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Original Article

Fetal urinoma and prenatal hydronephrosis: how is renal function affected?

Fetal urinom ve prenatal hidronefroz: renal fonksiyonlar nasıl etkileniyor?

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ABSTRACT

Objective: In our study, the functional prognosis of kidneys with prenatal urinomas were investigated.

Material and methods: Between 2006 and 2010, fetal urinomas were detected in 19 fetuses using prenatal ultrasonography (US), and the medical records were reviewed retrospectively. Of the 19 cases, the follow-up data were available for 10 fetuses. The gestational age at diagnosis, prognosis of urinomas, clinical course and renal functions were recorded. Postnatal renal functions were assessed with renal scintigraphy.

Results: Unilateral urinomas and increased parenchyma echogenicity in the ipsilateral kidney were detected in all of the fetuses. Of the 10 fetuses with follow-up data, the option of termination was offered in 6 cases of anhydramnios, including 3 cases with signs of infravesical obstruction (a possible posterior urethral valve (PUV) and poor prognostic factors and 3 cases with unilateral hydronephrosis and increased echogenicity in the contralateral kidney. Only one family agreed the termination. The other 5 fetuses died during the early postnatal period. The average postnatal follow-up period in the 4 surviving fetuses was 22.5 months (8-38 months). One patient with a PUV underwent ablation surgery during the early postnatal period. In the postnatal period, none of the 4 kidneys that were ipsilateral to the urinoma were functional on scintigraphic evaluation. The urinomas disappeared in 3 cases. Nephrectomy was performed in one case due to recurrent urinary tract infections.

Conclusion: In our study, no function was detected in the ipsilateral kidney of surviving patients with urinomas. Upper urinary tract dilatation accompanied by a urinoma is a poor prognostic factor for renal function.

Key words: Fetal urinoma; prenatal hydronephrosis; renal function.

ÖZET

Amaç: Çalışmamızda prenatal urinom saptanan böbreklerde fonksiyonel prognoz incelenmiştir.

Gereç ve yöntemler: Prenatal ultrason ile 2006-2010 yılları arasında 19 fetusta fetal ürinom saptanmış ve tıbbı kayıtlar retrospektif olarak değerlendirilmiştir. Bu 19 vakadan 10'nun takipleri mevcuttur. Tanı anındaki gebelik haftası, urinomun prognozu, klinik seyir ve renal fonksiyonlar incelenmiştir. Postnatal renal fonksiyonlar sintigrafi ile değerlendirilmiştir.

Bulgular: Tüm fetuslarda unilateral ürinom ve o taraftaki böbrekte artmış parankim ekojenitesi saptanmıştır. Takibi olan 10 fetusten, kötü prognostik faktörlere sahip ve infravezikal obstruksiyon düşünülen 3 olguya (muhtemel posterior uretral valv (PUV)) ve tek taraflı hidronefroz ve karşı böbrekte artmış ekojenite saptanan 3 vakaya terminasyon önerilmiştir. Sadece 1 aile terminasyonu kabul etmiştir. Diğer 5 fetus erken post natal dönemde exitus olmuştur. Hayatta kalan diğer 4 fetusun ortalama post natal takip süresi 22.5 (8-38) aydır. PUV'lu bir olguya erken post natal dönemde ablasyon yapılmıştır. Sintigrafi ile değerlendirildiğinde fetal ürinomlu 4 böbreğin hiç birinde fonksiyon saptanmıştır. Ürinomlar 3 vakada kaybolmuştur. Tekrarlayan üriner sistem enfeksiyon nedeniyle bir vakaya nefrektomi yapılmıştır.

Sonuç: Çalışmamızda aynı tarafta urinomu olan hiçbir hastada renal fonksiyon saptanmamıştır. Ürinomun eşlik ettiği üst sistem dilatasyonu renal fonksiyonlar için kötü prognostik göstergedir.

Anahtar sözcükler: Fetal urinom; prenatal hidronefroz; renal fonksiyon.

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Introduction

Urinoma is an encapsulated accumulation of extravasated urine in the perirenal fascia. The factors contributing to the formation of urinomas include a urine-producing kidney, rupture of the collecting system and an underlying urinary tract obstruction such as a ureteropelvic junction (UPJ) obstruction or a posterior urethral valve (PUV).[1] The development of urinomas may also be observed in neonatal life, and the progress of urinomas and hydronephrosis can be visualized and followed using prenatal ultrasonography (US).[2] According to the current literature, it is more difficult to preserve renal function in cases of fetal urinomas than in their adult counterparts.[3-8] In our study, we reviewed the functional prognosis of kidneys with prenatally diagnosed urinomas.

Material and methods

Between 2006 and 2010, fetal urinomas were detected in 19 fetuses during prenatal ultrasonography (US). Of the 19 cases, the follow-up data were available for 10 fetuses, and the records of these 10 patients were reviewed retrospectively (Table 1). Seven of the remaining 9 cases, which had been referred from different centers and were lost during follow-up, had an initial prenatal diagnosis of lower urinary tract obstruction with a fetal urinoma, and all 9 cases had poor prognostic indicators. Termination was suggested in these cases; however, the follow-up data could not be obtained.

