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A Case of Left Duplex Kidney with Hydronephrosis Mimicking a Left Renal Cyst in a 29-Year-Old Woman

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

CDEF Chung-Tso Chen
ABF Shih-Feng Wang

Division of Urology, Department of Surgery, Cathay General Hospital, Taipei, Taiwan

Corresponding Author: Shih-Feng Wang, e-mail: sfw61709@hotmail.com
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Patient: Female, 29-year-old
Final Diagnosis: Left duplicated kidney with upper moiety severe hydronephrosis
Symptoms: Left side abdominal pain
Medication: —
Clinical Procedure: Robot-assisted left heminephrectom
Specialty: Surgery • Urology

Objective: Congenital defects/diseases

Background: Duplex kidney, also known as duplex renal collecting system, consists of 2 ureters arising from a single kidney and is a common congenital anomaly. The condition is usually an asymptomatic normal variant. However, abnormal anatomic variants such as hydronephrosis, vesicoureteral reflux (VUR), and ureterocele are sometimes observed in a patient with a duplicated kidney. These abnormal variants usually lead to diagnostic challenges. Here, we report a case of congenital left duplex kidney with hydronephrosis that presented as an isolated left renal cyst in a 29-year-old woman.

Case Report: We present the case of a 29-year-old woman who had left-side abdominal pain and fever for 1 day. Left-side flank throbbing pain was also noted. Laboratory investigations showed leukocytosis, pyuria and bacteriuria. Renal ultrasound revealed a huge hypoechoic mass around the left kidney, which was suspected to be a huge renal cyst or renal abscess. Under the impression of acute pyelonephritis with abscess formation, the patient was admitted for antibiotic treatment. The following abdominal computed tomography (CT) revealed a left duplex kidney with severe hydronephrosis and hydroureter. A percutaneous nephrostomy was then performed. Next, following a discussion with the patient, she underwent a robot-assisted left heminephrectomy.

Conclusions: A duplex kidney and collecting system should be considered when chronic urologic problems occur. This report shows that because duplex kidney is a relatively common congenital abnormality, it should be considered in the differential diagnosis in young patients who present with renal cyst. This case also shows that patients can be managed effectively using robot-assisted heminephrectomy.

MeSH Keywords: Congenital Abnormalities • Kidney Diseases • Nephrectomy • Robotics

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/927430

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Background

Duplex kidney, also known as duplex renal collecting system, consists of 2 ureters arising from a single kidney and is a common congenital anomaly. These frequent congenital abnormalities of the urinary tract occur in approximately 1 in 125 people [1–3]. The condition is usually an asymptomatic normal variant, but abnormal anatomic variants such as hydronephrosis, vesicoureteral reflux (VUR), and ureterocele are sometimes observed. Such anatomic variation should be considered when a chronic urinary tract disorder, such as repeated urinary tract infection (UTI) or chronic pyelonephritis, is observed. However, these abnormal variants usually lead to diagnostic challenges. Here, we report a case of congenital left duplex kidney with hydronephrosis that presented as an isolated left renal cyst in a 29-year-old woman.

Case Report

The patient was a 29-year-old woman with a past history of an asymptomatic small left renal cyst that was found when she was in senior high school. The progression of this left renal cyst was observed via a renal echogram during a health examination several months ago.

