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A 50-YEAR-OLD FEMALE WITH DUPLEX COLLECTING SYSTEM FOLLOWING THE WEIGERT-MEYER RULE

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ABSTRACT

This study aims to describe the clinical presentation, radiological features, and management of a case of duplex collection system diagnosed in adulthood. Methods This study used a case report method. Data were obtained through anamnesis, physical examination, supporting examinations in the form of abdominal ultrasonography (USG) and Multislice Computed Tomography (MSCT), as well as intraoperative findings and patient medical records. Data were analyzed descriptively by comparing the examination results with relevant literature. The results of the USG examination showed lesions in the left hemiabdomen and pelvic cavity with a differential diagnosis of hydronephrosis, hydropyonephrosis, left hydroureter, colonic mass, and left ectopic kidney. Abdominal MSCT examination confirmed the presence of a dual collecting system in the left kidney with grade IV hydronephrosis in the upper pole collecting system that empties into the ureterocele according to the Weigert-Meyer Rule. Surgery revealed severe hydronephrosis in the upper pole of the left kidney accompanied by left hydroureter. In conclusion, a dual collecting system (DCS) is a rare congenital anomaly typically diagnosed in childhood, but in some cases it can remain asymptomatic into adulthood. Radiological examination, particularly abdominal CT scan, plays a crucial role in establishing the diagnosis and determining appropriate management.

Keywords: Dual Collecting System, Hydronephrosis, Weigert-Meyer Rule, Ureterocele, Adults

INTRODUCTION

A duplex collecting system (DCS) is one of the most common congenital abnormalities of the upper urinary tract. This disorder occurs due to impaired ureteric bud development during embryogenesis, resulting in the formation of two pyelocalic systems in a single kidney, with ureteral duplication that can be complete or partial. Although a relatively common congenital abnormality, most cases are asymptomatic and are diagnosed incidentally through imaging or after complications have developed (Alsaikhan et al., 2023).

The clinical manifestations of a dual collecting system vary widely depending on the type of duplication and the presence of comorbidities. In some patients, this disorder can cause recurrent urinary tract infections, hydronephrosis, hydroureter, vesicoureteral reflux, ureterocele, ureteropelvic obstruction, urinary incontinence, and

even decreased kidney function. However, most patients are asymptomatic in childhood, so the diagnosis is usually made in adulthood after complications or is discovered incidentally during radiological examinations (Katwal et al., 2023).

A recent systematic review showed that dual collecting ducts in adults are an underreported condition with a wide spectrum of clinical manifestations. The most common complaints include low back pain, recurrent urinary tract infections, hematuria, urinary incontinence, abdominal pain, and sepsis due to urinary tract obstruction. Complex anatomical variations often delay diagnosis, increasing the risk of permanent kidney damage if not treated appropriately (Alsaikhan et al., 2023).

Advances in imaging technology have improved the ability to detect congenital urinary tract anomalies. Ultrasonography (USG) remains the initial modality due to its accessibility and non-invasiveness, while computerized tomography urography (CTU), multislice computerized tomography (MSCT), and magnetic resonance urography (MRU) provide more detailed anatomical information regarding the pyelocalic system, ureteral course, the degree of hydronephrosis, and associated abnormalities such as ectopic ureters and ureteroceles. These imaging examinations play a crucial role in establishing the diagnosis and planning appropriate surgical treatment (Dwitayanti et al., 2024).

Dual collecting ducts in adults often pose a diagnostic challenge because their symptoms mimic those of various other abdominal and urologic conditions. Several case reports indicate that adult patients may present with abdominal enlargement, chronic abdominal pain, severe hydronephrosis, or recurrent urinary tract infections before being diagnosed with a duplicate renal collecting system. This often delays diagnosis, making management more complex than if the condition had been recognized in childhood (Katwal et al., 2023).