The gestational age at diagnosis, prognosis of urinoma, clinical course and renal functions were examined in all of the cases. During the postnatal period, an US and/or voiding cystourethrography were used for the evaluation of hydronephrosis. Postnatal renal functions were assessed using dimercaptosuccinic acid (DMSA) or benzoylmercaptoacetyltriglycine (MAG3) renal scintigraphy. All of the patients received prenatal counseling from a pediatric urologist. Written informed consent was obtained from the parents.

Results

Of the 10 fetuses, 3 were female and 7 were male. Signs of infravesical obstruction (PUV) were observed prenatally in 4 of the10 fetuses with urinomas. The diagnosis in the remaining 6 fetuses was unilateral hydronephrosis. The mean gestational age at the time of diagnosis was 25.7 weeks (18-36 weeks). The size of the urinomas varied from 21x32x18 mm to 52x70x56 mm on the prenatal US. Renal parenchyma that was ipsilateral to the urinoma was found to be hyperechoic in all of the cases. Among these 10 patients, the option to terminate the pregnancy was

Table 1. Prenatal assessment of 10 fetuses with urinomas

Patient	Gender	GA (wk)	Antenatal US Images	HEK	Diagnosis	Birth
1	F	33	Urinoma, unilateral HN	Yes	UPJO	Full-term
2	F	30	Urinoma, unilateral HN	Yes	UPJO	Full-term
3	F	24	Urinoma, unilateral HN	Yes	UPJO	Full-term
4	M	26	Urinoma, bilateral HUN keyhole sign	Yes	PUV	Full-term
5	M	23	Urinoma, bilateral HUN, keyhole sign Anhydramnios	Yes	Possible PUV	Death
6	M	30	Urinoma, bilateral HUN keyhole sign Anhydramnios	Yes	Possible PUV	Death
7	M	20	Urinoma, unilateral HN, Anhydramnios	Yes	Possible UPJO	Death
8	M	26	Urinoma, unilateral HN, Anhydramnios	Yes	Possible UPJO	Death
9	M	34	Urinoma, bilateral HUN, keyhole sign Oligohydramniosis	Yes	Possible PUV	Death
10	M	32	Urinoma, unilateral HN, Anhydroamnios	Yes	Possible UPJO	Termination (33. wk)

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offered in 6 cases, including 3 cases with signs of infravesical obstruction (PUV) with poor prognostic factors and developed anhydramnios as well as 3 cases with unilateral hydronephrosis showing increased echogenicity in the contralateral kidney and accompanying anhydramnios. Only one family agreed to termination. The other 5 fetuses died during the early postnatal period. No antenatal intervention was performed for urinomas during the prenatal period. The average follow-up period for the 4 surviving neonates was 22.5 months (8-38 months) (Table 2). Of the 4 surviving newborns, a PUV was detected in 1 case, and primary valve ablation was performed in the early postnatal period. In the remaining 3 newborns, the postnatal diagnosis was unilateral UPJ obstruction based on repeat US and renal scintigraphy. In the postnatal period, none of the 4 kidneys were functional in scintigraphic evaluation. The urinomas were disappeared during the follow-up in 3 cases. Nephrectomy was performed in 1 patient due to recurrent urinary tract infections. The other 3 children were managed conservatively. The mean serum creatinine levels in these 4 patients was 0.27 mg/dL (range: 0.2-0.4 mg/dL) at the last follow-up.

Discussion

Fetal urinoma is defined as an encapsulated accumulation of extravasated urine within the perirenal space or retroperitoneum. The differential diagnosis of a cystic mass located between the kidney and the spine includes urinoma, lymphangioma, hemorrhagic neuroblastoma, mesenteric cyst, enteric duplication, multicystic kidney disease, polycystic kidney disease and ureteric duplication.[9] The formation of a urinoma requires a urine-producing kidney, a leaking collecting system and an infravesical or ureteral obstruction (e.g., posterior urethral valves, UPJ obstruction, obstructive ureteroceles, or ureteral atresia or obstruction).[10] The occurrence of fetal urinomas has also been reported following a traumatic amniocentesis.[4] Additionally, Zaccara et al.[11] reported three cases of fetal urinomas in female fetuses without an identifiable obstructive uropathy.

Urinomas have been suggested to have a protective effect on renal function. The proposed mechanism is the rupture of the calyceal fornix as a result of increased pressure and the collection of urine in the perinephric space. Urinary extravasation acting as a "pop-off" mechanism could reduce renal dysplasia and protect renal function.[12] However, this protective mechanism was questioned in recent studies, and it was proposed that the renal functional outcome can also be affected by the underlying pathology and level of obstruction (e.g., a PUV or a UPJ obstruction).[8,13]

The functional prognosis of the involved kidney with a UPJ obstruction and an antenatal urinoma is limited, as reported in the literature. In a review of the literature, Gorincour et al.[6] reported that the postnatal function of kidneys with a urinoma and an accompanying UPJ obstruction was 7%. In a series of 5 cases of UPJ obstruction with prenatal urinomas, Stathopoulos et al.[8] noted poor or impaired postnatal renal function in all of the cases. In a literature review of 25 cases with prenatally diagnosed urinomas, including 16 cases with lower urinary tract obstructions and seven cases with upper urinary tract obstructions, Adorisio et al.[13] reported preserved renal function in only 30% of the cases. The authors further observed that the renal function prognosis was worse in patients with a ureteropelvic junction obstruction than in cases with a PUV. In our study, no renal function was detected postnatally in the cases that were diagnosed with a UPJ obstruction and a urinoma. Nephrectomy was performed in one of these cases due to recurrent urinary tract obstructions. The other patients were managed conservatively.

