

Fetal Urinoma in Females without Obstructive Uropathy

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Key Words

Prenatal diagnosis · Urinoma

Abstract

Objective: Prenatal diagnosis of urinomas has long been established with underlying obstructive uropathy generally responsible for urinary extravasation. Because urinoma formation represents a pop-off mechanism in cases of posterior urethral valves, the number of affected males greatly exceeds the number of females. Fetal urinoma has rarely been reported without obstruction and in females it has only been described as a consequence of a complicated amniocentesis.

Methods: Three cases of fetal urinoma in female fetuses without any dilatation of the urinary tract are described. Since the fetus remained healthy, they were all conservatively managed. **Results:** Two urinomas resolved after birth and 1 exhibited significant regression. In the second case, a compressed kidney was visualized with fetal MRI. Renal function was impaired in cases 1 and 3 and absent in case 2 (the kidney was no longer visualized). **Conclusions:** Fetal urinomas can occur even in the absence of urinary tract obstruction and in a low-pressure system as is found in female fetuses. Fetal MRI may help both visualize the ipsilateral kidney and differentiate the mass from other conditions. In a healthy fetus, fetal urinomas can be conservatively managed, but renal function after birth is often absent or impaired. Whether or not in utero aspiration may be beneficial for the preservation of renal function remains unclear.

Introduction

Fetal urinoma can be defined as an encapsulated fluid mass in the perirenal fascia, secondary to urine extravasation. It may occur both in males and females; however, since it is most commonly associated with posterior urethral valves, males are predominately affected in all series [1]. In these cases, as in others in which upper urinary tract obstruction is described [2], urinoma actually represents a protective mechanism that may temporarily decrease intrarenal pressure. However, if features of obstructive uropathy remain constant, renal function may decline to decreased or absent (the most commonly reported finding), or remain preserved [3].

To our knowledge, urinoma without underlying obstruction in a low-pressure system, as in the female, has been reported only as a complication of amniocentesis [4]. Three cases without any apparent mechanism of formation are described herein.

Case Presentation

Case 1

A 34-year-old para 1, gravida 1 patient was referred to our prenatal consultation service at 35 weeks of gestation with an ultrasound examination revealing a right perinephric cystic mass measuring 83 × 58 mm in anteroposterior and transverse diameters (fig. 1a). The corresponding kidney was medially displaced and was mildly hyperechoic. No hydronephrosis or hydroureter was evident. The ipsilateral adrenal gland was well visualized and nor-