Treatment of a dual collecting system is determined by kidney function, the location of the abnormality, and any associated complications. Asymptomatic patients generally require only regular observation, while patients with severe hydronephrosis, ectopic ureters, ureteroceles, vesicoureteral reflux, or recurrent infections require surgical procedures such as heminephrectomy, ureteroureterostomy, or ureteral reimplantation. The choice of treatment aims to maintain good kidney function while relieving obstruction and preventing long-term complications (Alsaikhan et al., 2023).

Recent case reports also indicate that adult women are more likely to experience clinical manifestations of a dual collecting system, especially if an ectopic ureter is present. In some patients, symptoms do not appear until the fourth or fifth decade of life after previously experiencing no symptoms during childhood. This suggests that a dual collecting system can remain asymptomatic for long periods and only be identified after anatomical changes or secondary complications have occurred (Yang et al., 2025).

Based on this description, a dual collecting system in adults is a relatively rarely diagnosed congenital anomaly, but it has important clinical features and complications. Therefore, this case report aims to describe the clinical manifestations, radiological findings, and management of an adult patient with a duplex collecting system and severe hydronephrosis. This report should raise clinicians' awareness in

considering congenital urinary tract abnormalities as a differential diagnosis in adult patients with urinary tract complaints or atypical abdominal masses.

RESEARCH METHODS

This study used a case report design with a descriptive approach. The subject was a 50-year-old female patient who presented to the emergency department complaining of abdominal distension, accompanied by abdominal tightness and nausea. Data were collected through history taking, physical examination, medical record review, and supporting examination results, including abdominal ultrasound (USG) and abdominal multislice computed tomography (MSCT). Data were also obtained from intraoperative findings to confirm the diagnosis.

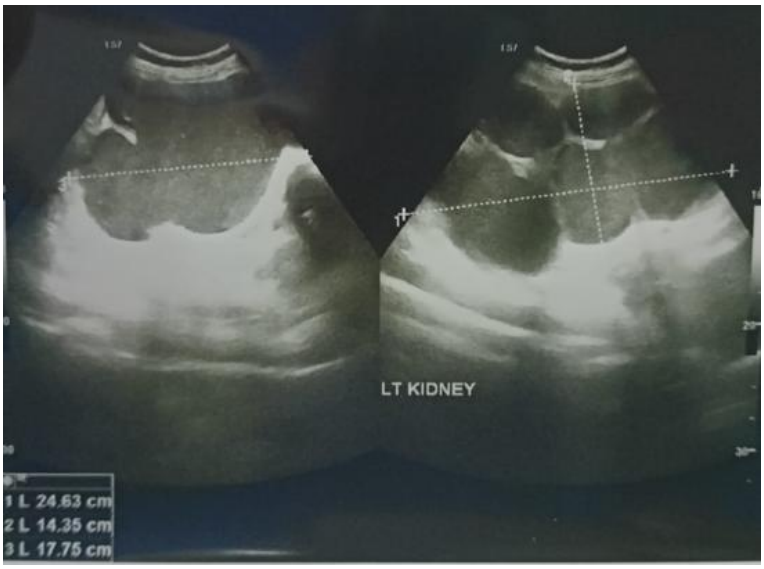
The data obtained were analyzed descriptively, outlining the patient's clinical characteristics, radiological examination results, intraoperative findings, and management. Furthermore, the case findings were compared with current theory and scientific literature regarding duplex collecting systems, providing an overview of the characteristics, diagnostic process, and management of cases that arise in adulthood.

RESEARCH RESULTS

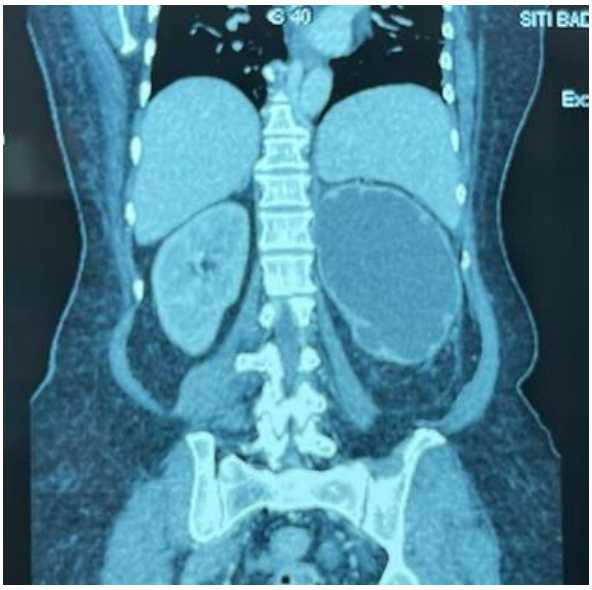
A 50-year-old woman arrived at the emergency department with complaints of abdominal enlargement that had been ongoing for approximately one month, accompanied by a feeling of tightness in the abdomen and nausea. During the physical examination, the abdomen appeared enlarged, raising suspicion of an abdominal tumor.

