



# Is the renal pyramidal thickness a good predictor for pyeloplasty in postnatal hydronephrosis?

Amr Hodhod <sup>a,b</sup>, John-Paul Capolicchio <sup>a</sup>, Roman Jednak <sup>a</sup>, Hadeel Eid <sup>c</sup>, Abd El-Alim El-Doray <sup>b</sup>, Mohamed El-Sherbiny <sup>a</sup>

<sup>a</sup>Department of Pediatric Surgery, Montreal Children's Hospital, McGill University, Montreal, Quebec, Canada

<sup>b</sup>Department of Urology, Faculty of Medicine, Menoufia University, Al Minufya, Egypt

<sup>c</sup>Pediatric Radiology Division, Montreal Children's Hospital, McGill University, Montreal, Quebec, Canada

Correspondence to: A. Hodhod, Department of Pediatric Surgery, McGill University, The Montreal Children's Hospital, Room B04.2916.1 GLEN, 1001 Boulevard Décarie, Montréal, Québec H4A 3J1, Canada, Tel.: +1 4514 412 4384

[amr.hodhod@mail.mcgill.ca](mailto:amr.hodhod@mail.mcgill.ca) (A. Hodhod)

## Keywords

Hydronephrosis; Pelvi-ureteric junction obstruction; Ultrasonography

Received 17 July 2017  
Accepted 15 January 2018  
Available online xxx

## Summary

### Objectives

We evaluated the feasibility and value of renal pyramidal thickness (PT) as a predictor of pyeloplasty in high-grade postnatal hydronephrosis.

### Patients and methods

We retrospectively reviewed the charts of patients who presented with postnatal hydronephrosis from 2008 to 2013. Included cases had grade 3 or 4 hydronephrosis. We included only units diagnosed as ureteropelvic junction obstruction. Gender, laterality, hydronephrosis side, renogram data, and follow-up data were recorded. Two investigators reviewed all patients' ultrasounds images. We measured PT and pelvic anteroposterior diameter (APD) in the last ultrasound before surgery. For those managed conservatively, measurements were obtained from the ultrasound with worst hydronephrosis. PT was measured in supine position in the middle third of the sagittal plane (Figure). We assessed the reliability of PT measurement using the intraclass correlation coefficient (ICC). Univariate and multivariate analyses were used to correlate the collected parameters to pyeloplasty incidence. Receiver operating characteristic curve was used to evaluate the cutoff value of PT that predicts pyeloplasty.

### Results

The total included cases were 155 patients (165 units). One hundred and fourteen units had grade 3 hydronephrosis and 51 units had grade 4 hydronephrosis. Fifty-two cases (55 units) underwent pyeloplasty. The median follow-up period was 37.6 months. PT measurement was reliable (ICC = 0.94). Univariate analysis revealed that SFU grading, APD, PT, T1/2, and MAG-3 curves were associated with surgery. Multivariate analysis showed that PT was a single independent predictor for pyeloplasty. PT  $\leq$  3 mm had 98.1% sensitivity and 89.7% specificity in predicting pyeloplasty.

### Discussion

PT is the first portion of renal parenchyma that is affected in high-grade hydronephrosis. Moreover, it changes little over the first 9 years of life. PT measurement in hydronephrosis was not previously evaluated. We found that PT was easily measured in most kidneys with high negative predictive value. The PT value as an indicator for pyeloplasty should undergo extensive assessment by other institutions with different protocols.

### Conclusion

Being a slowly growing part of the parenchyma, PT can be a good measurable parameter to predict pyeloplasty. Measurement of PT in hydronephrosis is reliable. PT  $\leq$  3 mm can predict pyeloplasty with 98.1% sensitivity and 89.7% specificity.

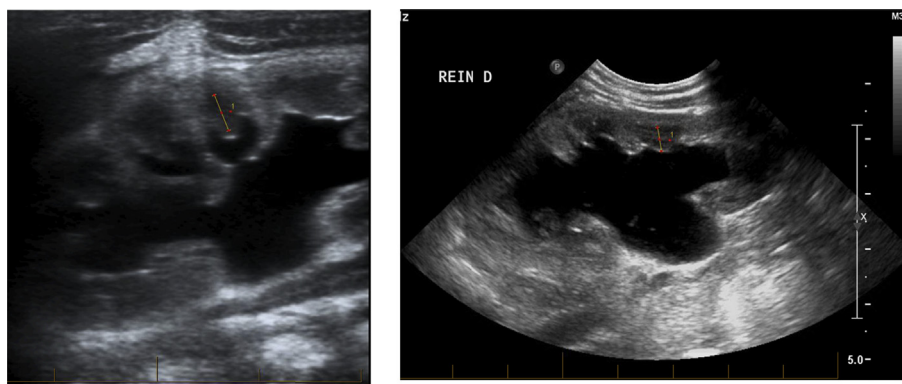


Figure Measurement of the renal pyramidal thickness.

<https://doi.org/10.1016/j.jpuro.2018.01.025>

1477-5131/© 2018 Journal of Pediatric Urology Company. Published by Elsevier Ltd. All rights reserved.

## Introduction

Many studies have evaluated the prediction value of ultrasound parameters regarding the surgical intervention and renal function [1–3]. Renal parenchymal thinning was considered as a subjective parameter to define the severity of hydronephrosis [4–6].

However, in addition to its subjectivity, the parenchymal thickness essentially changes with age that makes its clinical application difficult especially in bilateral hydronephrosis [7]. The pyramidal thickness (PT) changes little over the first nine years of life, which makes it superior to the parenchymal thickness [7].

