

# Does prematurity indicate poor prognosis in the treatment of infant ureteropelvic junction obstruction?

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## Abstract

**Aim:** To evaluate the outcomes of management of ureteropelvic junction obstruction in premature patients by comparing them to a group of non-premature.

**Material and Methods:** We reviewed the medical records of 102 patients with isolated hydronephrosis which were referred from pediatric nephrology outpatient clinic or those who admitted directly to pediatric urology clinic under one year of age between the years of 2005 and 2016. Two groups were set up; premature and term. The gestational age, sex, management for ureteropelvic junction obstruction, complications were recorded. Chi-Square, Fisher's and Mann-Whitney-U tests were used for statistical analyzes.

**Results:** There were 92 patients in the term group and 10 in the premature group. All patients were operated. Preoperative symptoms such as pyonephrosis, renal calculi, and hypertension were relatively common in the premature group. Postoperative low function, postoperative loss of function, and poor outcome were statistically more common in premature patients.

**Conclusion:** In our limited experience, prematurity is an independent factor associated with UPJO, and it may indicate a poor prognosis. We advocate that this issue should be considered in practice.

**Keywords:** Infant; Hydronephrosis; Ureteropelvic Junction Obstruction; Prematurity; Poor Prognosis.

## INTRODUCTION

Hydronephrosis (HN) is an anatomical definition that refers to a condition resulting in dilatation in the renal collecting system. However it does not represent an obstruction in the urine excretion from the kidney. Most of HN diagnosed prenatally with ultrasound examination (1,2). The hydronephrosis detected in the prenatal period does not always indicate a pathological condition. Hydronephrosis during fetal development may be a reflection of physiological process. Thus, only 1/5 of the cases with prenatal hydronephrosis require intervention in the postpartum period (3).

The most common cause of persistent hydronephrosis in newborns (44%) is Ureteropelvic Junction Obstruction (UPJO) (3). In UPJO, there is an obstruction in the renal excretion of urine. Although it constitutes the most important cause of kidney damage in children and infants, the natural course of this disease is poorly understood

and indications for therapeutic intervention remain highly controversial (4).

There is no high-confidence clinical finding or laboratory examination that can be used in a current practice in the differential diagnosis of UPJO in infants. For this reason, diagnosis is made according to clinical findings, as well as anatomic/functional data (5-8). However, in some patients, course of the disease may be more different-unexpected- and aggressive. In our practice, we observed that a more different and aggressive course was observed in premature newborns with hydronephrosis. Therefore we have designed this study and the aim was to evaluate the outcomes of management of UPJO in premature patients by comparing them to a group of non-premature.

## MATERIAL and METHODS

After the approval of the Ethics Committee, we reviewed the medical records of the patients with isolated hydronephrosis which were referred from pediatric

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nephrology outpatient clinic or those who admitted directly to pediatric urology clinic under one year of age between 2005-2016 years. A total of 102 patients were included in the study. Cases of hydronephrosis with known accompanying diseases (such as posterior urethral valve, vesicoureteral reflux, ureterocele, ectopic ureters, duplication anomalies) were excluded from the study. Two groups were set up; premature and the term.

According to the definition of the world health organization, prematurity was defined as babies born alive before 37 weeks of pregnancy are completed (9). The cause of preterm birth in all cases of prematurity was spontaneous preterm action. None of the patients had symptoms associated with preterm delivery such as oligohydramnios, preeclampsia and etc.

The study included patients' age, gender, presence of prenatal diagnosis, and gestation age at birth (weeks), age at admission, urinary tract infections and other clinical findings, ultrasound examination of affected and contralateral kidney and scintigraphy findings. HN values in ultrasound, renal pelvic anterior-posterior diameter (RPAPD) changes, renal perfusion and concentration ability of the affected kidney as well as relative function in scintigraphy were evaluated for both groups. The results were compared between the two groups.

Progressive hydronephrosis defined as an increase in RPAPD and caliceal diameter, parenchymal echo deteriorations, and parenchymal thinning in consecutive ultrasonography examinations.

Preoperative Loss of Function defined as > 10% loss of differential renal function (DRF) in consecutive scintigraphy preoperatively.

Postoperative Loss of Function defined as postoperative > 10% loss of DRF compared to preoperative scintigraphy.

At least 10% reduction in DRF and/or deterioration in HN following the operation was identified as postoperative poor outcome.

No patient was re-admitted to the hospital due to urinary tract infection. Three patients were re-admitted to the hospital due to postoperative persistent HN. JJ catheter was placed in all three of the patients which resulted in resolution of findings, eliminating the need for re-do surgery.

Independent two-group comparisons for the statistical analysis were performed using the Mann-Whitney U test. The ratios of the categorical variables among the groups were tested by Chi-square analysis and Fisher's test. The level of statistical significance was accepted as  $p < 0,05$ .

## RESULTS

There were 92 patients in the term group and 10 patients in the premature group. All the patients in the premature group were operated. It was found that the cause of hydronephrosis was UPJO in all cases requiring operative management.

All premature patients had prenatal diagnosis (weeks 22-33). In the term patient group however, 12 of the patients had no prenatal diagnosis. At the time of admission, the mean age was 2.4 (0 days-12 months) months in term patients and 3.3 (0-10 days) days in premature patients. Demographic characteristics of the patients are shown in table 1.

