

*Review Article*

## Dilemma of Managing Infants with Ureteropelvic Junction Obstruction (UPJO) Grades 3-4 Society of Fetal Urology (SFU): Review of Literature.

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### Abstract

In the last decade, management of congenital UPJ obstruction has become progressively observational for low grades infants despite the lack of clear dependent predictors of outcome. Furthermore, Surgical intervention for the young infant with high grades, under 6 months, has become relatively infrequent, yet can be necessary and poses unique challenges. In another hand, a careful evaluation and discussion with the family must be undertaken to identify the most appropriate treatment strategy. This review will address the clinical evaluation of UPJO in the very young infant and approaches to determining in whom surgical intervention may be preferable, as well as surgical considerations for the small infant.

**Keywords:** Ureteropelvic junction obstruction, Neonates, infants, pyeloplasty, SFU, Anteroposterior pelvic diameter, differential renal function.

### Introduction

Congenital ureteropelvic junction obstruction is considered one of the common causes of prenatally diagnosed hydronephrosis, which if left untreated, it can lead to progressive renal impairment<sup>[1]</sup>. Ureteropelvic junction (UPJ) obstruction is classified as intrinsic, extrinsic, or secondary.

Prenatal sonographic diagnosis of ureteropelvic junction obstruction allows early detection and intervention according to the degree of renal impairment<sup>[2]</sup>. The reported incidence of UPJ obstruction 1 per 1,000–2,000 live births<sup>[3]</sup>. However other report estimated UPJ obstruction incidence as is 1 in 500 live neonates<sup>[4, 5]</sup>. The widespread use of antenatal ultrasonography has contributed to an increase in the number and earlier diagnosis of hydronephrosis. It is commonly seen in infants and children and less commonly in adults<sup>[6, 7]</sup>.

### Natural History of Prenatally Detected Hydronephrosis

While at first it was believed that most UPJ obstructions with severe dilation detected prenatally required intervention, several studies have shown a relatively high rate of sponta-

neous resolution. This has led to a shift in management, centered on the serial monitoring of renal dilation and function to hopefully identify the children that will eventually require surgery as early as possible without irreversible loss of renal functional potential<sup>[8, 9]</sup>.

The rates of resolution and/or improvement even for severe dilation, as in grade 3 and 4 (SFU) are reasonably good. Indeed, complete resolution rates in observed children range from 33 to 70%<sup>[8, 10, 11]</sup>. In the literature, lower rates of resolution are associated with more severe hydronephrosis. Furthermore, another important parameter is improvement in hydronephrosis. Also, not all children with moderate and severe hydronephrosis have poor DRU as measured on diuretic renography. Data from studies shows that between 10 and 39% of children with SFU grade 3 or 4 have a reduced DRU at diagnosis, defined as <40%. These children are usually offered early pyeloplasty.

### Clinical Presentation

The UPJ obstruction presentation is variable. Infants and Neonates with UPJ obstruction are usually asymptomatic and accidentally presented with hydronephrosis that was diagnosed in

utero by an antenatal ultrasound<sup>[4, 6, 12]</sup>. On the other hand, older children clinical presentation varies according to the severity of obstruction. Intermittent loin pain or abdominal pain are the common presentation. The pain may worsen during brisk diuresis with increased fluid intake as known as (Dietl's crisis). The abdominal pain may be accompanied by nausea and vomiting<sup>[13]</sup>.

#### **Clinical Risk Factors of Renal Deterioration.**

Several studies in the literature try to investigate the ideal risk factor for renal deterioration and thus identify candidate who would benefit from early surgery. This is based on the belief that operating on a child whose split renal function has not deteriorated yet will lead to better long-term results. However, there are studies showing that lost renal function during follow up will be recovered after surgical repair<sup>[14]</sup> and will last till puberty<sup>[19]</sup>.

Furthermore, early detection of surgical candidates can potentially reduce the costs of follow-up by imaging as well as parents stress. The prediction usually depends upon parameters obtained from ultrasonography and diuretic renogram. As regard renal function affection, infants with a >10% difference in split renal function between the hydronephrotic kidney and contralateral healthy one at initial evaluation has been found to develop renal function deterioration 3 times more often and to be 2 times more likely to be symptomatic<sup>[15]</sup>. Another factor should be in mind is delayed cortical transit time, which has been found to be a predictor of deterioration. AS having adjusted for other factors such as Split function, T1/2 and degree hydronephrosis<sup>[6, 16]</sup>.

Anterior-posterior pelvic diameter (APD) on initial ultrasound has been found to be an independent predictor of hydronephrosis resolution<sup>[17]</sup>. An APD of 24 mm or more in the initial evaluation has been shown to be highly specificity and sensitivity to predict need of surgical intervention, in association to either a drop of 10% or greater in split renal function or progressing hydronephrosis with an obstructed renogram curve<sup>[18]</sup>.

The hydronephrosis index also was shown to be easily reproducible and can predict either resolution or worsening of hydronephrosis. The idea was first introduced by Shapiro and his

colleagues of creating a variable that includes information from both degree of hydronephrosis severity and renal parenchyma thinning. This was obtained by subtracting the area of the calyces and renal pelvis from the total area of the kidney and then dividing it by the total area<sup>[19]</sup>.

