Section A-Research paper

Antenatal renal pelvis dilatation detected in fetus by antenatal ultrasound scanning and its postnatal outcome

[1]Dr. Vinay Kumar, [2]Dr. Abhilasha Thakyal, [3]Dr. Anju Dogra

[1]Assistant Professor, [2]Senior Resident, [3]Lecturer, Department of Obstetrics and Gynaecology, SMGS Hospital, GMC Jammu, Jammu and Kashmir, India

Corresponding Author
Dr. Anju Dogra
Lecturer, Department of Obstetrics and Gynaecology, SMGS Hospital, GMC Jammu, Jammu and Kashmir, India
Email: anjudogra57212@gmail.com

Received: 15 March, 2023 Accepted: 19 April, 2023

ABSTRACT

Objective: The purpose of this study was to determine the postnatal outcome of renal pelvis dilatation that is detected in fetus by antenatal ultrasound scanning. **Material and methods:** This single-centered, retrospective study was conducted over a 24-month period from January 2017 to December 2019 including 52 pregnant patients. Fetuses with an anteroposterior pelvic diameter of ≥4 mm in the second trimester and/or ≥7 mm in the third trimester were enrolled. The fetuses were allocated to three groups based on pelvic anteroposterior diameter (APD) detected on ultrasound: APDs of <10 mm, 10–15 mm and >15 mm were classified as group 1, group 2 and group 3 respectively. Patient's characteristics, postnatal pathology and postnatal management over a period of 2 years were discussed. **Results:** Among the 52 infants whose cases were followed, 22(42.30%) had APD of <10mm, 18(34.61%) had APD of 10–15 mm and 12(23.07%) had APD of >15 mm respectively. Mean maternal age in the study population was 31.32±2.71 years. Among the affected fetuses, 34(65.38%) were delivered as male and 18(34.61%) were female. Left sided renal pelvis dilatation was seen more common than right, with about 29 fetuses (55.76%) having left pyelactasis. Bilateral renal pelvis dilatation was seen in 12 (23.07%) fetuses. Postnatally, transitional hydronephrosis was seen in 18(34.61%) infants, pelvic uretero junction obstruction in 18 (34.61%) infants, vesicouretric reflux in 13(25%) infants, and posterior urethral valve in 3(5.76%) infants respectively. Out of 22 infants with APD of <10mm, 20 resolved itself during followup of 2 years. Out of 18 infants with APD of 10-15mm, none of them resolved in 2 year follow up, 5 required surgery and 13 were still under followup and were given antibiotic prophylaxis. Of the 12 infants with APD >15mm, none of them resolved in followup of 2 years while 7 required surgery in 2years whereas 5 were still under followup and antibiotic prophylaxis. **Conclusion:** Totally, 38.46% of pyelectasis detected on antenatal ultrasound scanning resolved spontaneously in 2 years followup. The magnitude of fetal renal pyelectasis correlated with postnatal outcome, as 90.90 %(20 out of 22) infants resolved in 2 years followup in group 1(APD<10mm) while none of the infant resolved in group 3 (APD>15mm). Also, 58.33 % (7 out of 12) infants in group 3 required surgery in course of management while none required surgery in group1 over period of followup.

Keywords: fetal, renal pelvis, obstruction, hydronephrosis, outcome

INTRODUCTION

Fetal pyelectasis is a common finding on antenatal ultrasound. It is included as one of the soft ultrasonographic markers of aneuploidy. It is found in approximately 1–5% of pregnancies [1,2]. With the advances in ultrasound technology, this relative incidence is increasing. Also, correlations between ultrasound findings, as well as the final renal diagnosis, remain inconclusive. There is lack of uniformity in categorizing urinary tract dilation, which results in the differences between pre-and postnatal diagnoses. Furthermore, the majority of cases of fetal pyelectasis spontaneously regress subsequent to birth.

Data regarding the natural course of fetal pyelectasis and hydronephrosis are scarce, still previous studies have shown increased risk of significant congenital kidney and urinary tract anomalies in cases of severe fetal hydronephrosis [3,4], as well as greater need for postnatal antibiotic treatment and surgical intervention [5,6]. There is a lack of consensus regarding the threshold anteroposterior renal pelvic diameter (APRPD) that defines clinically significant fetal hydronephrosis requiring postnatal follow-up and is likely to indicate renal pathology.

The objective of this study was to determine the postnatal outcome of renal pelvis dilatation that is detected in fetus by antenatal ultrasound scanning.

