Urological Image

# Medullary pyramids opacification in high-grade vesicoureteral reflux associated with posterior urethral valve

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## ABSTRACT

Posterior urethral valve (PUV) is a common cause of obstructive uropathy in children, leading to renal failure and frequently associated with vesicoureteral reflux (VUR), which can rapidly progress to end-stage renal disease (ESRD). We describe a rare presentation of high-grade VUR opacifying the renal pyramids in a 5-month-old child with sepsis and renal failure.

## INTRODUCTION

Posterior urethral valve (PUV) is the leading cause of CAKUT-related chronic kidney disease in children, ultimately progressing to end-stage renal disease (ESRD).[1] Vesicoureteral reflux (VUR) is present in 26%–72% of PUV cases, and bilateral reflux is associated with an increased risk of renal failure.[2] Intrarenal reflux into compound medullary pyramids transmits high pressure-infected urine into the renal parenchyma accelerating reflux nephropathy. In this report, is presented a unique radiological finding wherein a high-grade secondary VUR is found to reflux into the medullary pyramids on a micturating cystourethrogram (MCU). Also discussed are the management options of a child in renal failure and sepsis due to the same.

## CASE REPORT

A 5-month-old-male child presented with hematuria, difficulty in urination since 1 month of age, crying during micturition, fever, and decreased responsiveness. This child was born full term and delivered at home, lacking antenatal ultrasound documentation and postnatal medical assessment. Subsequently, he was diagnosed with acute renal failure and septic shock, prompting immediate catheterization, and initiation of therapeutic interventions by a multidisciplinary team. Ultrasound revealed a thick-walled bladder with trabeculations and sacculations, a dilated posterior urethra, and bilateral gross hydroureteronephrosis with thinning of the renal parenchyma. Serum creatinine on admission was 3.4 mg/dL, which decreased to 1 mg/dL after catheterization. A MCU performed after optimization revealed trabeculated bladder, bilateral high-grade secondary VUR, extensively tortuous ureter and dilated posterior urethra, with contrast noted opacifying the medullary pyramids [Figure 1] which persisted on emptying the bladder [Figure 2]. Cystoscopy confirmed type 2 PUV with a severely trabeculated and small capacity bladder. Due to high-grade reflux, persistently high serum creatinine and poor general health despite adequate bladder drainage a bilateral loop ureterostomy was performed. Postoperatively, serum creatinine decreased to

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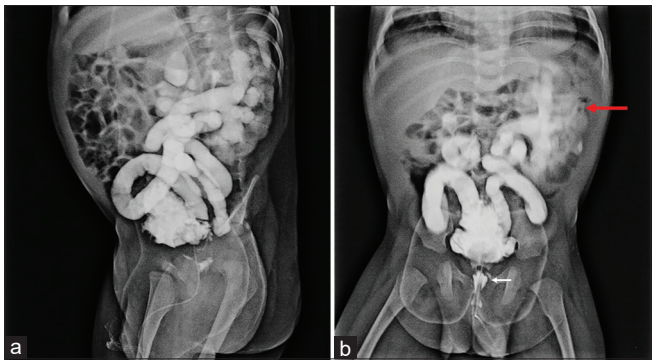


**Figure 1:** (a) Filling phase of micturating cystourethrogram demonstrating trabeculated bladder with bilateral high-grade vesicoureteral reflux. (b) Voiding phase demonstrating reflux opacifying medullary pyramids (red arrow) and dilated posterior urethra (white arrow)

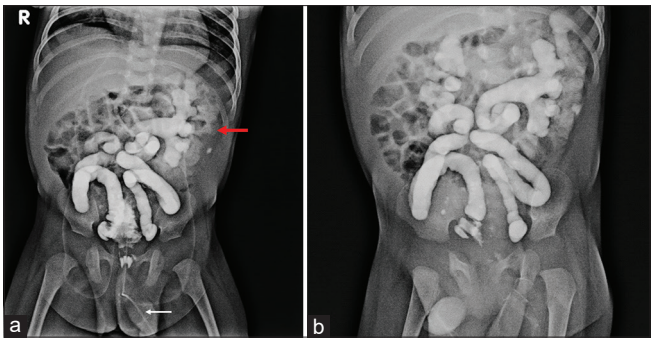


**Figure 2:** (a) Voiding phase of micturating cystourethrogram demonstrating persistent contrast within medullary pyramids (red arrow) and thin stream of urine in the anterior urethra (white arrow). (b) Postvoid phase demonstrating persistent reflux despite empty bladder

0.4 mg/dL, sepsis improved, and the child was discharged with counseling on urostomy care.

## DISCUSSION

Although secondary VUR is common in PUV, there have been no documented MCU images in the literature demonstrating a reflux into the renal pyramids. The use of bilateral loop ureterostomy as a primary modality for PUV has been the subject of controversy due to potential bladder de-functionalization and its impact on bladder capacity and compliance.[3] However, in resource-limited settings, the management of PUV must take into consideration socioeconomic factors. Bilateral loop ureterostomy can rapidly decompress the upper urinary tract, preserve renal function, and protect against infections in specific infant subsets.[4] In this case, the patient had a high degree of intrarenal reflux, persistent sepsis, and elevated creatinine despite bladder drainage. Bilateral loop ureterostomy effectively relieved back pressure and provided drainage of infected urine. When managing children with high-grade VUR, associated with PUV, clinical decision-making should be individualized, considering medical, family, socioeconomic factors, and logistical challenges, particularly in developing countries.

## CONCLUSION

Despite the fact that intrarenal reflux leading to renal failure is a common sequela in a child with PUV, herein is presented the first documented radiological image demonstrating reflux into renal pyramids. Accurate and timely decision to perform a high diversion can aid rapid recovery and delay progression to ESRD.

### *Declaration of patient consent*

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

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