Original Article / *Özgün Araştırma*

Turkish Journal of Pediatric Disease
Türkiye Çocuk Hastalıkları Dergisi

Is Differential Renal Function Improved After Pyeloplasty? Evaluation of 13 Cases with Low Differential Renal Function

Pyeloplasti Sonrası Böbrek Fonksiyonlarında Düzelme Olur mu? Düşük Renal Fonksiyonlu 13 Olgunun Değerlendirilmesi

Günay EKBERLİ[1], Hüseyin Tuğrul TİRYAKİ[2]

[1]Ankara University, Medical Faculty, Pediatric Urology Clinic, Ankara, Turkey
[2]University of Health Sciences, Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital, Pediatric Urology Clinic, Ankara, Turkey

ABSTRACT

Objective: Functional improvement after pyeloplasty in pediatric ureteropelvic junction obstruction (UPJO) is still debated, especially in poorly functioning kidneys. There is no consensus about the improvement of cases operated with poor renal function in the literature. In our study, we aimed to investigate whether there was an improvement after pyeloplasty in poor functioning cases.

Material and Methods: Thirteen of the 80 cases operated between January 2009 - December 2015 with poor renal function were evaluated in terms of preoperative and postoperative differential functions, renal antero-posterior diameter and parenchymal thickness. We determined whether improvement was present by comparing preoperative and postoperative findings.

Results: A total of 13 cases with differential renal function (DRF) less than 30% evaluated. Five of the cases were diagnosed after antenatal hydronephrosis, 4 after urinary tract infection and 4 following abdominal pain symptoms. Renal function improvement more than 5% was found in 3 of the 13 cases postoperatively. There was no statistically significant difference between preoperative to postoperative improvement of differential renal function in these series.

Conclusion: There was no change in postoperative renal function in cases with low functional UPJO after pyeloplasty in our series. It is important to perform pyeloplasty before significant loss of function during the follow-up, especially in patients who are monitored conservatively.

Key Words: Ureteropelvic junction obstruction, Poor renal function, Pyeloplasty

ÖZ

Amaç: Üreteroplevik bileşke obstrüksiyonlu çocuk olgularda pyeloplasti sonrası fonksiyonel düzelme özellikle düşük fonksiyonlu böbreklerde halen tartışmalıdır. Literatürde opere edilen düşük renal fonksiyonlu olgularda iyileşme üzerine görüş birliği yoktur. Çalışmamızda düşük renal fonksiyonlu olgularda pyeloplasti sonrası iyileşme olup olmadığı amaçlandı.

Gereç ve Yöntemler: Ocak 2009-Aralık 2015 tarihleri arasında opere edilen 80 olgudan 13 düşük fonksiyonlu olgunun preoperatif ve postoperatif diferansiye fonksiyonları, böbrek ön arka çapı ve parankimal kalınlığı değerlendirildi. Preoperatif ve postoperatif bulguların karşılaştırılması ile iyileşme olup olmadığına karar verildi.

Bulgular: Diferansiye böbrek fonksiyonu %30'un altında olan 13 olgu değerlendirildi. 5 olgu antenatal hidronefrozi nedeni ile tanı alırken, 4 olgu üriner sistem enfeksiyonu sonrası, 4 olgu ise karın ağrısı semptomu ile tanı aldı. 13 olgudan 3'ünde postoperatif dönemde böbrek fonksiyonlarında %5'den fazla düzelme saptandı. Serimizde ameliyat öncesi ve sonrası böbrek fonksiyonları karşılaştırıldığında istatistiksel olarak anlamlı fark bulunmadı.

Sonuç: Serimizdeki düşük fonksiyonlu UPJO nedeni ile pyeloplasti yapılan olgularda ameliyat sonrası bir değişiklik izlenmemiştir. Özellikle konservatif olarak izlenen hastalarda fonksiyon kaybı olmadan pyeloplasti yapılması önemlidir.

Anahtar Sözcükler: Üreteropelvik bileşke tıkanıklığı, Düşük renal fonksiyon, Pyeloplasti

Correspondence Address/Yazışma Adresi:
H. Tuğrul TİRYAKİ
Ankara Çocuk Sağlığı ve Hastalıkları Hematoloji Onkoloji Eğitim ve Araştırma Hastanesi, Çocuk Üroloji Kliniği, Ankara, Turkey
E-mail: httiryaki@yahoo.com

Received / Geliş tarihi : 12.10.2016
Accepted / Kabul tarihi : 03.04.2017
Online published : 10.08.2017
Elektronik yayın tarihi
DOI: 10.12956/tjpd.2017.287

INTRODUCTION

Ureteropelvic junction (UPJ) obstruction is defined as impaired urine flow from the pelvis into the proximal ureter, causing dilatation of the collecting system. UPJ obstruction is the most common cause of congenital hydronephrosis (1). This obstruction can lead to an increase in backpressure on the kidney, hydronephrosis, and progressive damage to kidney function. It is therefore important to understand how to treat this condition.

Dismembered Anderson-Hynes pyeloplasty is the gold standard therapeutic approach for the management of UPJ obstruction. The success rate of this procedure is estimated to be as high as 95% (2,3). Close follow-up after pyeloplasty is essential and may diagnose obstruction early so that further interventions can be undertaken to prevent irreversible loss of renal function.

Functional improvement after pyeloplasty in pediatric ureteropelvic junction obstruction (UPJO) is still debated, especially in poorly functioning kidneys (1,2). Nephrectomy is often recommended when the differential renal function (DRF) is less than 10% (3,4). No postoperative improvement have been noted with abnormal renal biopsy in patients with DRF below 35% (5). Most studies on poorly functioning kidneys, which incidentally have a variable definition, have very small numbers often not attaining statistical significance (6,7).