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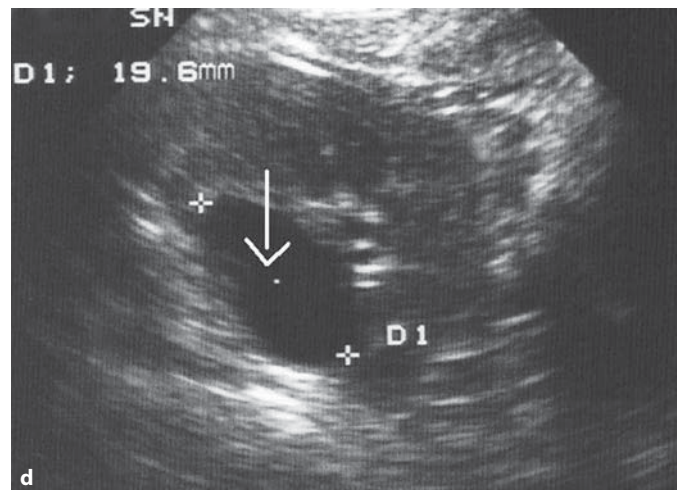
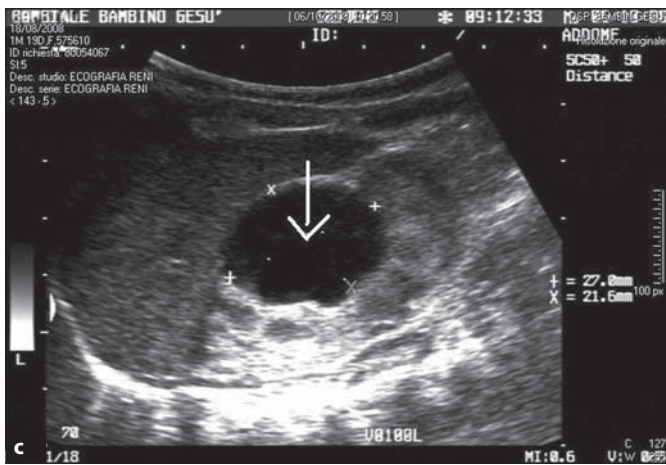
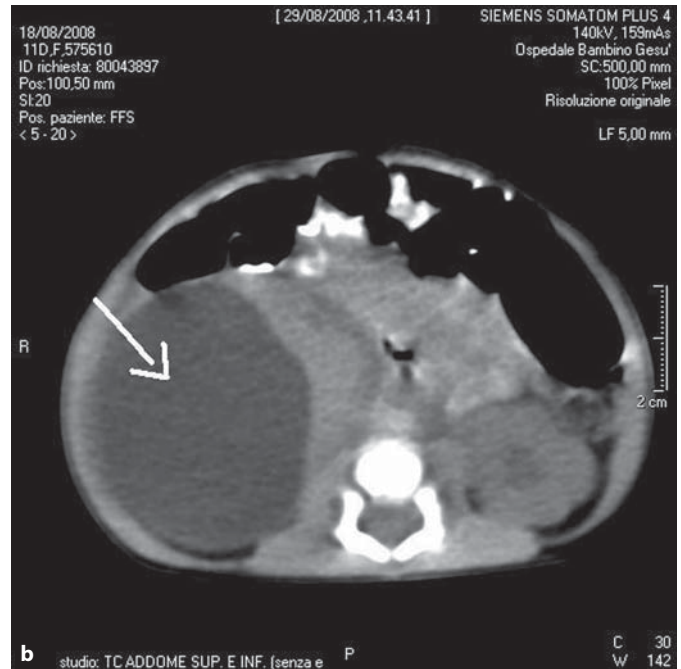


Fig. 1. Case 1. **a** Right perinephric mass at 35 weeks' gestation. **b** Postnatal CT scan. Fluid collection displacing right kidney (arrow). **c** US appearance of fluid collection at 3 months (arrow). **d** US appearance at 1 year (arrow).

mal in appearance. Amniotic fluid was normal. Past medical history revealed that the mass had first appeared at 28 weeks' gestation, and repeated scans documented a mild increase in size. The contralateral kidney was normal. Upon gynecological advice, an uneventful C-section was performed at 37 weeks' gestation with delivery of a female infant, weighing 3,250 g. Neonatal blood pressure and renal function were normal (serum creatinine 0.5 mg/dl).

Twenty-four hours postnatally, a renal ultrasound confirmed the prenatal findings and a CT scan was performed a week later. This examination demonstrated that the fluid collection was at the level of the upper renal pole (fig. 1b). A nuclear scan (MAG3 scintigraphy) documented reduced uptake of isotope by the right kidney compared with the left (26 vs. 76%), with normal washout. Expectant management was planned.

Follow-up ultrasounds at 1 and 3 months showed a progressive decrease in the size of the urinoma (fig. 1c), which almost completely disappeared at the 1-year follow-up (fig. 1d). Creatinine levels also stayed within normal limits at each encounter (0.4 mg/dl at 1 year).