MATERIAL AND METHODS

This single-centered, retrospective study was conducted over a 24-month period from January 2017

to December 2019 including 52 pregnant patients at SMGS Hospital, GMC Jammu. Fetuses with an anteroposterior pelvic diameter of ≥4 mm in the second trimester and/or ≥7 mm in the third trimester were enrolled. The fetuses were allocated to three groups based on pelvic anteroposterior diameter (APD) detected on ultrasound: APDs of <10 mm, 10–15 mm and >15 mm were classified as group 1, group 2 and group 3 respectively. The data were collected from medical record section. Patient's characteristics in terms of maternal age, parity, fetal position, fetal sex, side of renal pelvis involved were discussed. Postnatal pathology diagnosed like transitional hydronephrosis, vesicouretric reflux, posterior urethral valve, pelvic uretero junction obstruction was compared. Also, postnatal management and outcomes in neonates and infants were classified and followed over a period of 2 years, as requirement of surgery, antibiotic prophylaxis, under observationor resolved.

STATISTICAL ANALYSIS

Analysis of results were done by using Epi info version 6. Numerical data were presented as mean±SD and categorical data were presented as percentage and results were obtained.

RESULTS

Among the 52 infants whose cases were followed, 22(42.30%) had APD of <10mm, 18(34.61%) had APD of 10–15 mm and 12(23.07%) had APD of >15 mm respectively.

Table 1: Distribution of patient according to size of grades of renalpelvis dilatation

Group	Pelvic anteroposterior diameter (APD)	Number of fetus	Percentage
Group 1	<10mm	22	42.30%
Group2	10-15mm	18	34.61%
Group 3	>15mm	12	23.07%

Mean maternal age in the study population was 31.32±2.71 years and mean parity was 2.4. 31(59.61%) fetus were vertex while 17(32.09%) were breech at the time of delivery. Among the affected fetuses, 34(65.38%) were delivered as male and 18(34.61%) were female. Left sided renal pelvis dilatation was seen more common than right, with about 29 fetuses (55.76%) having left pyelactasis. Bilateral renal pelvis dilatation was seen in 12 (23.07%) fetuses.

Table 2: Patient's characteristics

Variables	Number	Percentage (%)
Mean maternal age(years)	31.32±2.71	
Mean parity	2.4	
Fetal positions		
Vertex	31	59.61%
Breech	17	32.09%
Transverse	4	7.6%
Fetal sex		
Male	34	65.38%
Female	18	34.61%
Side of renal pelvis		
Left	29	55.76%
Right	11	21.15%
Bilateral	12	23.07%

Postnatally, transitional hydronephrosis was seen in 18(34.61%) infants, pelvic uretero junction obstruction in 18 (34.61%) infants, vesicouretric reflux in 13(25%) infants, and posterior urethral valve in 3(5.76%) infants respectively.

Table 3- Postnatal pathology in antenatal renal pelvis dilatation

Pathology	Number	Percentage
Transitional hydronephrosis	18	34.61%
Pelvic uretero junction obstruction	18	34.61%
Vesicouretric reflux	13	25%
Posterior urethral valve	3	5.76%

Out of 22 infants with APD of <10mm, 20 resolved itself during followup of 2 years while 2 were still not resolved and were under followup. Out of 18 infants with APD of 10-15mm, none of them resolved in 2 year follow up, 5 required surgery and 13 were still under followup and were given antibiotic prophylaxis. Of the 12 infants with APD >15mm, none of them resolved in followup of 2 years while 7 required surgery in 2 years whereas 5 were still under followup and antibiotic prophylaxis.

Totally, 38.46% of pyelectasis detected on antenatal ultrasound scanning resolved spontaneously in 2 years followup. The magnitude of fetal renal pyelectasis correlated with postnatal outcome, as 90.90 %(20 out of 22) infants resolved in 2 years followup in group 1(APD<10mm) while none of the infant resolved in group 3 (APD>15mm). Also, 58.33 % (7 out of 12) infants in group 3 required surgery in course of management while none required surgery in group1 over period of followup.

