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Congenital bilateral double collecting system: Case report.

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Abstract

Introduction: Duplicate collecting systems are the least common congenital anomaly of the upper urinary tract, with an incidence of 0.8%. They are more frequent in females. Prenatal diagnosis is possible via ultrasound, but it is usually confirmed after birth when complications arise. The aim of this study was to report a case of bilateral duplicate collecting systems in a newborn girl and to analyze their clinical relevance.

Case report: We describe the case of a female neonate at 38.5 weeks of gestation with a history of bilateral pyelocaliceal dilatation detected on prenatal ultrasound. Subsequently, she presented with recurrent urinary tract infections.

Diagnostic workshop: Postnatal studies showed bilateral hydronephrosis with complete pyelocaliceal duplication in both kidneys. The patient experienced episodes of neonatal sepsis and urinary tract infection caused by multidrug-resistant bacteria. She was treated surgically with a ureteroureteral anastomosis, a technique that preserved renal function and reduced complications.

Discussion: Ureteral duplication can be complete or incomplete and is often associated with hydronephrosis and recurrent infections. Surgical treatment is indicated in cases of obstruction, vesicoureteral reflux, or recurrent infections. Ureteroureteral anastomosis is a conservative option with lower morbidity than ureterovesical reimplantation.

Conclusions: Prenatal diagnosis of urinary tract anomalies allows for appropriate follow-up and reduces complications. Ureteroureteral anastomosis is a safe and effective alternative in pediatric patients with bilateral duplicated collecting systems.

Keywords: duplicated collecting system, hydronephrosis, congenital urinary anomalies, uretero-ureteral anastomosis, neonate.

Introduction

the upper urinary tract. Its estimated incidence is 1 in 125 live births, with a predominance in females [1-4]. Embryologically, it results from an alteration in the interaction between the ureteric bud and the metanephric blastema, leading to the formation of two renal pelvises and one or two ureters per kidney.

Most cases are asymptomatic, but in the presence of obstruction, vesicoureteral reflux, or ureteral ectopia, the clinical picture may include hydronephrosis, recurrent urinary tract infections, and deterioration of renal function. This paper presents a case of a bilateral duplicated collecting system diagnosed in a newborn, with a complicated clinical course and successful surgical management.

Case report

Medical record

This is a female newborn, born at term at 38.5 weeks, weighing 3350 g, measuring 50 cm in length, with Apgar scores of 9/10 at 1 and 5 minutes (Table 1). Initial physical examination revealed the following circumferences: head circumference 38 cm, chest circumference 34 cm, and abdominal circumference 33 cm. Initial clinical assessment showed no organomegaly, patent natural orifices, and neurological reflexes present and consistent with gestational age. The maternal prenatal history is presented in Figure 1 and Table 2 .

Table 1. Clinical and anthropometric parameters at the patient's birth.

Parameter	Find
Sex	Female
Gestational age	38, 5 Weeks
Apgar	9/10
Weight	3350 g
Size	50 cm
Head circumference	38 cm
Chest perimeter	34 cm
Abdominal Circumference	33 cm

Urinary tract infection by Escherichia coli was observed in the first trimester, followed, at week 33, by ultrasound findings that showed bilateral renal dilation of grade IV and decreased amniotic fluid, which guided the prenatal diagnosis of hydronephrosis.

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Figure 1. Maternal prenatal history.

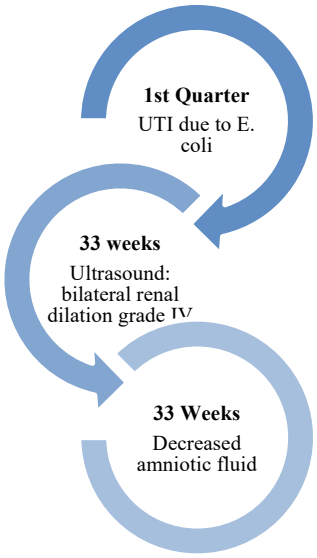

Table 2. Maternal history and ultrasound findings during pregnancy.

Parameter	Find
Maternal age	26 years old
Parity	First-time mother
Prenatal checkups	15
Ultrasound scans performed	14
Amniotic fluid (AFI)	<8 cm
Placental maturation	Early (week 33)

The relevant characteristics of the pregnancy, prenatal check-ups and parameters that supported the prenatal diagnosis of bilateral hydronephrosis are detailed.

The vesicoureteral ultrasound performed after admission revealed kidneys with a hydronephrotic appearance, cortical thinning, and bilateral pyelocaliceal duplication. The pyelocaliceal systems showed marked dilation, measuring 7 mm in diameter, without visualization of a ureterocele. The bladder walls were normal, and no urethral abnormalities were identified (Figure 2).

