Retrocaval Ureter Manifested after Ureteral Reimplantation for Ipsilateral Vesicoureteral Reflux: A Case Report

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We report a female patient diagnosed with retrocaval ureter (RCU) after ureteral reimplantation for vesicoureteral reflux (VUR). She was diagnosed as right grade IV VUR with breakthrough urinary tract infections, and underwent ureteral reimplantation with Cohen cross-trigonal technique. Thereafter, she developed severe right hydronephrosis associated with RCU, which was presumably due to caudal traction of right ureter at ureteral reimplantation. She underwent uretero-ureterostomy anterior to the inferior vena cava, and recovered well. Detailed evaluation for upper urinary tract is mandatory for high grade VUR, and Cohen technique should be avoided for VUR associated with RCU.

Keywords: Cohen cross-trigonal technique; hydronephrosis; retrocaval ureter; ureteral reimplantation; vesicoureteral reflux

INTRODUCTION

Retrocaval ureter (RCU) is congenital abnormal looping of the proximal ureter behind the inferior vena cava (IVC), resulting in progressive hydronephrosis.[1] There are few reports regarding vesicoureteral reflux (VUR) associated with RCU.[2] We report a female patient who was diagnosed as right RCU after ureteral reimplantation for ipsilateral VUR.

Figure 1. Voiding cystourethrography at 11 y-o
It shows right grade IV VUR with tortuous upper ureter.

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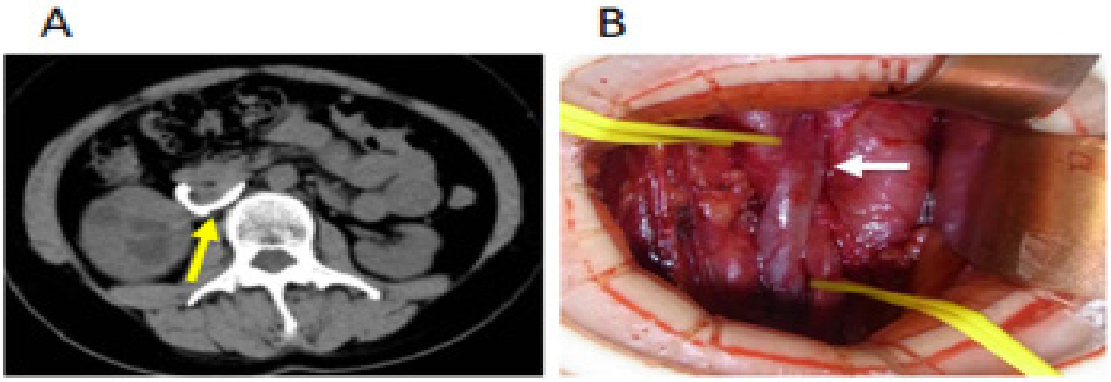

Figure 2. Abdominal Computerized tomography **(A)** and operative finding **(B)**
A: It shows the right ureter with double-pigtail stent (arrow) located posterior to the IVC.
B: It shows the right ureter (taping) located behind the IVC (arrow).

CASE REPORT

A 10-year-old girl presented with multiple febrile urinary tract infections (UTI), and was finally diagnosed as right grade IV primary VUR with multiple renal scarring (**Figure 1**). She underwent ureteral reimplantation with Cohen cross-trigonal technique at the age of 11. Postoperative study revealed reflux resolution, however, she had one recurrent UTI at the age of 12 and several right flank pain episodes within several years after surgery.

At the age of 25, severe right hydronephrosis was detected incidentally on the gynecological work-up. She subsequently underwent retrograde pyeloureterography which showed S-shaped tortuous upper ureter and its obstruction without ureterovesical junction stricture, and was referred to our institution for further treatment. Computerized tomography revealed right RCU (**Figure 2A**), and renography showed deteriorated right split renal function (32.2%).

She underwent uretero-ureterostomy with open retroperitoneal approach (**Figure 2B**). Right ureter was transected at the obstructive level behind the IVC, and was anastomosed over 6Fr double-pigtail stent with interrupted 6-0 absorbable sutures anterior to the IVC. The patient recovered well and the stent was removed after 2 months of surgery. The follow-up is now of 3 years without any complications including recurrent UTI and obstruction.