The patient was seen most recently due to left-side abdominal pain (near the left flank area) and fever for 1 day. Left-side flank throbbing pain was also noted. She denied cough, gastrointestinal symptoms, or dysuria. Laboratory investigations showed leukocytosis, pyuria, and bacteriuria. Renal function was normal. Renal ultrasound revealed a huge hypoechoic mass measuring 10x16 cm in diameter around the left kidney, which was suspected to be a huge renal cyst, but a renal abscess could not be ruled out (Figure 1). Under the impression of acute pyelonephritis with abscess formation, the patient was admitted for antibiotic treatment. After admission, an abdominal computed tomography (CT) scan was subsequently arranged due to the persistence of her symptoms. The abdominal CT scan revealed a left duplex kidney with upper-moiety severe hydronephrosis, cortical thinning, and hydroureter (Figure 2). A percutaneous nephrostomy was performed and some turbid urine was drained out. A left renal angiography was then also arranged for the identified supply artery. After discussing treatment options with the patient, she underwent a robot-assisted left heminephrectomy. We controlled the pedicle of the upper-moiety kidney according to the findings of the angiography. The upper-moiety kidney was resected smoothly afterward. The pathological findings indicated a duplicated collecting system with chronic pyelonephritis, abscess formation, and hydronephrosis (Figure 3). Urological CT and blood test for renal function were arranged in 3 months after surgery, then once per year afterward. The patient then had no specific complaints or abnormal finding on examination during the 2-year follow-up period.

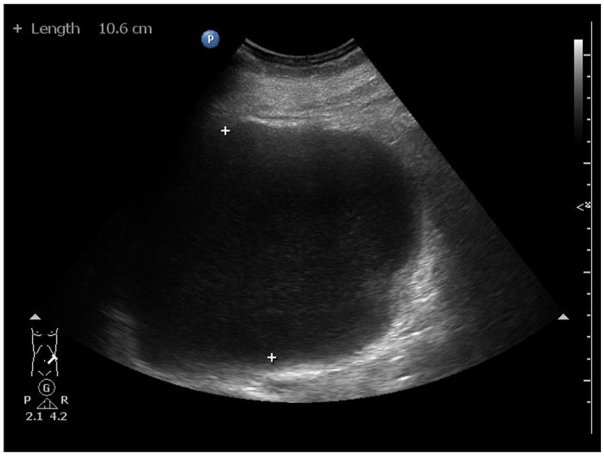

Figure 1. Left renal ultrasound image from a 29-year-old woman with congenital left duplex kidney with hydronephrosis that presented as a left renal cyst. The ultrasound image shows a large fluid-filled space measuring 10×16 cm in diameter that was initially diagnosed as a renal cyst or as a renal abscess.

Discussion

There have been several previously published cases of duplex kidney presenting with the appearance of renal cyst [4,5]. The finding of image studies and treatment of symptomatic duplex kidney in our case are similar to previously reported cases. Davda et al. [5] reported a 30-year-old man who had right loin pain for months. Ultrasound and CT demonstrated a large right-side renal cyst. Laparoscopic marsupialization was performed first, but the symptoms recurred after 2 years. Repeat CT scans revealed the presumed renal cyst was actually a distended upper moiety with dilated ureter that extended downwards to the pelvis. Excision of the non-functioning distended upper-moiety kidney and megaureter was eventually performed. The clinical course of this report is similar to our case. Severe hydronephrosis of duplex kidney was misdiagnosed as a renal cyst the first time. The true medical conditions were found in further CT scans because associated symptoms persisted after inappropriate management. Although duplex kidney is a relatively common congenital abnormality, severe hydronephrosis resulting from obstruction of a duplex ureter is relatively rare. Therefore, it may be a pitfall in clinical practice.

The possibility of anatomic variations should be considered when chronic urinary tract disorders, such as repeated UTI or chronic pyelonephritis, occur, as the mechanism underlying such repeated infections may be backward pressure placed on the collecting system due to anatomic variations. The incidence

