# Coexisting Ureteropelvic Junction Obstruction and Ureterovesical Junction Obstruction: Is Pyeloplasty Always the Preferred Initial Surgery?

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**OBJECTIVE** To report our experience with the diagnosis and management of coexisting ureteropelvic junction obstruction (UPJO) and ureterovesical junction obstruction (UVJO).

**MATERIALS AND METHODS** Among the pediatric patients who underwent pyeloplasty or ureteroneocystostomy from 2003-2012, 15 patients were diagnosed with coexisting UPJO and UVJO. We retrospectively analyzed their medical records.

**RESULTS** Of the 15 patients with coexisting UPJO and UVJO, the correct diagnosis was made preoperatively in 10 patients (66.7%). In 4 other patients, only UPJO was diagnosed, and in 1 patient, only UVJO was diagnosed. The decision of where to initially operate was determined from the combined results of the preoperative antegrade evaluation and retrograde ureteropyelography. Pyeloplasty was the initial surgical management choice for 9 patients, and ureteroneocystostomy was the initial surgical approach in 5 patients. In 1 patient, both pyeloplasty and ureteroneocystostomy were performed simultaneously. Of the 9 patients who underwent initial pyeloplasty, additional ureteroneocystostomy was required in 2. Additional pyeloplasty was required in 2 of the 5 patients who initially underwent ureteroneocystostomy.

**CONCLUSION** It is often difficult to correctly diagnose coexisting UPJO and UVJO. In patients with UPJO, it is highly recommended that retrograde ureteropyelography be performed before pyeloplasty to evaluate the distal ureter—ureterovesical junction. Initial pyeloplasty is not always recommended as a first-line therapy. UROLOGY 83: 443—450, 2014. © 2014 Elsevier Inc.


Ureteropelvic junction (UPJ) obstruction (UPJO) and ureterovesical junction (UVJ) obstruction (UVJO) are 2 main causes of pediatric hydronephrosis.[1,2] Pyeloplasty and ureteroneocystostomy (UNC) are well-established as effective treatments of UPJO and UVJO, respectively.[3,4] However, UPJO and UVJO that coexist in the same ureter is a rare condition, and it is often difficult to diagnose both disorders correctly and manage them properly.[5] Only a few reports have been previously published of this combined condition.[6-8] Most of these reports have described difficulties in establishing the correct diagnosis; however, once both disorders were diagnosed, pyeloplasty was usually recommended as the initial surgical approach. We report our experience with the diagnosis and management of coexisting UPJO and UVJO in pediatric patients.

## MATERIAL AND METHODS

With approval of the institutional review board of Severance Hospital (4-2013-0178), we performed a retrospective cohort analysis.

### Patients

From 2003-2012, pediatric pyeloplasty for UPJO and UNC for UVJO were performed in 389 patients and 58 patients, respectively, at our institution. Of these patients, 15 were diagnosed with coexisting UPJO and UVJO. We retrospectively analyzed their medical records.

### Data Collection

All patients underwent ultrasonography, radioisotope imaging, and voiding cystourethrography before surgery. In most patients, antegrade urinary tract evaluation was performed at least once with a technetium-99m mercaptoacetyl-triglycine (MAG-3) scan. In the case of referral from another institution after percutaneous nephrostomy, antegrade pyeloureterography was

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performed to evaluate the flow of contrast, and the differential renal function (DRF) was assessed using a dimercaptosuccinic acid (DMSA) scan instead of a MAG-3 scan.

In the operating room, retrograde ureteropyelography (RGP) was attempted in all patients before pyeloplasty or UNC. Ultrasonography was performed approximately 6 weeks after surgery and repeated 1-6 months later, depending on the results of the previous study. Radioisotope imaging was performed at 6-12 months postoperatively and repeated subsequently if needed.

We collected the following data to evaluate which factors correlated with a decrease in DRF: sex; age at the initial operation; type of initial operation; preoperative ultrasound, radioisotope imaging, and voiding cystourethrography results; and postoperative ultrasound and radioisotope imaging results.

The ultrasound evaluation was performed when the patients had a full bladder after oral hydration. The patients were given extra water to drink in addition to their normal diet; neither intravenous hydration nor diuretics were used. The bladder filling status was assessed before the evaluation, and the evaluation was delayed for approximately 1 hour if filling was insufficient. Hydronephrosis was graded according to the Society for Fetal Urology guidelines.[9] All ultrasound evaluations were performed by 2 pediatric radiologists (M.K. and M.L.). DRF was assessed using a DMSA scan or MAG-3 scan. If repeated radioisotope imaging evaluations were performed before surgery, only the 1 closest to the operation was used for data analysis. When radioisotope scans were repeated postoperatively, the last 1 was considered the postoperative study for the purposes of data analysis.

