



## Review article

Surgical indications for unilateral neonatal hydronephrosis in considering ureteropelvic junction obstruction<sup>☆</sup>Hong-Lin Cheng<sup>\*</sup>

Department of Urology, Medical College and Hospital, National Cheng Kung University, Tainan, Taiwan, ROC

## ARTICLE INFO

## Article history:

Received 3 March 2012

Received in revised form

5 April 2012

Accepted 10 May 2012

Available online 15 August 2014

## Keywords:

hydronephrosis

neonatal

obstruction

ureteropelvic junction

## ABSTRACT

Prenatal hydronephrosis is one of the most common urological congenital abnormalities detected by ultrasound. The incidence ranges from 0.59% to 0.69%. Approximately 50% of these fetuses do not have hydronephrosis on postnatal examination, whereas 25–33% of the rest have persistent hydronephrosis leading to the diagnosis of ureteropelvic junction (UPJ) obstruction. Renal ultrasonography and renal radionuclide scanning are the major modalities used for assessment and follow-up. Three main criteria used to determine the presence of obstruction are: (1) the magnitude of hydronephrosis present on ultrasound, (2) the relative renal function (RRF) measured by renography, and (3) the response of radionuclide washout with furosemide. Unfortunately, it is not always easy to determine obstruction; different types of management have been developed. Without depending on the severity of renal pelvis dilation, percentage of RRF, and response of radionuclide washout in the initial presentation, early surgery to preserve renal function and aggressive observation to prevent unnecessary surgery are two extremes on the spectrum of management for neonatal UPJ obstruction. Relying on renal function in renography, <35–40% or 5–10% of a decrease in the percentage of RRF or on the enlarging of hydronephrosis, respectively, and parenchymal thinning on ultrasonography are the indications for the surgical management to recover renal function in time. In addition to renal function change and imaging progression, the follow-up protocol and family compliance are the other considerations in prevention of impaired renal function. Through more than 40 years of development in the field of UPJ obstruction in infants, there have been several advances in management but controversies remain to be resolved. In this review, we focus on the surgical indications for the UPJ obstruction in this cohort.

Copyright © 2014, Taiwan Urological Association. Published by Elsevier Taiwan LLC.

Open access under [CC BY-NC-ND license](http://creativecommons.org/licenses/by-nc-nd/4.0/).

## 1. Background

Since the 1970s, the introduction of prenatal ultrasound has enabled the detection of hydronephrosis in the fetus as early as 18–20 weeks of gestation. The degree of hydronephrosis is defined based on the Society of Fetal Urology grading system by the ultrasound appearances of the pelvicalyceal system and renal parenchyma (Table 1), or on the maximal renal pelvis diameter (RPD) measurement popularly used in clinical practice. Prenatally, the incidence of hydronephrosis, defined as RPD >5 mm or 10 mm, by the ultrasound, ranged from 0.59% to 0.69%.<sup>1,2</sup> The dilation of the

renal pelvis does not imply obstruction or indicate prenatal renal function impairment, and the condition may improve or spontaneously resolve during postnatal follow-up. Because of its uncertainty, the clinical significance of dilation of the renal pelvis has been discussed for >40 years and persists.

The postnatal prognosis is significantly proportional to the severity of prenatal hydronephrosis. In addition, the diagnosis of the disease entity is closely related to the degree of prenatal hydronephrosis. Approximately 50–63% of prenatal hydronephrosis cases are resolved in the postnatal period and a 25–33% of the rest involve UPJ obstruction (Table 2).<sup>3</sup> Currently there are no reliable indicators to predict the outcome of UPJ obstruction. Therefore, for cases with unilateral hydronephrosis suggesting UPJ obstruction, postnatal management varies from early surgery to close observation. Although in current practice the number of patients who need surgery is reduced, the surgical indications are still controversial and warrant discussion.

<sup>\*</sup> Department of Urology, Medical College and Hospital, National Cheng Kung University, 138 Sheng Li Road, 704 Tainan, Taiwan, ROC.

E-mail address: [chenghl@mail.ncku.edu.tw](mailto:chenghl@mail.ncku.edu.tw).

<sup>☆</sup> There are 3 CME questions based on this article.

**Table 1**  
The Society of Fetal Urology grading system for prenatally detected hydronephrosis.

Grade	Central renal complex (pelvis)	Renal parenchymal thickness
0	Intact	Normal
1	Mild splitting = dilation	Normal
2	Moderate splitting, but complex confirmed within renal border	Normal
3	Marked splitting, pelvis dilated outside renal border, and calyces dilated	Normal
4	Further pelvicalyceal dilatation	Thin

## 2. Clinical studies

### 2.1. Ultrasonography

Ultrasonography is a convenient and noninvasive tool in the diagnosis and follow-up of hydronephrosis. Hydronephrosis is defined according to the classification of the Society of Fetal Urology Society or the RPD, commonly described as  $\geq 5$  mm or 10 mm. Although the magnitude of renal pelvis dilation is strongly correlated with the likelihood of abnormality after delivery, the degree of renal pelvis enlargement does not specifically indicate the presence of obstruction and does not predict whether hydronephrosis will worsen or improve. Grignon et al<sup>4</sup> showed that 94% of patients with RPD  $\geq 20$  mm, 50% of patients with RPD between 10 mm and 15 mm, and <3% of the patients with RPD <10 mm have a significant abnormality requiring surgery on long-term follow-up. In the newborn, the hydronephrosis transiently improves or disappears during the 1<sup>st</sup> week of life and fluctuates depending on the hydration status or bladder condition.

