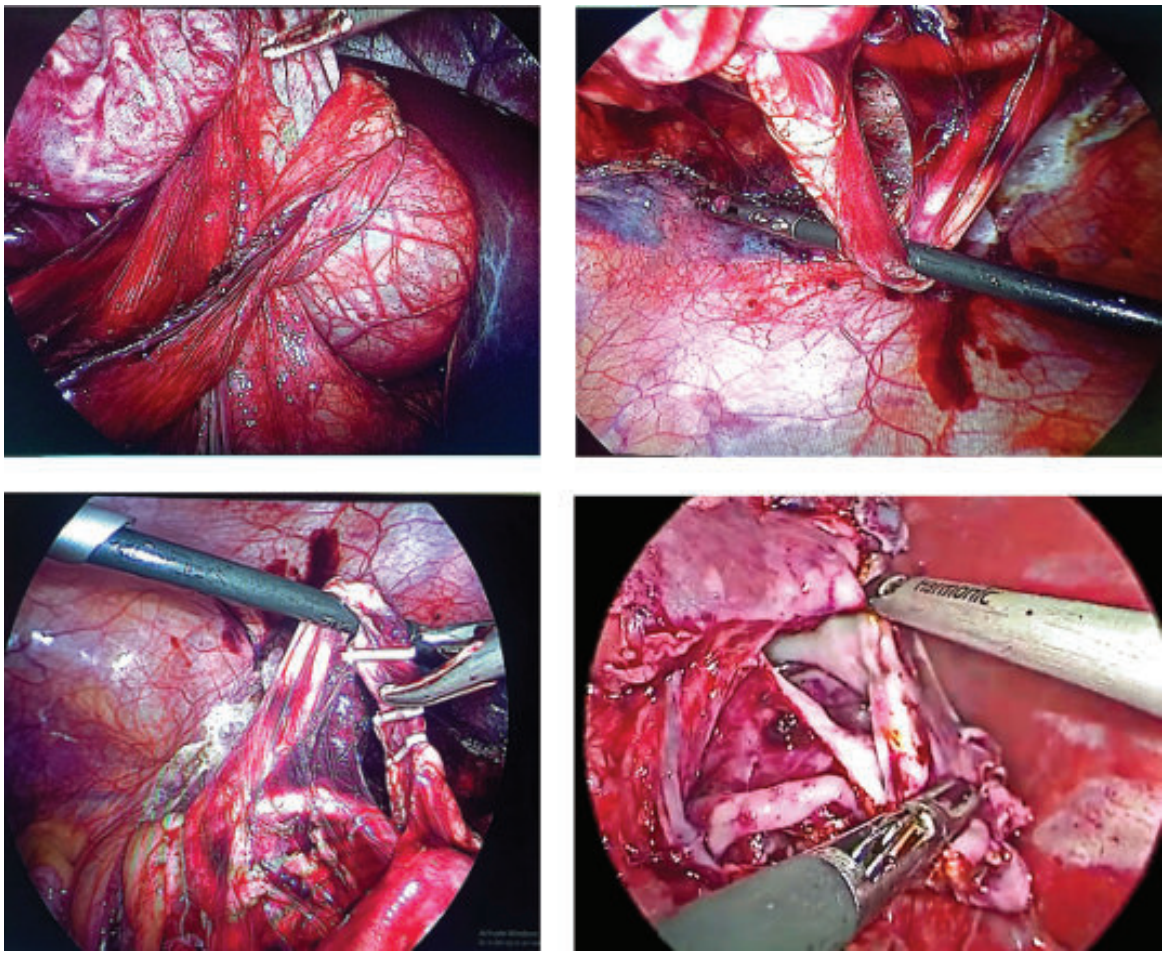

Fig. 3 *Laparoscopic view of different steps of upper moiety heminephrectomy of right side .*

The patient was then hospitalized and planned for surgical management. Under general anesthesia initially retrograde pyelography and stenting done in lower polar ureter on right. Then undergone right upper polar laparoscopic heminephrectomy with removal of right dilated ureter that exited from the superior pole. While hospitalized she was treated with antibiotic and pain medication. Postoperative period was uneventful and patient was discharged on 3rd postoperative day.

Discussion

Duplication of kidney system develops during the 4th to 5th weeks of gestation when there was failure to repress ectopic budding from the Wolffian Duct or multiple Ureteric Buds. Induction during metanephros development. In complete ureter duplication, the ureteric buds rotate 108° when incorporating into the urogenital sinus, known as Weigert-Meyer rule. A duplex collecting system is one of the most common congenital genitourinary tract abnormalities, even though it has a rare occurrence.[7-9] It is 2 to 4 times more common in female than male, either be asymptomatic or causing recurrent UTI in children.[6] In this case, the patient is female and had been treated for UTI multiple times. Duplex systems have potential for future complications, such as obstructive uropathy, stone formation, ureterocele, and vesicoureteral reflux. Early detection of this anomaly is helpful to prevent comorbidities and complications.[10] In all cases, imaging is mandatory to confirm the diagnosis. In children, kidney ultrasound represents the initial diagnostic test, but it has some limitations and may not be so helpful. Renal ultrasound and excretory urography can almost never detect an ectopic insertion of the ureter and they do not provide enough data regarding the precise anatomy as well as delineating the relationship between the ureter, bladder, and vagina.[11] Cross sectional imaging including computed tomography (CT) and magnetic resonance imaging (MRI) help in resolving the complex anatomy, including duplex collecting systems and to look for

complication like pyelonephritis, renal stones, and malignancies. CT urography is useful in the case of duplex collecting system, visualization of their complex course, distal opening, and associated other genitourinary malformations such as ectopic kidney complicated by stones, infection, or hypertension arising from multiple anomalous arteries.[12] Other than ultrasound and CT, MRI has the advantages of lack of ionizing radiation, better soft tissue contrast, and detection of the collecting system abnormalities even without contrast. Disadvantage is requirement of sedation in small children, cost, and availability.[12] In this case, contrast CT urography was done to confirm the diagnosis. This case is the same as what has been shown by Weigert Meyer's about the relationship between the upper and lower kidney parts in a duplex collecting system with their drainage.The best treatment in children and symptomatic patients is surgery, and it tries to resolve the complications, preserve renal function. Surgical treatment consists in upper pole heminephrectomy in the non-functional duplex system.[11] The nonfunctioning or poorly functioning kidney is usually dilated and hydronephrotic.[13] Surgical management depends on surgeon experience and preference, laparoscopic experience, and pediatric material investments.[11] It is necessary to consider the removal of the ureter to the level of the vesicoureteral junction.[14] In this case, we found the patient's right kidney is hydronephrotic with paper thin cortex, therefore laparoscopic upper pole heminephrectomy and removal of the dilated ureter exiting the upper pole were done to improve drainage and eliminate symptoms.

Conclusion

Laparoscopic heminephrectomy is a feasible operation for treatment of non-functioning duplex renal units in children and infants. The operation does, however, require the surgeon to have surmounted the learning curve for laparoscopic nephrectomy. Postoperative complications were minimal with no long-term negative sequelae.

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