Table 4- Postnatal management

Pelvic anteroposterior diameter (mm)	Resolved	Requirement of surgery	Under follow up/antibiotic prophylaxis	Total
Group 1 (<10mm)	20	Nil	2	22
Group 2 (<10-15mm)	Nil	5	13	18
Group 3 (>15mm)	Nil	7	5	12

DISCUSSION

Among the 52 infants whose cases were followed, 22(42.30%) had APD of <10mm, 18(34.61%) had APD of 10–15 mm and 12(23.07%) had APD of >15 mm respectively. Mean maternal age in the study population was 31.32±2.71 years and mean parity was 2.4. 31(59.61%) fetus were vertex while 17(32.09%) were breech at the time of delivery. Among the affected fetuses, 34(65.38%) were delivered as male and 18(34.61%) were female. In a study by Erica S. Hammer et al, males represented a larger percentage than females (73.5% vs 26.5%) [9].Farladansky-Gershnabel S et al concluded that fetal pyelectasis 6–9.9 mm was more frequent among males (68.5%) than females (51%, p = 0.034) [10]. Left sided renal pelvis dilatation was seen more common than right, with about 29 fetuses (55.76%) having left pyelactasis. Bilateral renal pelvis dilatation was seen in 12 (23.07%) fetuses.

Postnatally, transitional hydronephrosis was seen in 18(34.61%) infants, pelvic uretero junction obstruction in 18 (34.61%) infants, vesicouretric reflux in 13(25%) infants, and posterior urethral valve in 3(5.76%) infants respectively.

Out of 22 infants with APD of <10mm, 20 resolved itself during followup of 2 years while 2 were still not resolved and were under followup. Out of 18 infants with APD of 10-15mm, none of them resolved in 2 year follow up, 5 required surgery and 13 were still under followup and were given antibiotic prophylaxis. Of the 12 infants with APD >15mm, none of them resolved in followup of 2 years while 7 required surgery in 2 years whereas 5 were still under followup and antibiotic prophylaxis.

Totally, 38.46% of pyelectasis detected on antenatal ultrasound scanning resolved spontaneously in 2 years followup in our study whereas similar study by Hari B et al showed 90.2% resolution or improvement in followup[11]. Aviram R et al showed in 30.4%, the diagnosis of hydronephrosis was excluded postnatally [8]. In a study by Ahmad G, Green P, 74% cases of mild pyelactasis resolved whereas in Yamamura Y et al study, resolution occurred in 59% cases [7,15]. In a study by Coelho, G.M et al,pyelectasis wasnon-significant finding in 65.3% fetuses while in 34.6% fetuses, it leads to of significant uropathy [6].

Also, 58.33 % (7 out of 12) infants in group 3 required surgery in course of management while none required surgery in group1 over period of followup in our study. Ahmad G, Green P showed no requirement of surgery in mild pyelactasis in their study [7].

Coelho, G.M et al detected that 16.3% of significant uropathy had ureteropelvic junction obstruction (UPJO), 6.1% had vesicoureteral reflux (VUR), and 6.1% had posterior urethral valves (PUV). 18.3% required surgical intervention because of obstructive uropathy [6].

In our study, the magnitude of fetal renal pyelectasis correlated with postnatal outcome, as 90.90 %(20 out of 22) infants resolved in 2 years followup in group 1(APD<10mm) while none of the infant resolved in group 3 (APD>15mm). There was a highly significant association between anterior-posterior renal pelvis diameter above 10 mm in the last ultrasound performed before the birth and the need for surgery (p < 0.01) as seen in study by Policiano C et al [14]. Similar to our study, the long-term outcome is excellent in children with mild urinary tract dilatation, as shown in study by Herthelius M [12].Hari B et al showed no correlation of magnitude of fetal renal pyelectasis with postnatal outcome which was contrary as seen in our study [11].

Overall requirement of surgery in our study was 23.08% where as other studies reported higher rates of surgical intervention, ranging from 25% to 40% in fetuses with hydronephrosis [3].

In study by Loardi, Cet al, most cases of 6–9.9 mm pyelectasis remained stable or resolved spontaneously during pregnancy. There was a higher rate of postnatal renal reflux and renal obstruction in this group; however, most did not require surgical intervention [13].

Conclusions:

We found that most of mild cases of prenatal renal pelvis dilatation resolved spontaneously during follow up period without need for additional treatment. While moderate to severe cases of renal pelvis dilatation required close follow up and additional active treatment (Antibiotics/surgery).

