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Bilateral Hydronephrosis Secondary to Ureterocele in a Neonate

Shouvik Yousuf*

Department of Urology, University of Oxford, Oxford, United Kingdom

✉ ***Shouvik Yousuf***
Department of Urology,
University of Oxford,
Oxford, United Kingdom
E-mail: shouvik.yousuf@ikutrs.uk

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Description

Bilateral hydronephrosis secondary to ureterocele in a neonate represents a challenging clinical condition in pediatric urology. Ureterocele is a congenital abnormality characterized by a cystic dilatation of the distal ureter as it enters the bladder. This abnormality results from incomplete dissolution of the Chwalla membrane during embryogenesis, leading to a stenotic orifice and outflow obstruction. The incidence of ureterocele is rare, approximately one in 4,000 live births, with a higher frequency in females and a predominance of involvement on the left side. While ureteroceles often present unilaterally, bilateral occurrence, especially when associated with hydronephrosis, is uncommon but clinically significant due to the risk of renal damage.

The pathophysiology of hydronephrosis in neonates with ureterocele is multifactorial. The cystic dilatation of the distal ureter results in obstruction of urinary flow from the affected renal moiety. When the ureterocele is large or strategically positioned, it can cause significant bladder outlet obstruction or impinge on the contralateral ureteral orifice, leading to bilateral upper urinary tract dilation. This obstruction elevates pressure within the renal pelvis and calyces, resulting in hydronephrosis. If untreated, the persistent back pressure can lead to progressive renal parenchymal damage, decreased renal function, and an increased risk of urinary tract infections. Early diagnosis and management are thus critical to prevent irreversible renal injury.

The diagnosis of bilateral hydronephrosis due to ureterocele is often suggested by prenatal ultrasonography, which has become a valuable tool for early detection of urinary tract anomalies. Hydronephrosis is commonly identified on routine fetal ultrasound screenings, prompting further postnatal evaluation. Typical prenatal ultrasound findings in cases of ureterocele include cystic intravesical structures, bladder wall thickening, and dilation of the ureters and renal pelvis. However, distinguishing ureterocele from other causes of fetal hydronephrosis can be challenging. Additional imaging studies such as Voiding Cystourethrogram (VCUG) and Magnetic Resonance Urography (MRU) are often utilized postnatally to confirm the diagnosis, assess for vesicoureteral reflux, and delineate the anatomical details of the urinary tract.

The clinical presentation of bilateral hydronephrosis secondary to ureterocele varies depending on the severity of obstruction and the presence of complications. Many neonates are asymptomatic and diagnosed solely on prenatal imaging. Others may present with urinary tract infections, palpable abdominal masses, failure to thrive, or symptoms related to bladder outlet obstruction such as urinary retention or poor urinary stream. In some cases, the presence of a large ureterocele causes bladder outlet obstruction that leads to intermittent urinary retention or overflow incontinence. Given the risk of infection and progressive renal damage, prompt evaluation and management are warranted in all symptomatic cases.

The management of ureterocele-related hydronephrosis is individualized, taking into account the anatomy of the collecting system, renal function, severity of obstruction, and patient age. The primary goal is to relieve obstruction, preserve renal function, and prevent urinary tract infections. In neonates with bilateral hydronephrosis, the initial approach is often minimally invasive, with endoscopic decompression via transurethral incision or puncture of the ureterocele. This technique involves creating an opening in the ureterocele wall to facilitate urine drainage and decompress the obstructed system. Endoscopic puncture is typically performed under general anesthesia and can result in rapid resolution of obstruction with minimal morbidity.

While endoscopic management is effective in many cases, it may be associated with complications such as postoperative vesicoureteral reflux or incomplete decompression necessitating further interventions. In cases where renal function of the affected moiety is severely compromised or the ureterocele is associated with a non-functional upper pole in a duplicated system, heminephrectomy may be considered. Ureteral reimplantation may also be necessary if persistent reflux or obstruction occurs after initial endoscopic treatment. Open or laparoscopic surgical approaches are reserved for complex cases or those refractory to less invasive procedures.

Postoperative monitoring is critical in patients treated for ureterocele with hydronephrosis. Serial ultrasounds are used to evaluate the regression of hydronephrosis and detect complications such as persistent obstruction or recurrent ureterocele. Renal scintigraphy and diuretic renography can assess differential renal function and drainage efficiency, guiding further management decisions. Long-term follow-up is necessary to monitor for late-onset vesicoureteral reflux, recurrent urinary infections, or progressive renal impairment. Prophylactic antibiotics may be prescribed in the immediate postoperative period or in cases with significant reflux to minimize the risk of infection.

The prognosis of neonates with bilateral hydronephrosis secondary to ureterocele largely depends on the timing of diagnosis, promptness of intervention, and degree of renal impairment at presentation. Early diagnosis facilitated by prenatal ultrasound and advances in minimally invasive surgical techniques have improved outcomes substantially. When obstruction is relieved before significant renal damage occurs, most patients experience resolution of hydronephrosis and preservation of renal function. Conversely, delayed treatment or severe obstruction can result in chronic kidney disease and the need for more extensive surgical reconstruction.

Conclusion

Bilateral hydronephrosis secondary to ureterocele in neonates is a rare but significant cause of urinary tract obstruction with potential for serious renal consequences. Prenatal detection through ultrasonography, supplemented by postnatal imaging modalities, allows timely diagnosis and intervention. Endoscopic puncture remains the first-line therapeutic option in most cases, offering a minimally invasive means to relieve obstruction and preserve renal function. Careful follow-up is essential to monitor for complications such as vesicoureteral reflux or recurrent obstruction. With early recognition and appropriate management, affected neonates can have favorable outcomes and maintain normal renal function.