Case 2

A 28-year-old, para 2, gravida 1 patient was referred to our prenatal consultation service at 25 weeks' gestation with an ultrasound examination revealing a right anechoic mass in the retroperitoneum measuring 66 mm in diameter. The compressed right kidney was visualized along the medial aspect of the mass, even though it had been described as normal in appearance at a previous ultrasound performed 4 weeks earlier. Amniocentesis was

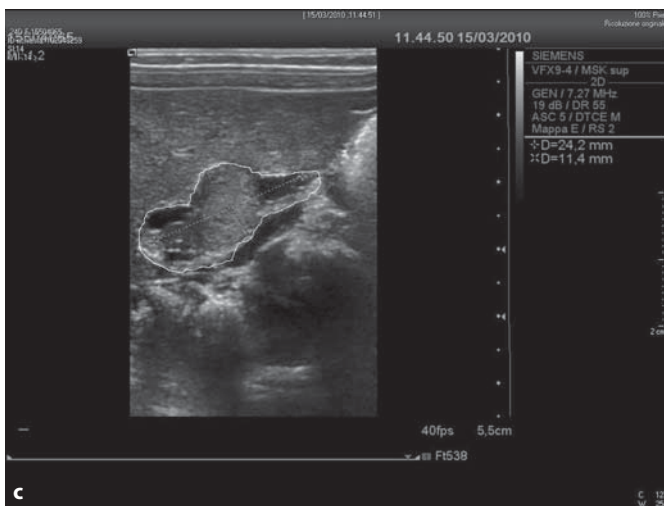
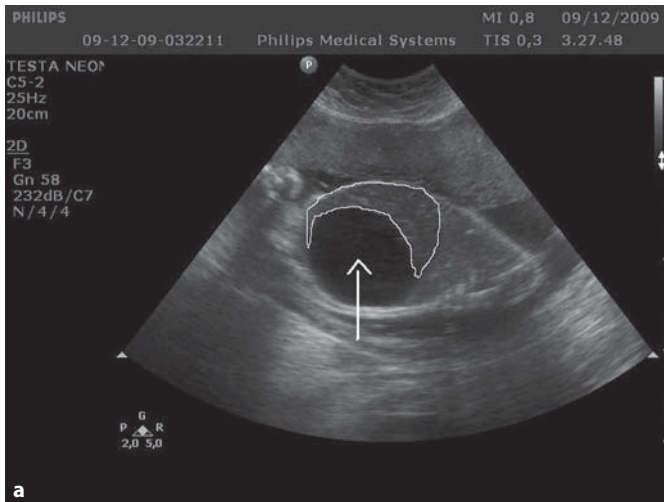


Fig. 2. Case 2. **a** Perirenal mass at 27 weeks' gestation (arrow). The right kidney is compressed along the medial aspect of the mass (white contour). **b** Fetal MRI showing fluid collection (arrow) displacing hyperchoic kidney. **c** US appearance at 1 month. Fluid collection is no longer visible. A dysmorphic kidney is visualized with a pelvis-like structure (white contour).

carried out at the patient's request, to rule out chromosomal aberrations. The procedure was uneventful and the karyotype was 46 XX. Since the amniotic fluid and surrounding organs were normal, prenatal management was conservative, and a follow-up ultrasound was planned after 2 weeks. At that time, the cystic mass was stable in size, and the kidney was not well visualized (fig. 2a). A fetal MRI was then performed, which demonstrated a medially displaced, hyperchoic kidney without signs of urinary tract dilatation (fig. 2b). An additional follow-up ultrasound was performed at 33 weeks, documenting a significant decrease in the size of the fluid collection. The right kidney was now visualized with parenchymal thinning and hyperchoic appearance. Upon gynecological advice, an uneventful C-section was performed at 38 weeks' gestation. The patient delivered a 3,850-gram female infant in good condition. Physical examination was unremarkable. Neonatal renal function and blood pressure were normal.

Follow-up ultrasound at 1 month showed that the fluid collection had nearly disappeared and the corresponding kidney had decreased in size and was dysmorphic and hyperchoic (fig. 2c). At an ultrasound performed at 3 months, the kidney was no longer

visible and the left showed compensatory hypertrophy. Renal function stayed within normal limits (serum creatinine 0.5 mg/dl at 3 months).

