DOI: 10.4274/buchd.galenos.2022.55453
J Dr Behcet Uz Child Hosp 2022;12(3):222-226

Original Article

Evaluation of Detailed Fetal Renal Sonographic Findings and the Early Neonatal Outcomes of the Patients with Fetal Pelviectasis Whom Referred After 24th Weeks of Pregnancy

Gebeliğin 24. Haftasından Sonra Fetal Pelviektazi Saptanarak Perinatoloji Kliniğine Refere Edilen Hastaların Detaylı Renal Ultrason ve Erken Neonatal Sonuçlarının Analizi

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ABSTRACT

Objective: Analysis of detailed renal sonographic findings in the patients whom referred to our tertiary center with the diagnosis of renal pelvic dilatation (RPD) after 24 weeks of gestation.

Method: The study group consisted of the patients who have referred by their doctors to our perinatology center with a diagnosis of pelviectasy. Maternal age, gestational week, right and left renal pelvis diameter, bladder diameter, amniotic fluid index, other sonographic findings and antenatal diagnosis were analysed.

Results: Bilateral hydronephrosis were detected in 19 (44.18%) patients. Unilateral left hydronephrosis were found in 10 (23.25%) patients while right hydronephrosis were found in 6 (13.95%) patients. Mearn left renal pelvis diameter was 11.20 (4-32) mm and mean right renal pelvis diameter was 7.89 (4-18) mm. Antenatal diagnosis was vesicoureteral reflux in 16 (37.20%) patients, ureteropelvic junction obstruction in 9 (20.93%) patients, posterior urethral valves in 5 (11.62%) patients. The antetanal diagnosis was renal agenesia in one patient, renal cortikal cyst in one patient, policyctic renal disease in one patients and multiple dysplastic renal disease in 3 patients.

Conclusion: When RPD is detected in the fetal ultrasound of during pregnancy, directing the patients to the perinatal centers for advanced evaluation is important, since it can prevent the progressive renal damage that may develop in the later years of life.

Keywords: Pelviectasy, renal pelvic dilatation, detailed fetal ultrasound, renal anomalies

ÖZ

Amaç: Renal pelvik dilatasyon (RPD) ön tanısıyla üçüncü trimesterde perinatoloji kliniğine refere edilen gebelerin tersiyer merkezde yapılan ayrıntılı renal ultrasonlarının analizi.

Yöntem: Gebelik takibi sırasında birinci düzey ultrasonda pelviektazi saptanarak perinatoloji kliniğimize refere edilen üçüncü trimesterdeki gebeler çalışmaya alınmıştır. Gebelerin yaşı, gestasyonel haftası, sol ve sağ renal pelvis çapları,mesane çapları, amniotik sıvı indeksi, ultrasonda ek bulgu varlığı ve sonografik antenatal tanıları analiz edildi. Genetik anomali şüphesi olanlar ve daha önce tanı almış olanlar çalışmaya alınmadı.

Bulgular: On dokuz (%44,18) hastada bilateral hidroüreteronefroz saptanırken 10 (%23,25) hastada sol hidroüreteronefroz, 6 (%13,95) hastada sağ hidroüreteronefroz saptandı. Geriye kalan hastaların 1'inde renal agenezi, 1'inde renal kortikal kist, 6 hastada ise böbrekte kistik genişleme tespit edildi. Ortalama sol renal pelvis çapı 11,20 (4-32) mm iken ortalama sağ renal pelvis çapı 7,89 (4-18) mm idi. On altı (%37,20) hasta antenatal takiplerde veziko üretral reflu ön tanısı aldı. Dokuz (%20,93) hastada antenatal ön tanı ureteropelvik bileşke darlığı idi. Beş (%11,62) hastada posterior üretral valv düşünüldü. Bir hastada renal agenezi. Bir hastada renal kortikal kist, 1 hastada polikistik böbrek, 3 hastada multiple displastik böbrek ön tanısı konuldu.

Sonuç: Gebelik takibinde birinci düzey ultrasonda RPD saptandığında ileri düzeyde değerlendirme için hastaların perinatal merkezlere yönlendirilmesi hayatın ilerleyen yıllarında gelişebilecek ilerleyici böbrek hasarının önüne geçebileceğinden önem taşımaktadır.