An abdominal ultrasound was performed, and radiology expertise was requested. The results indicated a lesion in the left hemiabdomen and pelvic cavity, with potential differential diagnoses including hydronephrosis with pus (hydropyonephrosis), left hydroureter, a colon mass, and a left ectopic kidney with a complex cystic mass. The following day, the patient underwent a Multislice Computed Tomography (MSCT) scan of the abdomen, which included axial, coronal, and sagittal reformatted slices. The findings suggested a double collecting system in the left kidney, with the upper moiety's collecting system exhibiting severe grade IV ectasis, draining into a ureterocele located inferior to the ureterovesical junction (UVJ) of the lower moiety of the left kidney, consistent with the Weigert-Meyer Rule.

Subsequently, the patient underwent surgery, which revealed severe hydronephrosis in the upper moiety and left hydroureter. Extensive adhesions were found in multiple areas: anteriorly to the peritoneum, superiorly to the diaphragm, and posteriorly to the vena cava and aorta. Upon opening the kidney, pus was discovered, and approximately 1 liter was drained. A heminephrectomy was then performed on the affected upper part of the kidney and its collecting system.



Ultrasound findings suggest a left ectopic kidney accompanied by a complex cystic mass.



CT scan suggest Double collecting system in the left kidney, with the upper moiety collecting system showing severe ectasis.

DISCUSSION

The case of a 50-year-old woman with a dual collecting system following the Weigert-Meyer rule is supported by consistent literature on duplicate ureteral anatomy, upper versus lower complication patterns, the importance of imaging, and the fact that some cases may not be diagnosed until adulthood (Yang et al., 2025; Didier et al., 2017; Raja et al., 2016).

The literature also indicates that women with ectopic ureters more often present with incontinence, recurrent urinary tract infections, or hydroureteronephrosis, so this case profile remains biologically plausible, although rare in adulthood (Chionardes et al., 2022). The most common complications in the duplicate system are upper moiety

obstruction/ureterocele and lower moiety vesicoureteral reflux, which are the basis for the clinical interpretation of similar case reports (Kanali et al., 2024; Doery et al., 2015).

A duplex collecting system (DCS) is a congenital urinary tract abnormality that occurs due to impaired development of the ureteric buds during embryogenesis. This abnormality can be complete or partial duplication, depending on whether one or two ureteric buds develop from the mesonephric duct. Although it is a relatively common congenital anomaly, most cases are asymptomatic and are diagnosed only during imaging or after complications develop in adulthood. A recent systematic review showed that most adult patients are diagnosed after experiencing obstruction, infection, or impaired renal function (Alsaikhan et al., 2023).

In this case, a 50-year-old patient presented with chief complaints of abdominal distension, tightness, and nausea. These manifestations are relatively rare, as most adult patients with a duplex collecting system more often present with flank pain, recurrent urinary tract infections, hematuria, or urinary incontinence. However, several recent case reports have shown that severe hydronephrosis due to ureteral obstruction can cause abdominal enlargement, mimicking an intra-abdominal mass or tumor. Therefore, a dual collecting system should be considered as a differential diagnosis in adult patients with an unexplained abdominal mass (Shu et al., 2022).