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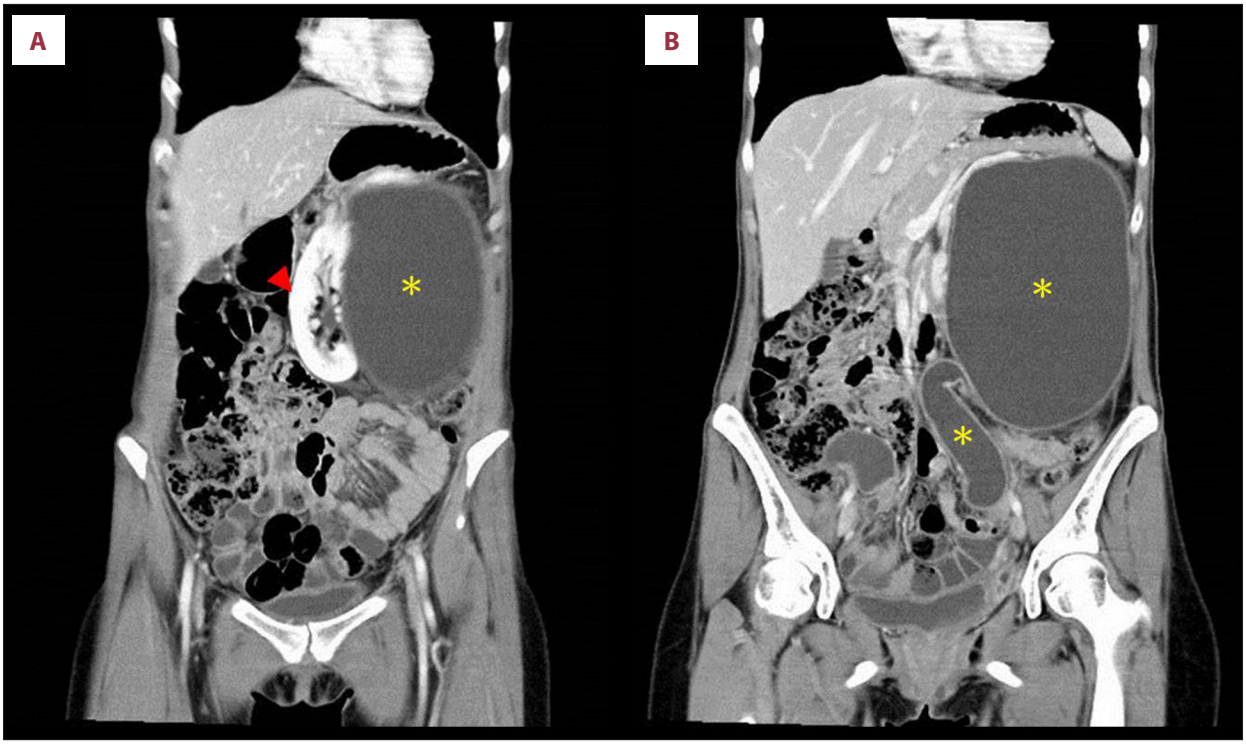

Figure 2. Coronal view of abdominal CT images from a 29-year-old woman with congenital left duplex kidney with hydronephrosis that presented as a left renal cyst. (**A**) The left kidney is compressed by a fluid-filled cyst measuring 10×16 cm in diameter (arrow head). (**B**) The left cyst with dilated ureter extended to the pelvis, which made us suspect a duplex kidney with hydronephrosis and hydroureter (asterisk).

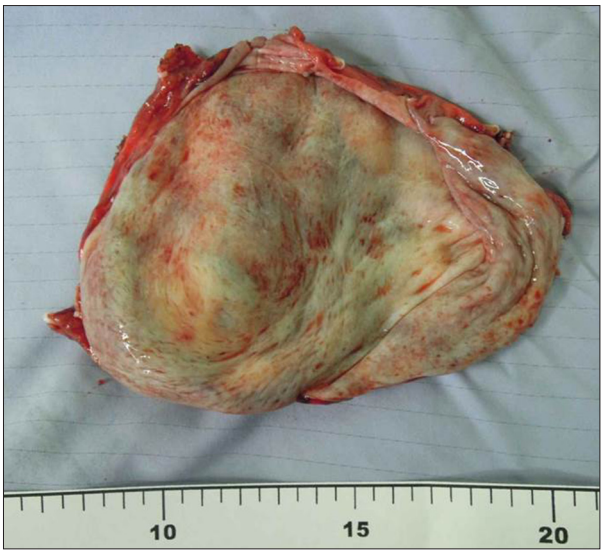

Figure 3. The surgical specimen following robot-assisted heminephrectomy from a 29-year-old woman with congenital left duplex kidney with hydronephrosis. The excised cystic structure measures×cm in diameter and has a pale fibrotic wall. There is no evidence of tumor or abscess.

and prevalence of duplicated urinary tract in the general population has been reported to be 0.7–4%. All forms of duplex kidney occur at a 2: 1 female: male ratio [6].