Quantitative Ultrasound for Measuring Obstructive Severity in Children with Hydronephrosis proposed by Cerrolaza and colleagues by applying machine learning to ultrasound images and diuretic renogram curves, described how quantitative analysis of renal ultrasound images can predict diuretic renography curves and help reduce the number of nuclear medicine studies<sup>[20]</sup>.

Recently, Rickard and colleagues showed that the renal parenchyma to hydronephrotic area ratio correlates well with split renal function and T1/2. Also it shows a promising predictor in selecting children who will require surgery<sup>[21]</sup>.

#### **Treatment Algorithm**

Absolute indication for surgical treatment is symptomatic cases, however defining symptoms of UPJO in infants can be challenging, since most will not be able to complain. Significant symptoms also include recurrent urinary tract infections on antibiotic prophylaxis protocol, hematuria, kidney stones, or renal mass from the severely dilated kidney. Another absolute indication for surgery is the child with clinically significant obstruction in a solitary kidney and evidence of reduced overall renal function. For all other patients, the algorithm (Figure: 1) is a suggested clinical tool.

#### **Conclusions**

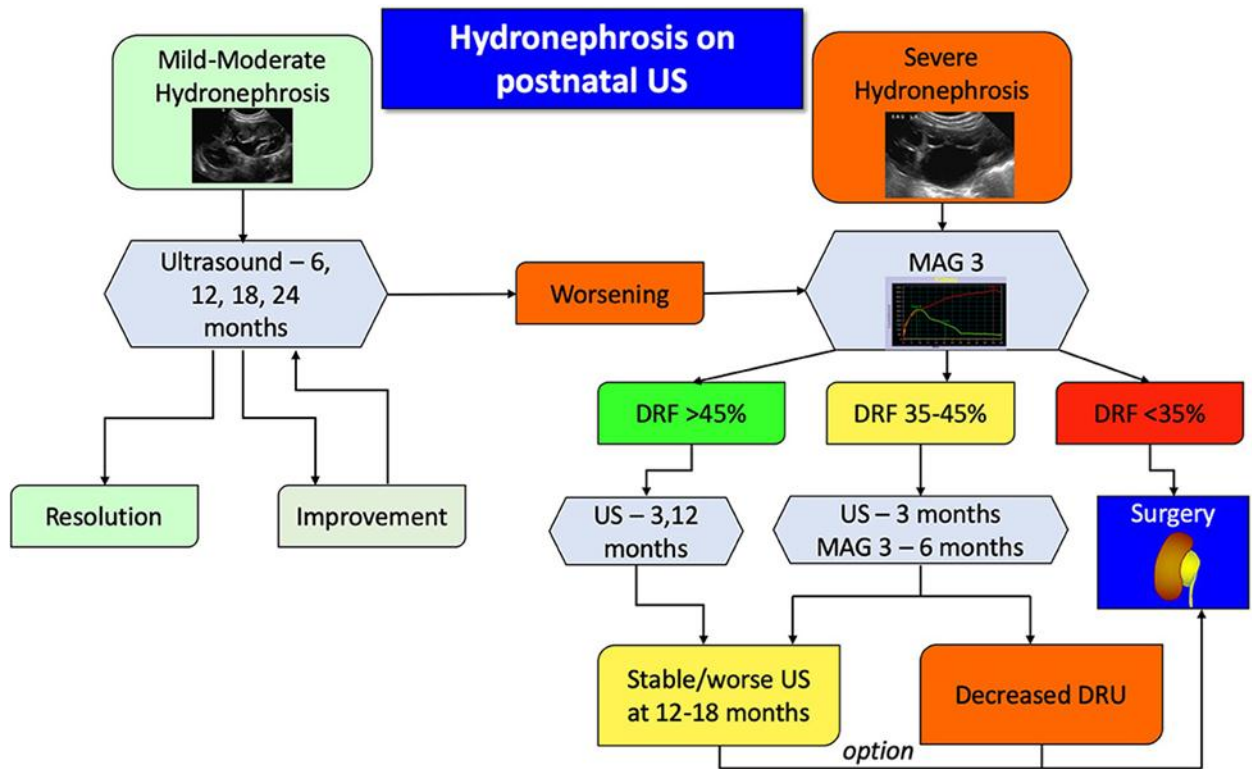
Prenatal detection of hydronephrosis secondary to UPJO has increased the numbers of asymptomatic cases from which the clinician must discern who will benefit from surgery and who is best observed. Most of these children will have resolution of their hydronephrosis, however a non-trivial minority will not improve and may be best managed with surgical intervention to preserve renal functional potential. Early signs of worsening obstruction should be caught promptly to offer surgical correction, which can be performed safely with a minimally invasive approach in the hands of an experienced surgeon.

Leaving significant obstruction untreated for a prolonged period can lead to long-term

consequences that will manifest later in the life of the child.

**Abbreviations**

**UPJO:** Uretero-pelvic junction obstruction; **SFU:** Society of Fetal Urology; **DRU:** Diuretic renogram; **APD:** Antero-posterior renal pelvic diameter.



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