The patient's ultrasound examination revealed a large lesion in the left hemiabdomen, with a differential diagnosis of hydropyonephrosis, hydroureter, colonic mass, and ectopic kidney. This illustrates that ultrasound has good sensitivity as a screening modality, but it still has limitations in differentiating various complex anatomical abnormalities of the urinary tract. Recent case reports also demonstrate that ultrasound interpretation can lead to a broad differential diagnosis, necessitating further imaging studies to confirm the underlying anatomical abnormality. Multislice Computed Tomography (MSCT) in this case successfully demonstrated a complete dual collecting system in the left kidney, accompanied by grade IV hydronephrosis of the upper collecting system and a ureterocele. These results are consistent with various studies that suggest that CT urography (MSCT) is the best examination for evaluating renal anatomy, the pyelocalycecal system, the course of the ureters, and associated complications, thus greatly assisting in surgical planning (Dwitayanti et al., 2024).

The finding of a ureterocele at the upper pole, which opens inferiorly, in accordance with the Weigert-Meyer Rule, is also consistent with the embryological theory of the dual collecting system. In complete duplication, the upper pole ureter generally opens medially and inferiorly, making it more susceptible to obstruction and ureterocele formation, while the lower pole ureter is more frequently associated with vesicoureteral reflux. This anatomical pattern has been confirmed in numerous adult case reports, showing that complications most frequently involve the upper pole collecting system (Yang et al., 2025).

This case demonstrated grade IV hydronephrosis accompanied by very severe hydroureter, producing approximately one liter of pus at the time of surgery. This condition indicates hydropyonephrosis due to chronic obstruction followed by infection. Recent literature suggests that ureteral obstruction in the dual collecting

system can cause urinary stasis, facilitating bacterial growth and ultimately progressing to severe infection, even sepsis, if not promptly treated.

The surgery revealed extensive adhesions to the peritoneum, diaphragm, vena cava, and aorta. These adhesions are likely the result of a long-standing chronic inflammatory process caused by hydronephrosis and persistent infection. This condition often complicates surgery due to the increased risk of bleeding and injury to surrounding organs. Therefore, thorough anatomical identification via CT before surgery is crucial to reduce intraoperative complications.

This patient underwent an upper pole heminephrectomy because this portion of the kidney was severely damaged and no longer functional. Heminephrectomy is the recommended treatment option for patients with dual collecting ducts accompanied by nonfunctional moieties, severe hydronephrosis, or recurrent infections. Systematic reviews have shown that heminephrectomy in adults has a high success rate when performed based on a thorough evaluation of kidney anatomy and function (Al-Smair et al., 2022).

During surgery, severe hydronephrosis was found, with approximately one liter of pus in the renal collecting system. This condition indicates that chronic obstruction has progressed to hydropyonephrosis. Urinary stasis due to the obstruction allows bacterial growth, which can lead to pyopyonephrosis and even sepsis if not treated promptly. Therefore, decompression and surgery are the primary options for patients with severe infections and impaired urinary drainage (Qasem et al., 2022).

In this case, extensive adhesions were also found to the diaphragm, peritoneum, vena cava, and aorta. These adhesions likely resulted from a long-standing chronic inflammatory process caused by hydronephrosis and persistent infection. Previous research has shown that chronic inflammation in the dual collecting system can increase surgical complexity due to anatomical changes and fibrotic tissue surrounding the kidney. Therefore, preoperative radiological evaluation is crucial to reduce the risk of intraoperative complications (Ntalianis et al., 2022).

CONCLUSION

A duplex collecting system is a very rare condition and often presents symptoms during childhood, but it can also be asymptomatic and appear in adulthood, which is more commonly found in women.

SUGGESTION

Based on the results of this case report, it is recommended that healthcare providers consider the possibility of a duplex collection system in adult patients, especially women, who present with urinary tract complaints or unexplained abdominal enlargement. Imaging examinations such as ultrasonography and multislice computed tomography (MSCT) should be performed to establish an accurate diagnosis so that appropriate management can be provided and further complications can be prevented. Furthermore, further reporting and research on cases of dual collecting systems in adults is needed to enrich the scientific evidence regarding its clinical characteristics, diagnosis, and management.

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