Case 3

A 23-year-old, para 1, gravida 1 patient was referred to our prenatal consultation service at 35 weeks' gestation with a fetal ultrasound examination revealing a cystic mass on the right side measuring 80 mm in diameter (fig. 3a). The remaining fetal anatomy was unremarkable and the amniotic fluid was normal. The corresponding kidney was not well visualized. Because of the late presentation, no further ultrasounds were performed and the patient delivered at 39 weeks a female infant weighing 3,320 g and in good condition. Renal function and blood pressure were normal.

Follow-up ultrasound at 1 and 3 months showed a progressive decrease in size of the fluid collection with evidence of a mildly hyperchoic kidney posterior to the mass. Ovaries were visualized and were normal. No dilatation of the underlying urinary tract was described (fig. 3b), and renal function showed no deterioration (serum creatinine 0.4 mg/dl at last evaluation).

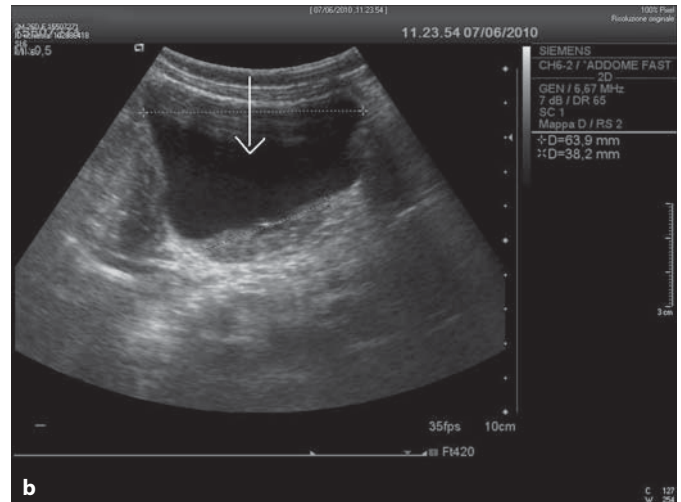
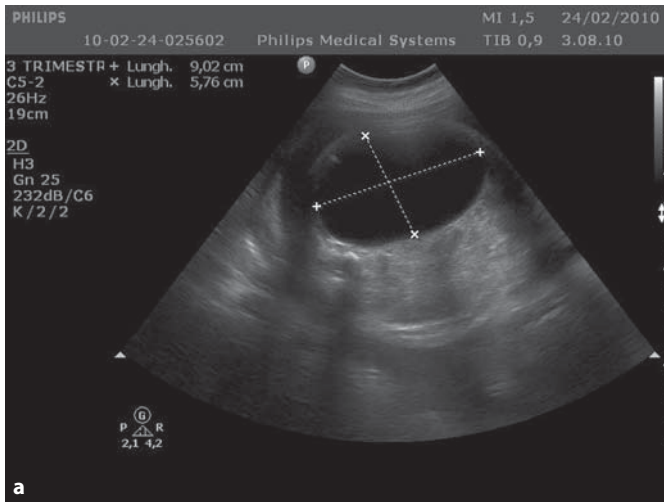


Fig. 3. Case 3. **a** Perirenal fluid collection as seen antenatally. **b** US appearance at 3 months showing reduction of the fluid collection (arrow).

Discussion

Fetal urinomas have received much attention in the literature. In their extensive review, Gorincour et al. [5] collected 25 published cases. The postulated mechanism of formation was microperforation of the renal pelvic walls with leakage of urine beneath the renal fascia or retroperitoneally [6]. All reported cases were secondary to urinary tract obstruction, such as posterior urethral valves or ureteropelvic junction obstruction. Therefore, increased pressure within the urinary tract seems to be a prerequisite for rupture and urine extravasation.

Contrary to these observations, in our series we were not able to document any sign of obstruction. In case 1, obstruction was ruled out both by the absence of sonographic dilatation and by the findings on the nuclear scan. In the remaining 2 cases, absence of dilatation from the time of the initial evaluation, along with reduction in size/disappearance of the corresponding kidney at further follow-up, did not warrant further imaging studies.