Multiple classification systems were used to define various grades of antenatal hydronephrosis (ANH) [4–6,8,9]. PT is the first portion of renal parenchyma that is affected in high-grade hydronephrosis [7]. Using PT to define the hydronephrosis severity, regarding ureteropelvic junction obstruction (UPJO) has not been reported before.

We tried to prove the feasibility and reliability of PT measurement in hydronephrosis. The renal pyramid grows slowly during the first years of life. Owing to its proximity to the calyx, it is the first part of the renal parenchyma to be affected by the increase of intracalyceal pressure. So, we hypothesized that PT measurement can be utilized to assess the need for pyeloplasty. We evaluated PT as a predictor for pyeloplasty compared with other possible predictors such as anteroposterior diameter (APD), Society for Fetal Urology (SFU) grading, and renogram findings.

Parenchymal thinning in SFU grade 4 is not objectively well defined. In the current study, we provided a feasible alternative measurement that would help in defining surgically important parenchymal thinning.

## Patients and methods

Local ethics approval was obtained (#14-256-ped.).

We retrospectively reviewed patients' charts who presented with antenatal hydronephrosis (ANH) from January 2008 till December 2013. All included patients presented with ANH in the first year of life and had SFU grade 3 or 4 initially diagnosed as isolated hydronephrosis. We excluded cases associated with posterior urethral valve (PUV), vesico-ureteric reflux (VUR), ureterocele, vesicoureteric junction obstruction (VUJO), and neurogenic bladder. Moreover, we excluded patients with UPJO of non-functioning kidneys.

We recorded the patients' personal data regarding the age and gender. Laterality and side of hydronephrosis were also collected. Two investigators (A.H.) and (H.E.) reviewed all patients' ultrasound images. This review was blinded to surgical need and outcome. The last ultrasound before surgery was reviewed. Otherwise, for units managed conservatively, the ultrasound with worst hydronephrosis was reviewed. Postnatal hydronephrosis was graded using the SFU system. We collected only renal units with SFU grade 3 or 4. SFU grade 3 was defined as dilated renal pelvis and all renal calyces with normal parenchyma while SFU grade 4 was considered as grade 3 but with parenchymal thinning [5].

Thereafter, PT was measured. The method and interpretations of PT measurement were applied as described

by Kadioglu [7]. PT was measured in the middle third of the sagittal renal ultrasonic images that were captured in supine position, as the distance between the cup of calyx and the base of pyramid. To get the most accurate measurement, we selected the sagittal images that showed mostly all pyramids. Further, we chose the one with maximal diameter of the mid-renal pyramid. We considered PT in a non-visualized pyramid, in all renal sagittal images, with very thin parenchyma as 0 mm. Moreover, we measured PT of the contralateral kidneys if not included in the diseased group.

Moreover, APD was measured at the mid-renal transverse plane of the renal pelvis in the supine position.

Mercaptoacetyltriglycine 3 (MAG-3) was indicated for all patients with SFU grade 4. Patients with SFU grade 3 had MAG-3 when hydronephrosis was bilateral high grade, in a single kidney or worsening in subsequent ultrasounds. We recorded MAG-3 data regarding the differential renal function (DRF), post-Furosemide radioisotope  $T_{1/2}$  washout and curve type. When the  $T_{1/2}$  was  $<10$  min, non-obstructive renogram was considered. In cases of  $T_{1/2} > 10$  min, we reviewed the renal washout percentage to exclude obstruction. Renogram curve types were obstructive or not obstructive. Obstructive curve was considered when continuously rising or slow down sloping without adequate washout ( $<50\%$ ) in response to furosemide, otherwise the curve was considered to be non-obstructive [10].

We reviewed the hydronephrosis outcome regarding the surgical intervention throughout the follow-up period. Pyeloplasty was indicated when DRF  $< 40\%$  with impaired drainage ( $T_{1/2} > 20$  min) or deterioration of the renal function  $> 10\%$  on follow up renogram study. Moreover, surgery was indicated in cases of high-grade worsening hydronephrosis on follow-up ultrasound or symptomatic hydronephrosis. These indications are similar to that of the SFU recommendations [11]. Otherwise, conservative management was considered. Patients who underwent conservative management were followed up every 3–6 months. When worsening hydronephrosis was detected, MAG-3 was performed. Patients with improving hydronephrosis were followed at longer intervals.

According to our institutional post-pyeloplasty protocol, patients had their first ultrasound study within the first 3 months postoperatively then after 3–4 months. The frequency of further follow-up was decided by the surgeon. PT was remeasured post pyeloplasty by reviewing postoperative ultrasound images during short-term follow up. For renal units with preoperative PT  $> 0$  mm, the percentage of PT change ( $\Delta PT\%$ ) was calculated using the following formula:

$$\frac{[\text{postoperative PT} - \text{preoperative PT}] \times 100}{\text{preoperative PT}}$$

When the preoperative PT = 0, we calculated the PT change ( $\Delta PT$ ) according to the following formula: postoperative PT – preoperative PT.

Postoperative hydronephrosis status was assessed by comparing hydronephrosis grade pre- and postoperatively according to the SFU system [5]. Thereafter, downgraded was defined as “improved hydronephrosis” and the term

Download English Version:

<https://daneshyari.com/en/article/8811530>

Download Persian Version:

<https://daneshyari.com/article/8811530>

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