FUNDING

No funding sources

CONFLICT OF INTEREST

Nil

ETHICAL CLEARANCE

Study approved by institution ethics committee

REFERENCES

1. Blyth, B.; Snyder, H.M.; Duckett, J.W. Antenatal diagnosis and subsequent management of hydronephrosis. *J. Urol.* **1993**, *149*, 693. [Google Scholar] [CrossRef]
2. Robyr, R.; Benachi, A.; Daikha-Dahmane, F.; Martinovich, J.; Dumez, Y.; Ville, Y. Correlation between ultrasound and anatomical findings in fetuses with lower urinary tract obstruction in the first half of pregnancy. *Ultrasound. Obstet. Gynecol.* **2005**, *25*, 478. [Google Scholar] [CrossRef]
3. Lee, R.S.; Cendron, M.; Kinnamon, D.D.; Nguyen, H.T. Antenatal hydronephrosis as a predictor of postnatal outcome: A meta-analysis. *Pediatrics* 2006, *118*, 586.
4. Scalabre, A.; Demède, D.; Gaillard, S.; Pracros, J.P.; Mouriquand, P.; Mure, P.Y. Prognostic Value of Ultrasound Grading Systems in Prenatally Diagnosed Unilateral Urinary Tract Dilatation. *J. Urol.* **2016**, *197*, 1144–1149. [Google Scholar] [CrossRef]
5. Shamshirsaz, A.A.; Ravangard, S.F.; Egan, J.F.; Prabulos, A.M.; Shamshirsaz, A.A.; Ferrer, F.A.; Makari, J.H.; Leftwich, H.K.; Herbst, K.W.; Billstrom, R.A.; et al. Fetal hydronephrosis as a predictor of neonatal urologic outcomes. *J. Ultrasound. Med.* **2012**, *31*, 947–954. [Google Scholar] [CrossRef]
6. Coelho, G.M.; Bouzada, M.C.; Pereira, A.K.; Figueiredo, B.F.; Leite, M.R.; Oliveira, D.S.; Oliveira, E.A. Outcome of isolated antenatal hydronephrosis: A prospective cohort study. *Pediatr. Nephrol.* **2007**, *22*, 1727–1734. [Google Scholar] [CrossRef]
7. Ahmad G, Green P. Outcome of fetal pyelectasis diagnosed antenatally. J ObstetGynaecol. 2005 Feb; 25(2):119-22. doi: 10.1080/01443610500041446. PMID: 15814386.
8. Aviram R, Pomeran A, Sharony R, Beyth Y, Rathaus V , Tepper R. 2000. Increase of renal pelvis dilatation in the fetus and its significance. Ultrasound in Obstetrics & Gynecology 16: 60-2. Blyth B, Snyder HM, Duckett JW. 1993. Antenatal diagnosis and subsequent management of hydronephrosis. Journal of Urology 149: 693–8.
9. Erica S. Hammer, Alexandra Loza , Adam Borgida. Fetal sex and the impact on antenatally detected renal pelvis dilation. *American Journal of Obstetrics &Gynecology* 2023 Jan; 228(1):S302. https://doi.org/10.1016/j.ajog.2022.11.534.
10. Farladansky-Gershnabel S, Gluska H, Meyer S, Sharon-Weiner M, Schreiber H, Arnon S, Markovitch O. Postnatal Outcomes of Fetuses with Prenatal Diagnosis of 6–9.9 mm Pyelectasis. Children. 2023; 10(2):407. https://doi.org/10.3390/children10020407
11. Hari B. Srinivasan, NishantSrinivasan, PrajwalDhungel, Ruth London, Charles Lampley&GopalSrinivasan (2013) Natural history of fetal renal pyelectasis, The Journal of Maternal-Fetal & Neonatal Medicine, 26:2, 166-168, DOI: 10.3109/14767058.2012.722726.
12. Herthelius, M. Antenatally detected urinary tract dilatation: long-term outcome. PediatrNephrol (2023).https://doi.org/10.1007/s00467-023-05907-z.
13. Loardi, C.; Signorelli, M.; Gregorini, M.; Marella, D.; Torri, F.; Zambelloni, C.M.; Omodei, U.; Odicino, F. Moderate and severe fetal pyelectasis: Correlation between prenatal aspects and postnatal outcome. *J. Neonatal. Perinatal. Med.* **2020**, *13*, 91–96. [Google Scholar] [CrossRef]
14. Policiano C, Djokovic D, Carvalho R, Monteiro C, Melo MA, Graça LM. Ultrasound antenatal detection of urinary tract anomalies in the last decade: outcome and prognosis. J Matern Fetal Neonatal Med. 2015 May;28(8):959-63. doi: 10.3109/14767058.2014.939065. Epub 2014 Jul 17. PMID: 24975200.
15. Yamamura Y, Swartout JP, Anderson EA, Knapp CM, Ramin KD. Management of mild fetal pyelectasis: a comparative analysis. J Ultrasound Med. 2007 Nov;26(11):1539-43. doi: 10.7863/jum.2007.26.11.1539. PMID: 17957048.