Serial examination is another avenue to obtain a useful parameter. Progressive dilation usually indicates an obstruction, whereas reduction of the renal pelvis indicates an equivocal condition or nonobstruction. In addition to the appearance of the renal pelvis, progressive parenchymal thinning indicates deterioration of obstruction.

Contralateral kidney hypertrophy, compared with a normal renal growth curve, also indicates ipsilateral renal function impairment.<sup>5</sup> However, if the phenomenon of contralateral hypertrophy develops, it usually means the change of renal function impairment is irreversible.

### 2.2. Diuretic renography with well-tempered renography

During the entire course of diuretic renography,<sup>6,7</sup> the bladder is catheterized and urine output is measured at 10-minute intervals

**Table 2**  
Causes of antenatal hydronephrosis.

Cause	Frequency (% of total)
Renal	
Transient hydronephrosis	48
Physiological hydronephrosis	15
Ureteropelvic junction obstruction	11
Vesicoureteral reflux	9
Megaureter	4
Multicystic dysplastic kidney	2
Ureterocele	2
Renal cyst	2
Posterior urethral valve	1
Others <sup>a</sup>	6

Note. From "Postnatal management of antenatal hydronephrosis" by M. Woodward and D. Frank, 2002, *BJU Int*, 50, p. 149–56. Copyright 2002, BJU International. Reproduced with permission.

<sup>a</sup> Ectopic ureter, prune belly, urethral atresia, and urachal cyst. Not renal: ovarian cyst, hydrocolpos, sacrococcygeal teratoma, enteric duplication, duodenal atresia, and meningocele.

to assess hydration status and diuretic response after intravenous furosemide administration. Children are intravenously hydrated with 15 cc/kg dextrose 5% in water and 0.3% normal saline for 30 minutes, beginning 15 minutes prior to the injection of radiopharmaceutical agents and continued at a maintenance fluid rate 200 cc/kg/24 hours thereafter.

Technetium-99m-mercaptoacetyltriglycine (Tc99mMAG3) is used with activity of 50  $\mu$ Ci/kg and a minimum dosage of 1 mCi. Imaging is performed while the child is in the supine position. The region of interest during the renography phase includes the entire kidney and dilated renal pelvis, and an area two pixels wide around the perimeter of the kidney for background subtraction. Intravenous furosemide (1 mg/kg) is administered after the renography phase (20–30 minutes), but not prior to when the entire collecting system is believed to have been completely filled. The region of interest during the diuretic phase includes the renal pelvis and a semilunar area inferior and lateral to the lower pole of the kidney for background subtraction. Computer frame rates of 20 seconds and static images at 5-minute intervals for 20 minutes are taken.

The percentage of RRF is determined from the total counts of the renogram curve for each kidney less background, during the first 60–90-second interval after isotope injection. Time-activity curve patterns during the diuretic phase of the renogram are reviewed and used to categorize the dilated kidney as follows: no obstruction, obstruction indeterminate, or obstruction.

Diuretic renography is one of the standard methods used in the diagnosis of UPJ obstruction. However, in this well-known method, there are a few pitfalls including severity of obstruction, glomerular immaturity, dilation of renal pelvis, bladder fullness, hydration status, the choice of radiopharmaceutical agent, the dose, and the timing of the administration of diuretics, and the region of interest, as well as a family's compliance with treatment.<sup>6</sup>

## 3. Surgical indications

Based on the assumption that severe dilation of the renal pelvis is detected by ultrasound, decreased or lowering the percentage of RRF, or prolonged half time ( $t_{1/2}$ ) in washout curve assessed by diuretic renography to be diagnosed as obstruction in infancy, obstruction resulting in renal damage, and early conversion to reverse the consequence, different kinds of management developed for prenatal hydronephrosis presumed UPJ obstruction in infancy (Table 3).<sup>5,8–12</sup>

### 3.1. Aggressive observation

The most famous representation of aggressive observation of neonatal hydronephrosis suspected UPJ obstruction has been reported by Koff and Campbell.<sup>5</sup> In 1992, they prospectively followed up 45 neonates with unilateral hydronephrosis and suspected UPJ obstruction nonsurgically for 30 months. Irrespective of the degree of hydronephrosis, the initial RRF, or washout curve, surgical indication is >10% lowering in RRF. None of the 30 patients with Grades 2 and 3 hydronephrosis (Society of Fetal Urology grading system) and none of the remaining 15 patients with Grade 4 demonstrated the lowering percentage of RRF needed surgical intervention. In the Grade 4 hydronephrosis group, ultrasonography showed no change in 8 patients, mild to marked improvement in 5 patients, and complete improvement in 2 patients. No contralateral kidney hypertrophy was observed. The diuretic renographic washout curve showed that only four patients showed a nonobstructive pattern ( $t_{1/2} < 15$  minutes) and RRF of affected kidney function became  $\geq 50\%$  (7.5–42% in the initial RRF) in five patients. Therefore, they concluded that the diagnostic tests for assessing hydronephrosis in infancy were not sufficient to identify

Download English Version:

<https://daneshyari.com/en/article/4276394>

Download Persian Version:

<https://daneshyari.com/article/4276394>

[Daneshyari.com](https://daneshyari.com)