### Statistical Analysis

Univariate analyses were performed using Fisher's exact test and Student's $t$ test. The Statistical Package for Social Sciences, version 18.0, software (SPSS, Chicago, IL) was used. $P < .05$ was considered statistically significant.

## RESULTS

### Initial Diagnosis

Of the 15 patients with coexisting UPJO and UVJO, the correct diagnosis was made preoperatively in 10 patients (66.7%; Table 1). In 4 patients (26.7%), only UPJO was diagnosed preoperatively, and in 1 patient (6.7%), only UVJO was diagnosed preoperatively.

The 10 patients with a correct diagnosis preoperatively all had diffuse ureteral dilation with hydronephrosis on ultrasonography and stasis of radionuclide or contrast material at the renal pelvis during the antegrade imaging studies (eg, MAG-3 scans, antegrade pyeloureterography). The half-life of tracer washout from the pelvis was uncountable in all patients who underwent MAG-3 scanning because of severely impaired drainage.

The existence of UVJO was not diagnosed preoperatively in 4 patients, because they did not have ureteral dilation on the preoperative ultrasound scan. In these patients, UVJO was found during RGP in the operating room. One of these patients had hydronephrosis with perirenal urinoma, but no dilation of the ureter, on the ultrasound examination performed before surgery (Fig. 1). The size of the urinoma had increased, and pyeloplasty was planned. During RGP, this patient was noted to have ureteral narrowing at the UVJ and diffuse ureteral dilation. In the other 3 patients, ureteral dilation was either never or only occasionally found on their preoperative ultrasound evaluations. These patients displayed no evidence of vesicoureteral reflux (VUR) during voiding cystourethrography.

The existence of UPJO was not diagnosed preoperatively in 1 patient, because a preoperative antegrade urinary tract evaluation was not performed. Preoperative ultrasonography revealed hydronephrosis grade III with diffuse ureter dilation. The DMSA scan revealed decreased DRF (35.3%) in the ipsilateral kidney; thus, UNC was planned, because it was assumed that this patient had only UVJO. After general anesthesia was induced, RGP was attempted but failed; the ureteral catheter could not pass through the ureteral orifice owing to severe angulation of the distal ureter at the UVJ. Plication UNC was performed, and temporary ureteral catheter placement was attempted during surgery; however, this also failed, because the ureteral catheter could not pass into the renal pelvis. RGP was attempted again, which was then successful. The results showed narrowing of the ureter at the UPJ, and pyeloplasty was immediately performed.

### Surgical Management and Outcomes

The median age of the 15 patients who underwent pyeloplasty or UNC as their first operation was 5.0 months (interquartile range [IQR] 3.2-12.8). Pyeloplasty was the initial surgical approach in 9 patients, and UNC using the Starr technique for ureter plication[10] was the initial surgery in 5 patients (Table 1). In the patient in whom UPJO was not diagnosed preoperatively, both pyeloplasty and plication UNC were performed simultaneously.

During a median follow-up period of 39.3 months (IQR 15.3-60.2), an additional UNC or pyeloplasty was required in 4 patients (28.6%) of the 14 patients who had undergone initial pyeloplasty or UNC. Of the 5 patients with initial plication UNC, additional pyeloplasty was required in 2 patients. In another patient who had undergone initial plication UNC, pyeloplasty was planned because of residual postoperative hydronephrosis with decreased renal function. However, RGP revealed no obstruction at either the UPJ or previously operated UVJ; thus, pyeloplasty was not performed.

Preoperative DRF was assessed at a median of 0.6 months (IQR 0.4-1.1) before the initial operation. Postoperative DRF was assessed in 13 patients at a median of 11.8 months (IQR 9.5-33.5) after the initial operation. The median preoperative and postoperative DRF value was 43.0 (IQR 37.0-47.0) and 39.0 (IQR 31.0-45.5), respectively. Of the 13 patients with both preoperative and postoperative DRF assessments, the DRF decreased by >5% in 7 patients (53.8%). A decreased DRF by >5% was observed in all 4 patients (100.0%) who had undergone initial UNC but in only 3 of the 9 patients (37.5%) who had undergone initial pyeloplasty. This difference did not reach statistical significance ($P = .081$). Sex, kidney side (left or right), age at the initial operation, and preoperative