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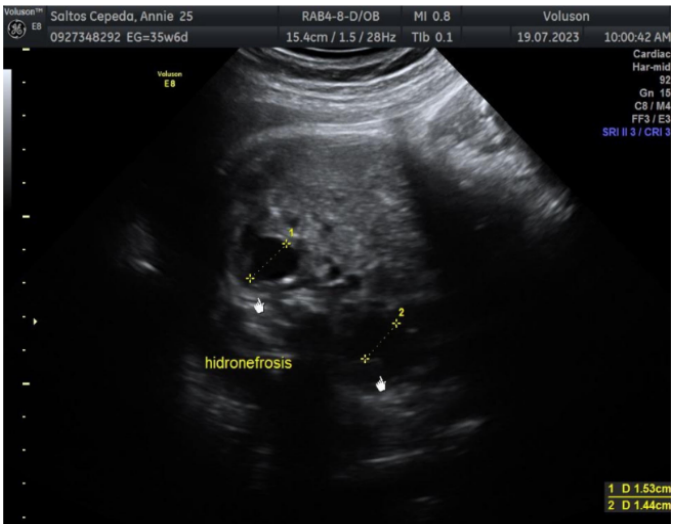
Figure 2. Postnatal vesical ultrasound.



Both kidneys showed hydronephrosis and cortical thinning, associated with bilateral pyelocaliceal duplication and marked dilation of the collecting systems. Following the ultrasound, the newborn presented clinical signs that prompted the consultation. Early identification of fever, jaundice, respiratory distress, and acrocyanosis guided the diagnostic studies and established the primary and complementary diagnoses. Table 3 summarizes the clinical findings, diagnoses, and complementary results, integrating the clinical and imaging assessment, as well as the recommended management plan.

Table 3 . Postnatal vesical ultrasound.

Category	Detail
Reason for consultation/ symptoms	Fever 38 °C, jaundice of arms and legs (Kramer IV/V), respiratory grunting, acrocyanosis
Main diagnosis	- Unspecified neonatal jaundice (P59.9) - Bacterial sepsis of the newborn (P36.9)
Prenatal checkups	
-Vesicorectal ultrasound: bilateral hydronephrosis with cortical thinning, pyelocaliceal duplication, pyelocaliceal dilation 7 mm, normal bladder. -Retrograde urethrocystography: no ureterocele, no vesicoureteral reflux, bladder with regular walls. - Pediatric urology consultation: scheduled surgery. - General care: hygiene at each diaper change.	

The newborn's second hospital admission, 1 month later, was due to a fever of 39°C, so laboratory studies were performed (Table 4).

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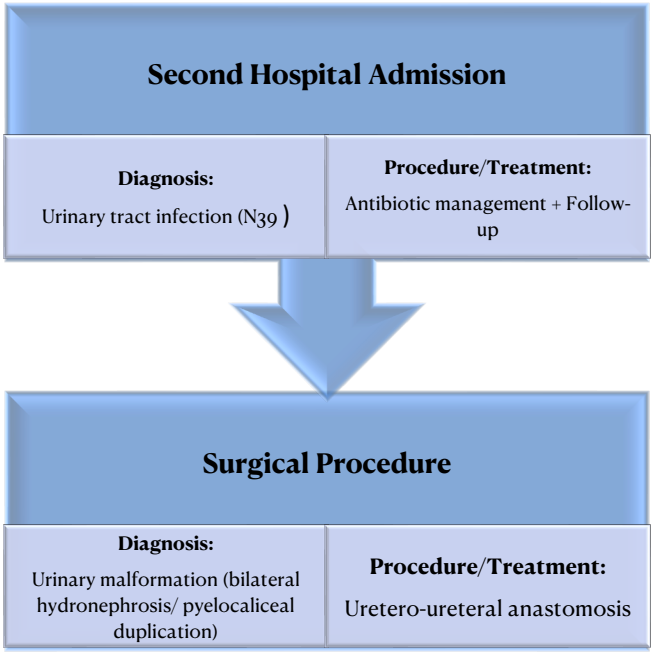
Table 4. Laboratory results and microbiological findings from the second hospital admission.

Exam	Find	Interpretation
Leukocytes	13, 120/ mm	Mild-moderate leukocytosis
Neutrophils	62%	Neutrophilic predominance suggests bacterial infection.
Urine culture	Klebsiella pneumoniae ESBL	Resistant pathogen.
Kidney function	Within normal parameters	Without acute renal impairment.

The urine culture was positive for ESBL-producing Klebsiella pneumoniae. Renal function remained within normal parameters, so once the infection was treated, surgical intervention was planned.

Figure 3. Chronology of the second hospital admission and surgical management.



One month after her second admission, a ureteroureteral anastomosis was performed, a procedure that restores the continuity of the urinary system. Following the procedure, the patient has not experienced any further urinary tract infections, and her renal function is normal. Currently, the patient has been undergoing regular follow-up for 2 years, with monitoring of both her renal function and urinary tract health (Figure 3).

Discussion

The term "bilateral duplicated collecting system" refers to the duplication of the renal collecting systems in both kidneys, a rare congenital anomaly. This malformation can be classified as complete (two ureters draining independently) or incomplete (ureteral bifurcation with a single bladder meatus). In the complete variant, the upper ureter is usually

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inserted ectopically, predisposing to obstruction, while the lower ureter is frequently associated with vesicoureteral reflux, which follows Weigert-Meyer's Law.