Anahtar kelimeler: Pelviektazi, renal pelvik dilatasyon, ayrıntılı fetal ultrason, renal anomaliler

Received: 09.05.2022
Accepted: 01.09.2022

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Cite as: Uzun Çilingir I, Sayın C, Sütçü H, İnan C, Gürsoy Erzincan S, Varol F. Evaluation of Detailed Fetal Renal Sonographic Findings and the Early Neonatal Outcomes of the Patients with Fetal Pelviectasis Whom Referred After 24th Weeks of Pregnancy. J Dr Behcet Uz Child Hosp. 2022;12(3):222-226

INTRODUCTION

Renal pelvic dilatation (RPD) is one of the most common anomalies detected in antenatal ultrasound and is seen in 1% to 5% of all pregnancies [1,2]. RPD can be seen unilaterally or bilaterally, but incidence of unilateral pelviectasis is generally higher [3,4]. It is also more common in male fetuses than female fetuses [5].

RPD may occur due to many urological and nephrological conditions, or it may be purely physiological. Ultrasound findings accompanying RPD are also important in the differential diagnosis of this condition. RPD is also considered an aneuploidy marker, especially when detected in the 2nd trimester ultrasound [5,6]. Although this clinical condition, which may be evaluated in a wide spectrum, is described under a single title, clearer results can be obtained when the limitation is made according to the time of its occurrence and accompanying findings.

In this study, we have planned to analyze the detailed renal ultrasound findings and antenatal diagnoses of pregnant women in the 3rd trimester who were referred to our clinic with a diagnosis of pelviectasis based on level 1 (screening) ultrasound findings.

MATERIALS and METHODS

This retrospective study evaluated the patients between November 2015 and November 2018 who were referred to the Perinatology Department of the Faculty of Medicine of Trakya University. The ethical approval was obtained from Trakya University Faculty of Medicine Scientific Research Ethics Committee (decision number: 04/11, date: 05.03.2018). The patients referred after 24th weeks of gestation with a diagnosis of fetal pelviectasis were included in the study. The diagnosis of pelviectasis was made when the anteroposterior (AP) diameter of the renal pelvis was 7 mm or greater. The pregnant women who had a detailed ultrasonographic examination in our clinic before the study period were also excluded from the study. All women in the study group were selected from the pregnants who were examined firstly in the 3rd trimester in our clinic. Pregnant women who did not reach 24 weeks of gestation were not included in the study. Pregnant women who were found to be in a high risk category in screening tests were also excluded from the study.

All ultrasonographic examinations were performed using a 2-MHz convex abdominal probe of a GE Voluson 730 Expert ultrasound machine (Voluson 730; General Electric, Tiefenbach, Austria).

Age, gestational week, AP diameters of both renal pelvises, and bladder, bladder thickness, renal echogenecity, state of ureters, amniotic fluid index, additional ultrasonographic findings and sonographic antenatal diagnoses of the referred pregnant women were analyzed.

Hydronephrosis was defined based on the measurements of the AP diameter of the pelvis as mild (7-9 mm), moderate (9-15 mm), and severe (≥15 mm) hydronephrosis.

Presence of renal cysts, abnormal renal echogenicity or dimensions, oligohydroamnios, thickened bladder wall, abnormal bladder volume, state and dilatation of the ureters, and genital organs, urethral widening, and key hole signs were used as the sub-diagnostic criteria but all of the diagnoses were made after repeated sonographic examinations to exclude transient changes or sonographic pitfalls.

Statistical Analysis

NCSS (Number Cruncher Statistical System) 2007&PASS (Power Analysis and Sample Size) 2008 Statistical Software (NCSS, Kaysville, UT, USA) program was used for statistical analysis. Kruskal-Wallis test and Mann-Whitney U test were used in the evaluation of the results of the study data. In the results of three or more in the normal examination in the reasons for voter, standard, proportionality, minimum, maximum preferences, rank quantitative selections, and in the aspects of different approaches. Pearson's chi-square test and Fisher-Freeman-Halton's Exact test were used to compare the data. Statistical significance was evaluated at $p<0.01$ and $p<0.05$ levels.