A duplicated urinary collecting system can sometimes be found accidentally due to normal variants that are clinically asymptomatic. However, such a system can also be an abnormal variant with vesicoureteral reflux (VUR), ureterocele, or hydroureteronephrosis that can cause chronic urinary tract problems or the impairment of renal function. Renal duplications have been found to be significantly associated with repeated UTIs and chronic pyelonephritis [7].

Ultrasound is a non-invasive, non-radiation-based, and relatively inexpensive diagnostic tool. It can be used as a first-line imaging modality in the evaluation of a suspected duplicated urinary system. The findings of a duplicated kidney and collecting system on ultrasound include abnormal parenchymal contours, unequal lengths of kidney, and asymmetrical dilation of the renal pelvis and renal calyx in different moieties [8]. However, in the present case, the severe hydronephrosis and cortical thinning of the upper-moiety kidney increased the difficulty of identifying its parenchymal contours. Therefore, a huge renal cyst or renal abscess was suspected at the time of the early evaluation.

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A CT scan can delineate complex or abnormal anatomical variations and provide excellent spatial resolution. These advantages make a CT scan a useful imaging tool to evaluate a patient with a duplicated urinary system. The findings of duplicated kidney and collecting system on a CT scan may include different sizes of kidneys, a dividing cleft in the parenchyma of a kidney, asymmetrical dilation of the collecting systems in different moieties, or 2 ipsilateral ureters [8]. In our case, the further CT examination provided useful insights for making a differential diagnosis. Marked left upper-moiety hydronephrosis and hydroureter due to ureterocele were found. The lower moiety of the kidney was displaced due to compression resulting from upper-moiety hydronephrosis. Because the high resolution of the CT scan allowed us to delineate the patient's complex anatomy, we clarified that the previous renal echogram had identified severe hydronephrosis of a duplicated kidney instead of a renal cyst or abscess.

The conventional treatment for a symptomatic unilateral duplicated collecting system is a heminephrectomy. Laparoscopic heminephrectomy has previously been described in the literature for adult patients [9]. A transperitoneal approach method was reported to offer a technically simple approach for complete ureterectomy, which makes the surgery more effective in moiety excision [10]. However, reports regarding robot-assisted surgery for renal duplication are rare. Mason et al. [11] reported their experiences with robot-assisted treatment of 4 patients. The authors highlighted the concept that a heminephrectomy should be approached differently from a partial nephrectomy for a tumor due to the complex vascular anatomy involved. Akca et al. [12] reported their experiences in treating 5 patients with robot-assisted treatment. In those cases, there were no significant renal function declines postoperatively and only 2 minor complications. According to these and other previous experiences, robot-assisted heminephrectomy is an effective surgical treatment for the abnormal variation of a duplicated system. The robotic technology can provide excellent dexterity and vision to facilitate the management of complex vascular and ureteral anatomies in a duplicated urinary system.

Conclusions

A duplicated kidney and collecting system should be considered when chronic urologic problems occur. Abnormal anatomic variations usually lead to diagnostic challenges. A case is presented of congenital left duplex kidney with hydronephrosis in a 29-year-old woman that had the appearance of a left renal cyst. This report has shown that because duplex kidney is a relatively common congenital abnormality, it should be considered in the differential diagnosis in young patients who present with renal cyst. This case also shows that patients can be managed effectively using robot-assisted heminephrectomy.

Conflict of interest

None.

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