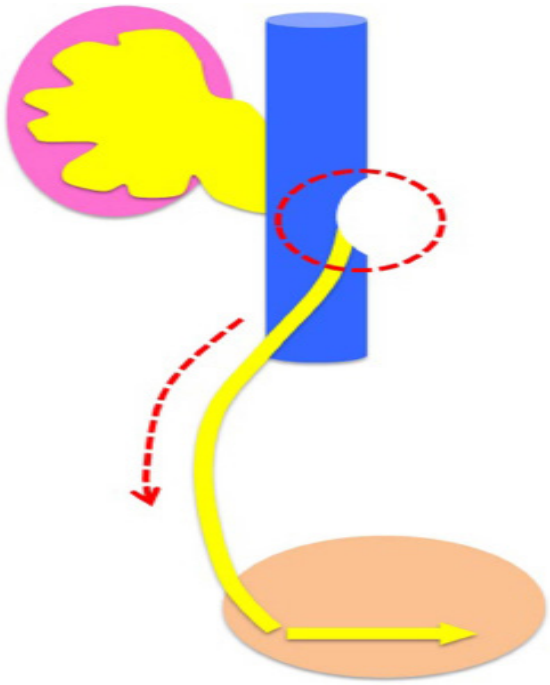

Figure 3. Schema of deteriorated right hydronephrosis associated with RCU after ureteral reimplantation
Severe right hydronephrosis presumably developed due to ureteral obstruction with its caudal traction (arrow) at the time of ureteral reimplantation with Cohen technique.

DISCUSSION

RCU is a comparatively rare sequelae to the mal development of the IVC, not of the ureter.[1] It occurs as a consequence of the persistence of the posterior cardinal veins during embryologic development. RCU is termed circumcaval ureter or preureteral vena cava as well. RCU causes ureteral obstruction considerably slowly, therefore it usually does not show symptoms such as flank pain, hematuria or UTI until 3rd or 4th decades of life.[1] Its presence used to be suspected with the finding of a characteristic S-shaped deformity on intravenous pyeloureterography which is not routinely performed anymore now in children. Our patient did not lead to a diagnosis of RCU before ureteral reimplantation in childhood, because UTI and upper ureteral tortuosity without marked hydronephrosis were supposed to result from high grade reflux.

RCU is associated with several abnormalities of various systems and organs. Genitourinary anomalies are reported in half of those patients, however, there is only one case report associated with VUR. Tazaki et al. reported a 4-month-old boy who presented UTI, and was diagnosed as bilateral VUR associated with right RCU.[2] There are potentially more patients with this association, because the prevalence of RCU or VUR has been estimated at 0.06-0.17% or 0.4-1.8%, respectively.[3,4]

In our case, the patient had recurrent UTI and right flank pain episodes after VUR resolution, even though RCU rarely shows any symptoms in childhood. Severe hydronephrosis presumably developed due to ureteral

obstruction with its caudal traction at the time of ureteral reimplantation with Cohen technique (**Figure 3**). Cohen's procedure has become the most commonly used technique for intravesical reimplantation, in which the ureter is disconnected from bladder wall once and advanced across the trigone toward the contralateral wall, resulting in ureteral caudal traction. Meanwhile, extravesical Lich-Gregoir technique preserves ureterovesical junction continuity and its blood supply without risk of ureteral caudal traction. Ureteral blood supply should be preserved as much as possible to prevent postoperative its stricture when ureteral reconstruction is needed for RCU. Therefore, if our patient had been diagnosed as RCU as well as VUR preoperatively, Lich-Gregoir procedure could have been adopted for VUR correction because of prevention of ureteral obstruction and possible future ureteral reconstruction. Furthermore, if it had been now, Deflux injection therapy could have been also an alternative choice.

In conclusion, detailed evaluation for upper urinary tract is mandatory in children with high grade VUR before and after ureteral reimplantation, especially with some symptoms. Our patient suggests Cohen technique should be avoided for VUR correction in children associated with RCU.

CONFLICT OF INTEREST

The authors report no conflict of interest.

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