Furthermore, since all subject fetuses were female, the most common ‘high pressure’ mechanism, such as posterior urethral valves, could reasonably be excluded.

To our knowledge, there are only 3 reported cases in the literature of non-obstructed urinoma. In 1 case, a large urinoma was found in a 7-day-old neonate without any apparent cause of obstruction. Since prenatal diagnosis was negative, the etiology was deemed to be secondary to trauma during delivery [7]. In the second case, reported by Miller et al. in 2001, a perirenal fluid collection was

due to traumatic amniocentesis [4]. In the third case, only gross vesico-ureteral reflux was documented [8]. Since the latter was a male infant, the authors postulated a transient urethral outflow obstruction, such as that seen in syringocele, as the possible cause of renal rupture. In our cases, the pregnancies were uneventful and the amniocentesis in case 2 was uncomplicated, so traumatic injury to the fetus could be excluded.

In the absence of any explaining mechanism, urinoma formation could be the consequence of an obstructing process taking place earlier in pregnancy. Alternatively, it may follow rupture of a very small dysplastic upper pole of a duplex system; however, this speculation is made solely on the basis of female sex because there was no imaging evidence of renal duplication in any of our cases.

Differential diagnosis in cases of large urinomas may be particularly difficult when no dilatation is present in the urinary tract and, therefore, the fluid collection may be the only detectable ultrasound finding. The mass effect may cause diagnostic confusion because the kidney can be distorted and markedly displaced from the renal fossa, making its identification difficult, as happened in our cases 2 and 3.

In this respect, fetal MRI, as was done in the second patient, may be helpful because it might enable detection of the kidney and its relationship with the mass. This level of detection, in turn, may avoid unnecessary invasive procedures such as in utero shunting, which has been performed when the identification of the kidney was precluded [11].

Other causes of fluid accumulation in the fetus include lymphangioma, mesenteric cyst, enteric duplication, as well as other cystic renal diseases and Wilms' tumor. Gastrointestinal causes were ruled out when it became evident that the mass was of renal origin. Cysts and Wilms' tumor were excluded because of size, which was larger than in simple renal cysts [9], and because of appearance, which was described as a solid, echogenic mass or a heterogeneous lesion with multiple cystic areas because of hemorrhage or necrosis in prenatal renal tumors [10].

Regarding perinatal management, we believe that, in the absence of compression and displacement of the intra-abdominal organs by the mass and with normal amniotic fluid, a conservative approach can be justified in the interest of fetal well-being. In this respect, all 3 fluid collections we described were greater than 65 mm at diagnosis and underwent rapid reductions in size: 1 of them completely resolved in utero, 1 resolved completely at 1 year and the last showed signs of regression soon after birth.

Urinoma formation has been frequently reported in association with impaired renal function of the ipsilateral kidney [12], which has been attributed to the pressure exerted by the urine confined within Gerota's fascia on the developing kidney [13].

Our series seems to confirm previous observations. In case 1, ipsilateral renal function was severely compromised, whereas in case 2, the kidney was no longer visu-

alized after birth. This observation could support the hypothesis of some pre-existing form of dysplasia that is predisposed to urinoma formation. In the third patient, renal function had not yet been functionally assessed, but the hyperechoic aspect of the parenchyma suggested impairment as well.

Whether or not invasive maneuvers such as in utero aspiration might contribute to preservation of any residual renal function remains unclear.

Conclusions

Fetal urinomas may be encountered in pregnancy without associated urinary tract obstruction and without visualization of the kidney, but with fluid collection being the only finding in the abdomen. Occurrence in female fetuses makes the differential diagnosis even more difficult, because obstruction of the posterior urethra cannot be called upon. In such cases, fetal MRI can be helpful in establishing the diagnosis and in counseling prospective parents.

Once the diagnosis has been made, conservative management prevents unnecessary invasive procedures that might injure the fetus, cause a complications necessitating premature delivery, and ultimately prove to be of no benefit in preventing the renal injury that already exists in these cases.

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