RESULTS

A total of 43 pregnant women were included in the study. The mean age of the pregnants was 31.52 (19-41) years. The mean gestational week of the pregnants was 28.83 (24-38) weeks. Bilateral hydroureteronephrosis was detected in 19 (44.18%), left hydroureteronephrosis in 10 (23.25%), and right hydroureteronephrosis in 6 (13.95%) patients. Renal agenesis was found in 1, renal cortical cyst in 1, and renal cysts in 6 patients. The mean AP diameters of the left and the right renal pelvises were 11.20 (4-32) mm, and 7.89 (4-18) mm respectively (Figure 1). The pelviectasis were classified as mild (7-9 mm) in 11 (25.5%), moderate (10-15 mm) in 22 (51.1%) and severe (>15 mm) in 10 (23.2%) patients. The bladder were larger than normal in 7 (16.27%) patients, and 5 (11.62%) of these patients had also thickened bladder wall (>2 mm). The

bladders of 3 (6.97%) patients were smaller than their age-adjusted normal sizes. Thirty (69.76%) male, and 13 (30.23%) female fetuses were evaluated. Male fetuses were significantly higher than female fetuses (p=0.001).

Additional ultrasonographic findings were detected in 10 (23.25%) patients. The most common accompanying ultrasonographic findings were hyperechoic cardiac foci (40%), followed by choroid plexus cysts, growth retardation and gallbladder agenesis in order of decreasing frequency (Table 1).

The patients were monitored up to term. Seven (16.27%) patients were excluded from follow-up because of the stabilization of the pelviectasis at 7 mm or the disappearance of ultrasonographic findings. Sixteen (37.20%) patients received the antenatal diagnosis of vesicoureteral reflux (VUR) in antenatal follow-ups. Antenatal diagnoses were posterior urethral valves (PUV) in 9 (20.93%), ureteropelvic junction obstruction in 9 (20.93%), renal cortical cyst in 5 (11.62%), polycystic kidney in 1, and multiple dysplastic kidney in 3 patients. All antenatal diagnoses were confirmed postnatally.

Figure 1. Fetal pelviectasis

DISCUSSION

The incidence of antenatal hydronephrosis is 1 in 500 pregnancies. They are often transient in 50-70% of the cases, but ureteroropelvic junction obstruction,vesicoreteric reflux, ureterovesical junction obstruction, multicystic dysplastic kidney, posterior urethral valve, ureterocele, ectopic ureter, duplex system, urethral atresia, cysts also lead to urinary tract dilatation. Criteria of normality are defined as normal ultrasonographic echogenicity, non-visible hydronephrosis, and ureters, visible but not enlarged bladder, and also normal amniotic fluid after 16 gestational weeks.

Fetal pelviectasis as a ultrasonographic finding at the first line sonography is one of the most common indications of referrals to the high-risk pregnancy and maternofetal units for detailed ultrasonographic evaluation. The diagnosis of fetal pelviectasis is usually made by measuring ultrasonographically the diameters of the renal pelvis in the antero-posterior plane in suspected cases of enlarged renal pelvis.

There are different approaches to the definition of fetal pelviectasis. In addition to the approaches

Table 1. Ultrasonographic findings

	Ultrasonographic findings
Gestational week at admission	28.8 (24-38) weeks
Hydroureteronephrosis	19 (44.18%) bilateral 10 (23.25%) left 6 (13.95%) right
Mean renal pelvis AP diameters	left 11.20 (4-32) mm right 7.89 (4-18) mm
Bladder	7 (16.27%) increased bladder volume 5 (11.62%) thickened bladder wall (>2 mm) 3 (6.97%) small bladder
Amniotic fluid index	4 (9.30%) oligo/anhydramnios 39 (90.69%) normal
Fetal gender	30 (69.76%) male 13 (30.23%) female

AP: Anteroposterior

that accept 4-7 mm as AP diameter of renal pelvis between 24 and 32 weeks of gestation, some authors have suggested that pelviectasis should be mentioned when it is measured above 5 mm regardless of the gestational week [6,7]. However, fetal pelviectasis is commonly mentioned when the renal pelvis diameter is measured higher than 7-10 mm in the 3rd trimester [8-10]. According to Society for Fetal Urology grading system, hydronephrosis is classified as mild, moderate, and severe when AP diameters of renal pelvises are 7-9 mm, 9-15 mm, and >15 mm, respectively [11].

In our cases, we observed regression or stabilization in the following weeks of pregnancy in almost all of the patients with renal pelvic AP diameters measuring between 7-9 mm in the 3rd trimester, and we defined them as benign pelviectasis. Benign, in other words, physiological pelviectasis develops depending on maternal hydration and pregnancy hormones [12]. Especially considering our own data, we think that the pelviectasis with AP diameters measuring between 7-9 mm with no additional finding is usually a benign condition if it would not progressively increase during follow-up. It is clear that evaluation and follow-up in advanced perinatal centers will be beneficial, especially considering the serious pathologies that may underlie the measurements above 10 mm. In our cases some of the underlying causes were ureteropelvic junction obstruction, posterior ureteral valve and VUR. Establishment of these perinatal diagnoses is very important to improve the postnatal management [13].