The incidence of urinomas associated with PUV has been reported to vary between 1% and 9% in the literature.[14-16] Because urinomas associated with PUV are an uncommon occurrence, the significance of urinomas in PUV patients remains unclear. The postnatal function of kidneys with urinomas and PUV has been previously reported to be between 20% and 71%.[6-16] In 1990, Fernbach et al.[1] described 5 cases with PUV, in which renal function was preserved in the presence of a urinoma. However, later studies have not identified any protective effect for urinomas in PUV patients. Ghidini et al.[9] noted that prenatal visualization of a urinoma indicates a poor prognosis for the

Table 2. Postnatal evaluation of the 4 surviving cases with prenatally diagnosed urinomas

Patient	Gender	Postnatal US		Urinoma		Urinoma Follow up		Surgery	Surgery age	DFR		Follow up (mo)
		Age (wk)	Images	AP (mm)	Side Size (mm)	Age (mo)	Size (mm)			Side	Function	
1	F	2	Urinoma	16	Left 33x31x22	2	28x15x13	Nephrectomy	3 mo	Left	0%	8
2	F	0	Urinoma	20	Left 50x52 x25	35	Absent	None	None	Left	0%	38
3	F	0	Urinoma	24	Left 21x32x16	8	Absent	None	None	Left	0%	11
4	M	2	Atrophic Kidney	NA	Right A>bsent	26	Absent	PUV ablation	1 wk	Right	0%	33

affected kidney and should be considered an ultrasonographic sign of renal dysplasia. Patil et al.[15] reported that renal function was impaired on the side of the perirenal urinoma. Of the 9 PUV patients with unilateral urinomas without ascites, the differential renal function was reduced on the side of the urinoma in 5 cases, and the affected kidney was nonfunctional in 1 case. Therefore, unilateral urinomas have been associated with a poor ipsilateral renal prognosis. In none of the cases was the renal function of the affected kidney better than that of its counterpart. According to the results of Heikkila et al.[16] urinomas are neither harmful nor protective. Of the 6 PUV patients with urinomas, 2 patients exhibited decreased renal function on the side of the urinoma and 1 patient exhibited decreased renal function on the contralateral side. The authors stated that there was generally no difference between renal function in the patients with urinomas and ascites and the controls. In our series, out of 4 patients with a presumed diagnosis of a PUV and urinomas during the prenatal period, only 1 patient survived postnatally, and no renal function was detected ipsilateral to the urinoma in that patient.

In our series, the postnatal survival rate of the 10 fetuses with prenatal urinomas was 40% (4/10). Previously, Gorincour et al.[6] have reported a termination of pregnancy in 1 case of bilateral UPJ obstruction with bilateral urinoma and accompanying renal dysplasia. The high mortality rate (60%) can be explained by the accompanying pathologies in the fetuses. Cases with unilateral hydronephrosis and UPJ obstruction also exhibited dysplastic contralateral kidneys and developed anhydroamnios during the follow-up. Furthermore, fetuses with signs of a PUV exhibited poor prognostic factors based on the radiological and urine sampling results.

The management of male fetuses with urinomas is straightforward with intervention reserved largely for those cases with large urinomas that may interfere with the function of other organ systems (e.g., pulmonary hypoplasia secondary to diaphragmatic hernia).[17] Evidently, only symptomatic fetuses require specific treatment (i.e., drainage or diversion).[15] In asymptomatic fetuses, there is no indication for the puncture of a urinoma because urinomas have a tendency to recur. In addition, puncturing a urinoma has no effect on renal function prognosis.[18] In our study, none of the patients required puncture of a urinoma during the prenatal follow-up.

The limitations of our study are that we could not present the follow-up data in 9 out of 19 cases of prenatally diagnosed fetal urinomas that were referred from different centers. Seven of these nine cases who were lost to follow-up had an initial prenatal diagnosis of lower urinary tract obstruction with fetal urinomas, and all of the cases exhibited poor prognostic indicators. Termination was suggested in all of these cases; however, the follow-up data could not be obtained from either the patients or the centers.

In conclusion, antenatal US and postnatal scintigraphy are two ideal methods for the diagnosis and follow-up of fetal urinomas. In our study, no function was detected in the ipsilateral kidney during the follow-up of cases that survived during the postnatal period. Upper system dilatation with an accompanying urinoma is a possible poor prognostic factor for renal functions. Routine nephrectomy is not indicated in most of the cases.

Conflict of Interest / *Çıkar Çatışması*
No conflict of interest was declared by the authors.
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