Six of the premature patients underwent open surgery, 3 had laparoscopic surgery, and one patient, with non-functional kidney which DRF not improved after nephrostomy drainage, was not operated, while 56 of the term patients underwent open surgery and 26 had laparoscopic surgery. At the time of operation, the mean age was 8.2 (1-25 months) months in term patients and 5.6 (1-12 months) month in premature patients. Indications for surgery are shown in table 2.

There was no more than one symptom in the same patient preoperatively (Table 3). Hypertension, renal calculi, and pyonephrosis were found to be relatively higher in premature patients, but the statistical study could not be performed because the number of patients was insufficient.

**Table 1. Demographic characteristics of the premature and term patient groups**

N: 102	PREMATURE (n:10)	TERM (n:92)
Gestation age at birth (weeks)	34.6 (32-36)	38.3 (37-40)
Male/Female	9/1	3/1
Unilateral/bilateral	10/0	87/5

**Table 2. Indications for surgery in premature and term patient groups**

INDICATIONS FOR SURGERY	PREMATURE (n:10)	TERM (n:92)
Progressive HN (DRF was stable)	n:1	n:54
Low function (HN was stable)	n:4	n:10
Preoperative Loss of function (HN was stable)	n:2	n:15
Progressive HN and Low function	n:2	n:13

**Table 3. Preoperative symptoms in premature and term patient groups**

SYMPTOMS	PREMATURE (n:10)	TERM (n:92)
Preoperative Hypertension	1 (%10)	4 (%2)
Preoperative Renal Calculi	1 (%10)	6 (%3.5)
Preoperative Pyonephrosis	1 (%10)	4 (%2)

**Table 4. Renal functional changes and poor outcomes during the pre- and post-operative period of premature and term patients**

	Premature (n:10)	Term (n:92)	p
Preoperative Low Function	6	23	p=0.0294
Preoperative Loss of Function	2	15	p=0.6
Postoperative Loss of Function	5	3	p<0.001
Poor outcome	50% (n:5)	1.7% (n:3)	p<0.001

Of the preterm patients, 2 had affected DRF 11% and 17.5% at the time of admittance and after operation, affected kidneys had atrophied in both of these patients (there were no complications in these patients during and after surgery).

Although the renal function of another premature patient was normal (DRF 50%), hypertension developed and this patient, who had SFU grade IV was operated. Hypertension persisted, and renal function decreased (DRF 50% to 35%) during postoperative period (there were no complications during and after the operation in this patient).

Table 4 shows changes in renal function and poor outcomes in the preoperative and postoperative periods of premature and term patients. Preoperative low function, postoperative loss of function, and poor outcome were statistically more common in premature patients.

## DISCUSSION

An estimated 15 million babies are born preterm (10). Improvements in neonatal intensive care during the last 20 years have increased the survival of the most immature newborns. As the number of patients with preterm delivery history increases, the number of preterm patients with known pathologies is also increasing. Obviously, we observe that the number of patients who are admitted to the Pediatric Urology outpatient clinic for isolated hydronephrosis is increasing.

Preterm infants are less physiologically and metabolically mature than term infants. Thus, they are at higher risk of morbidity and mortality than term infants (11).

In our practice, we observed that a more aggressive course was observed in premature newborns with isolated hydronephrosis. There are not enough studies on this subject in the literature. In a study published in 1999 by Oliveira EA et al, preterm delivery was found as an independent poor prognostic factor in a large group of patients with prenatal hydronephrosis (12). In this study, it was shown that prematurity, along with oligohydramnios and reduced glomerular filtration rate, leads to increased adverse effects such as renal failure or death.

There is only one study in the literature that evaluates the association between UPJO and prematurity. This study is published by Karnak I et al. in 2008 (13). According to this study, in which one hundred forty-three patients were

evaluated, prematurity was independently associated with UPJO (4.9%). In our study, the rate of premature patients was 11%. Therefore, our study supports that prematurity is an independent factor associated with UPJO.

Karnak et al. could not have performed a statistical analysis because the total number of premature patients was 7 in their study, however the ratio of males to females was higher (6/1) and premature patients were more likely to undergo pyeloplasty. In our study, the ratio of males to females was 9/1, which is significantly higher than that of term patients (3/1). It is not correct to explain male dominance with the greater number of males in the general preterm infant population. Although it is reported in the literature that male premature patients' number are higher than girls, this rate is at most 1.5 / 1 (14-16). This figure cannot explain 9/1 ratio in our study. There is evidence that females have an advantage over males with a better outcome in the perinatal period, particularly after preterm birth. Male sex is an important risk factor for poor neonatal outcome and poor neurological and respiratory outcome at follow-up (17-20). The increased risks at follow-up are not explained by neonatal factors and lend support to the concept of male vulnerability following preterm birth.

In our practice, UPJO usually had a worse course in preterm infants (70% vs. 30%). Although we do not have clear information to explain this situation, we can say that preterm infants are physiologically immature and have limited compensatory responses to the extra-uterine environment compared with term infants. Therefore preterm infants are at a greater risk of morbidity and mortality than are term infants (11). Prematurity is a morbid condition by itself, which is an additional risk factor for worsening of patients with UPJO.

### Limitations:

The limitation of the study is the inadequate number of patients in the preterm group. For this reason, data should be supported by multicentre study.

## CONCLUSION

In our limited experience, prematurity is an independent factor associated with UPJO, and it may indicate a poor prognosis. We advocate that this issue should be considered in practice. Findings should be supported by further studies.

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