Detection of improvement or regression in renal function in poor functioning kidneys after pyeloplasty would provide important data in the establishment of follow-up protocols. In our study, we aimed to compare preoperative and postoperative renal functions of UPJO cases with poor renal functioning (<30%).

MATERIAL and METHODS

Data of consecutive children with UPJO attending a referral center from 2009 to 2015 were retrospectively collected. The study group comprised those with 13 unilateral UPJO and poorly functioning renal units, that is DRF less than 30% on an isotope renal scan. UPJO in bilateral units, duplex systems, crossed fused kidneys, and associated vesicoureteral reflux (VUR) were excluded. The UPJO diagnosis was based on USG of the kidney, ureter, bladder (USG KUB), and obstructed drainage on a standardized scan with dynamic and static images taken at regular intervals after injection of the radionuclide along with Lasix (1.0 mg/kg dose). Intravenous urography (IVU) was not performed routinely. All patients underwent open Anderson-Hynes dismembered pyeloplasty as practiced in our unit through the lumbar approach with adequate excision of intrinsically narrow ureters. A scan was repeated 3 months later after stent removal. We analyzed the postpyeloplasty outcome in renal units with preoperative DRF less than 30% over a seven-year period in retrospectively collected data. An increase in DRF >5% was considered significant improvement. Further follow-up was done in the outpatient department with USG. The results of any further scans and development of complications such as hypertension and UTIs were noted during the study period.

Follow-up was ranged from 1 to 6 years (4.6±1.34 years). Statistical analysis was performed with the statistical package for social sciences (SPSS 13). A p value < 0.05 was considered significant. Preoperative and postoperative scans were compared using the Chi-Square test and p<0.05 was accepted as significant.

RESULTS

There were 13 cases with DRFs scintigraphically determined as less than 30%. Male-female ratio of the patients was 9:4. The age of the patients ranged between 1 month and 18 years (median age 4.2±3.1).

Seven of the cases had right, six left kidney involvement. Diagnostic symptoms were determined as antenatal hydronephrosis in 5 cases, urinary tract infection in 4 cases and abdominal pain in 4 cases. A crossing vessel in 1 case and primary obstruction in 12 cases were found to be etiologic reasons of the hydronephrosis. Patient details are shown in Table I. Dismembered pyeloplasty was performed in all patients. Drainage was by external stent (n=4) or a internal double J (n=9) stent based on surgeon's preference. Preoperative and postoperative antero-posterior mean diameters was 37.5±19.4 mm and 13.8±12.8 mm respectively. Renal parenchymal thickness on USG ranged from 2 to 5 mm (mean 4.91±2.8 mm). Urine cultures were positive in two patients on follow-up.

Postoperative DRF improvement more than 5% was noted in 3 cases (23%). There was no statistically significant difference between preoperative and postoperative differential functions (p>0.05). However, a significant parenchymal thickness and drainage improvement was seen in all patients.

A statistically significant difference was found between preoperative (mean 4.91±2.8 mm) and postoperative (mean 6.88±3.7 mm) parenchymal thickness and antero-posterior diameters (p<0.05).

All patients who presented with clinical signs and symptoms had relief. No patient required re-do pyeloplasty or developed hypertension. There was no relation between the clinical signs, age, and kind of stent and improvement of DRF.

DISCUSSION

Renal differential function in ureteropelvic junction obstruction (UPJO) cases can now be monitored closely as the rate of antenatal diagnosis increases. In this manner, the renal function

Table I: Patients detail.

	n
Male/Female	9/4
Age	1 month-18 years 4.2±3.1 years
Right/Left	7/6
Antenatal hydronephrosis	5
UTI	4
Abdominal pain	4
Crossing vessel	1
Primary obstruction **External stent** **Internal stent** **Preoperative a-p diameter** **Postoperative a-p diameter**	12 4 9 37.5±19.4 mm 13.8±12.8 mm

of the most cases is preserved before it decreases by surgical interference. However, some of the cases are still operated with low renal function (30%). For the prevention of irreversible renal deterioration after an early UPJO diagnosis, follow-up and surgical management should be done if necessary. The goals of management of UPJO are to improve urine flow, prevent further parenchymal damage, and alleviate symptoms.

The outcome of pyeloplasty in a unilateral poorly functioning kidney is still speculated upon. There are a number of studies both in favor and against preservation of poorly functioning kidneys. Some authors note that pyeloplasty gives good intermediate-term results in poorly functioning kidneys in the pediatric age group (11,12). Sang Won et al. (9) studied histopathological changes by renal biopsy in relation to differential renal function in 42 children with UPJO. They determined irreversible histopathological changes in the group with renal function less than 40% and no histopathological change in the group with renal function greater than 40%. McAller et al. (10) compared preoperative and postoperative renal functions of 79 patients aged 2 weeks to 18 years operated due to UPJO. There was no scintigraphically significant improvement in their patients.

In our study, greater than 5% increase was determined in 3 cases in whom renal function was less than 30%. During the study period, none developed hypertension. We did not note UTIs after surgery in our patients. We observed no significant increase in split function in the study group after pyeloplasty. However, there was improvement in drainage after pyeloplasty.

There was no statistically significant difference between preoperative and postoperative differential functions but parenchymal thickness and antero-posterior diameters were improved postoperatively in our series. We believe that improving the parenchymal thickness ensures improvement in the drainage of renal units. All clinical signs and symptoms were also resolved. The limitations of our study were a relatively small number of patients and its retrospective nature. A prospective study would better identify functional outcome and all factors associated with the failure of pyeloplasty.

In conclusion, there was no significant renal function improvement after pyeloplasty in cases with low renal function in our series. However, renal parenchymal thickness and drainage of renal pelvis improved with pyeloplasty.

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