Although prenatal diagnosis is possible in cases of marked dilation, it is usually confirmed in the neonatal period by ultrasound. Typical clinical presentations include recurrent urinary tract infections, hydronephrosis, and obstructive symptoms; therefore, definitive management will depend on the severity and associated complications. Surgical options include heminephrectomy, ureterovesical reimplantation, and ureteroureteral anastomosis (ureteroureterostomy).

From a medical perspective, the clinical signs described in this patient reflect significant pathophysiological responses. The initial fever and respiratory distress indicated activation of the immune system in response to an infectious process, consistent with neonatal sepsis. Severe jaundice suggests accumulation of unconjugated bilirubin, likely secondary to hepatic immaturity, and is associated with hemolytic processes related to the infection. Furthermore, acrocyanosis indicated impaired peripheral oxygenation, a common finding in neonates with systemic involvement [6-8].

From an anatomical perspective, renal findings—such as bilateral hydronephrosis and pyelocaliceal duplication—represent congenital malformations that increase the risk of urinary reflux, recurrent infections, and progressive kidney damage; in this scenario, retrograde urethrocystography is a key study to rule out major obstructive complications and confirm the surgical indication [9, 10].

Ureteroureterostomy is a well-established surgical technique, supported by the literature, for the treatment of ureteral duplications, with favorable results in symptom resolution and preservation of renal function [11-18]. This technique is used to treat complications such as obstruction, vesicoureteral reflux, or ureterocele, especially when preservation of the affected segment is desired. The procedure involves creating an anastomosis between the ureter of the affected (donor) segment and that of the healthy (recipient) segment, usually on the same side (ipsilateral). This preserves renal function and avoids the need to reimplant both ureters into the bladder, thereby reducing the risk of bladder complications.

In the medical literature, this intervention—reported since 1965—is described as a safe and effective option, both via open and minimally invasive (laparoscopic or retroperitoneoscopic) approaches, and is associated with good functional outcomes and low morbidity [11-18]. Evidence shows that it is especially useful in cases of complete duplication with obstruction or reflux, in which symptomatic resolution rates are high [11, 12, 15, 16, 18]. Furthermore, laparoscopic and retroperitoneoscopic approaches offer clear advantages, including shorter operative time, reduced intraoperative bleeding, and shorter hospital stay compared with bladder reimplantation [12, 15].

It is important to note that the term "bilateral ureteroureteral anastomosis" does not exist in the medical literature as a standardized procedure for the simultaneous management of bilateral duplications. However, in exceptional cases of symptomatic bilateral duplication, ureteroureterostomy may be considered bilaterally, always tailoring the strategy to the specific anatomy and renal function of each patient. In this case, the choice of this technique enabled the resolution of hydronephrosis and the prevention of recurrence of infectious processes, which is consistent with recent scientific reports.

The correlation between clinical signs and imaging findings underpins a comprehensive approach that combines surgical intervention with postoperative preventive measures—such

as strict hygiene during diaper changes—to minimize long-term infectious complications. A detailed preoperative evaluation using imaging and functional studies is essential to select the most appropriate technique. Taken together, this analysis demonstrates how timely postnatal evaluation allows for linking clinical interpretation with complementary studies, guiding therapeutic decisions based on individual risk and available medical evidence. This sequence highlights the importance of integrating clinical evolution and previous findings to make timely decisions regarding surgical intervention, ensuring comprehensive, safe, and successful management of the neonate [8-11].

Conclusion

Bilateral duplicated collecting systems, by disrupting normal urinary flow, cause stasis and hydronephrosis, predisposing infants to recurrent urinary tract infections due to multidrug-resistant pathogens and to neonatal sepsis. Clinically, the close correlation between prenatal ultrasound diagnosis of pyelocaliceal dilation and the subsequent onset of systemic symptoms (fever, jaundice, and respiratory distress) indicates that early in utero detection is crucial for anticipating serious obstructive or infectious complications in the postnatal period. Furthermore, ipsilateral ureteroureteral anastomosis has proven to be a conservative surgical alternative with a solid pathophysiological basis, as it restores continuity and physiological drainage of the urinary system, preserves long-term renal function, and reduces the morbidity associated with traditional invasive techniques such as bladder reimplantation. The main lesson of this report is that timely prenatal diagnosis of upper urinary tract anomalies, combined with conservative and tailored surgical intervention, such as ureteroureterostomy, is safe, effective, and crucial for ensuring infection-free survival and safeguarding renal function in pediatric patients with complex duplicated collecting ducts.

Abbreviations
ESBL: Extended-spectrum beta-lactamase.

Supplementary information
Supplementary materials have not been declared.

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Robert Alfredo Mora Torosine : Conceptualization, data curation, research, methodology, visualization, original draft writing.
Annie Candy Saltos Cepeda : Conceptualization, data curation, research, project management, and writing of the original draft.
Yoel Enrique Pinto Mejía: Conceptualization, data curation, research, project management, and writing of the original draft.
Nadine Nalensska German Naranjo: Conceptualization, data curation, research, project management, and writing of the original draft.
All authors read and approved the final version of the manuscript.

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