If pelviectasis with AP diameters measuring over 10 mm worsens during pregnancy, it is recommended that these patients should be followed up in tertiary centers that also have pediatric urology and pediatric nephrology clinics [14]. We included patients whose detailed ultrasonographic examinations were not performed by us and pelviectasis was detected for the first time in the 3rd trimester and referred to us in our study. One of our aims here was to reveal the correlations or contrasts with the preliminary diagnosis of the patients by disclosing the findings of the ultrasonographic examinations performed in a tertiary health care center and sent to us with the diagnosis of pelviectasis. Only 16.27% of the patients referred to us were evaluated as benign pelviectasis. Potentially serious renal pathologies were diagnosed during antenatal period in 83.72% of the cases. VUR was detected in 11-24% of the cases with antenatal pelviectasis [15,16].

In our study group, 37.20% of the patients had the antenatal diagnosis of VUR during antenatal follow-up. Antenatal diagnosis was ureteropelvic junction stenosis in 20.93% of the patients. Suspicion of these two most common diagnoses in the antenatal period and appropriate follow-up after birth are of great importance as it can prevent progressive kidney damage that may occur in the future. The antenatal diagnosis of PUV is also important because it has been shown that it may improve postnatal management [13]. Critical diagnoses leading to termination of pregnancy were less frequently seen by us, because we included only pregnancies diagnosed in the 3rd trimester in our study. Genetic diseases are diagnosed earlier. Severe pathologies like polycystic kidney are usually diagnosed until the 3rd trimester. Third trimester diagnoses usually include pathologies for which follow-up conveys paramount importance.

When the patients referred to us were evaluated, a correlation was found with the findings detected in level 1 ultrasound which signifies that when in doubt referral of the patients to perinatal centers is a medically correct approach.

When fetal pelviectasis is detected in the first level ultrasound, the findings will be evaluated more precisely and it will be easier to enlighten the patient before referral to a tertiary health care center if the state of the bladder and sex of the fetus are known. In general, when pelviectasis below 10 mm is detected, and in the absence of additional finding(s), the patient should be told that a good prognosis is expected and the possibility of serious underlying disease is low. However, any pelviectasis greater than 7 mm, regardless of whether it is accompanied with additional findings or not, should be referred to advanced perinatal centers where pediatric urology consultations is possible. Particular attention should be paid to progressive and bilateral pelviectasis.

One week and one month after birth, renal ultrasound should be performed to all these fetuses to confirm the antenatal diagnosis and to plan for follow-up and treatment [17].

Study Limitations

This was a retrospective study with a small sample size. We examined pregnant women who applied to a tertiary center with the diagnosis of pelviectasis. We evaluated the sonographic findings and postnatal diagnoses of the fetuses. We also confirmed our prenatal

diagnoses in the postnatal period. Although it is very important to follow these babies up to the age of 2 after birth, this study included the postnatal data of babies from birth to one month.

CONCLUSION

Apparently, the follow-up, which can prevent progressive kidney damage, starts in the antenatal period. Therefore, it is of great importance to determine whether there is a noticeable enlargement of the kidneys of the fetus during ultrasonographic examination performed in the 3rd trimester evaluation as a routine pregnancy follow-up.

Ethics

Ethics Committee Approval: The ethical approval was obtained from Trakya University Faculty of Medicine Scientific Research Ethics Committee (decision number: 04/11, date: 05.03.2018).

Informed Consent: Retrospective study.

Peer-review: Externally peer reviewed.

Author Contributions

Surgical and Medical Practices: I.U.Ç., C.S., H.S., C.İ., S.G.E., F.V., Concept: I.U.Ç., C.S., F.V., Design: I.U.Ç., C.S., H.S., C.İ., Data Collection and/or Processing: I.U.Ç., H.S., C.İ., S.G.E., Analysis and/or Interpretation: I.U.Ç., C.S., H.S., C.İ., S.G.E., Literature Search: I.U.Ç., H.S., S.G.E., Writing: I.U.Ç., C.S.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

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