CASE REPORT

Ultrasound follow-up of an unusual giant urinoma in a newborn

Bruno Drera¹ · Carlo Poggiani^{1,2}

Received: 13 May 2016 / Accepted: 16 November 2016 / Published online: 16 December 2016
© Società Italiana di Ultrasonologia in Medicina e Biologia (SIUMB) 2016

Abstract Urinoma, defined as an encapsulation of urine caused by urine extravasation into the perirenal space either through rupture of a calyceal fornix or a tear in the renal parenchyma, is an uncommon finding in prenatal diagnosis and the neonatal period. Urinoma can be associated with any urinary tract obstruction, or, as reported in several published cases, related to vesicoureteral reflux, kidney dysplasia, or complication arising during amniocentesis. We report on a newborn with a perinatal urinoma, with initial slight corpusculated fluid associated with nonobstructive and nonrefluxing megaureter, and no signs of kidney dysplasia. Close sonography follow-up of the urinoma allowed complex differential diagnoses, including cystic, septated, and solid perirenal masses, due to dissimilar and peculiar ultrasound images during urinoma evolution stages.

Keywords Urinoma · Neonatal · Fetal · Megaureter · Hydronephrosis · Urinary tract obstruction

Riassunto L'urinoma, definito come una raccolta di urina dovuta a uno stravasamento nello spazio perirenale tramite rottura di un fornice caliciale o del parenchima renale, è un riscontro non comune in diagnosi prenatale ed è un'entità rara nel periodo neonatale. L'urinoma può essere associato a qualsiasi ostruzione delle vie urinarie, o, come riportato

in pochi casi della letteratura, ricondotto a un reflusso vescico-ureterale, a displasia renale o a complicazioni nell'esecuzione dell'amniocentesi. Riportiamo il caso di un neonato con un urinoma perinatale, caratterizzato inizialmente da un contenuto liquido finemente corpuscolato, associato al riscontro di megauretere bilaterale non ostruttivo e non refluyente, e senza segni di displasia renale. Il follow-up ecografico dell'urinoma ci permette di svolgere diagnosi differenziali complesse, comprendenti lesioni sia cistiche che settate sia masse solide perirenali, sulla base di immagini ecografiche peculiari delle diverse fasi di evoluzione dell'urinoma.

Abbreviations

US Ultrasound

Introduction

Urinoma, defined as an encapsulation of urine caused by urine extravasation into the perirenal space either through rupture of a calyceal fornix or a tear in the renal parenchyma, is an uncommon finding in prenatal diagnosis and in the neonatal period [1, 2]. The fluid of the urinoma can be contained within the perirenal space or can enter the peritoneal cavity through direct communication or transudation, presenting as urinary ascites [1, 2].

When urinomas arise spontaneously, the likely cause varies with the patient's age. In the neonatal period, posterior urethral valves are a common cause of urinomas, occurring in 3–15% of neonates affected by this condition. Furthermore, any urinary tract obstruction, including not only posterior urethral valves but also ureteropelvic obstruction, partial ureteral atresia, and ectopic ureterocele,

✉ Bruno Drera
b.drera@ospedale.cremona.it

¹ Neonatal Intensive Care Unit, Azienda Istituti Ospitalieri di Cremona, Viale Priori, 1-26100 Cremona, Italy

² Advanced School of Ultrasonography in Pediatrics and Neonatology, Azienda Papa Giovanni XXIII, Piazza OMS, 1-24100 Bergamo, Italy

have been correlated with urinoma formation, leading to hydronephrosis and high pressure into the collecting system [3, 4]. So far, few cases of urinoma without evidence of obstruction and related to vesicoureteral reflux, kidney dysplasia, or amniocentesis complications, have been reported [5–8].

We present the case of a newborn with a perirenal urinoma associated with nonobstructive and nonrefluxing megaureter, and its US follow-up showing peculiar sonographic changes in the first weeks of life as well as spontaneous resolution.

Case presentation

The patient was a male born from nonconsanguineous Italian parents by emergency cesarean section for fetal bradycardia. A concomitant obstetric US performed by a gynecologist disclosed a perirenal cystic mass of the right kidney not previously detected by prenatal sonography exams. At birth, the patient's Apgar score was normal and clinical evaluation was unremarkable. An abdominal US was the first exam performed within the first 24 h of life; it showed a roughly oval-shaped and encapsulated cystic collection, located anteriorly and laterally to the right kidney and containing slight corpusculated fluid (Fig. 1a, b). This subcapsular perirenal mass compressed the kidney, devoid of normal landmarks but with normal parenchyma and mild dilatation of the pelvis and calices (Fig. 1c). Both ureters were dilated (1 cm), showing kinking and coiling throughout their course, and the bladder was not thick-

walled, though slightly trabeculated, without an elongated or dilated posterior urethra (Fig. 1d). The day after, in this fluid collection several thin septa appeared, multiplying and thickening over time and with concomitant and progressive liquid reabsorption. After nearly 2 weeks, US examination indicated that it was almost a perirenal mass with a significant hyperechoic component simulating stroma (Fig. 2a). There was no demonstrable flow on color Doppler. US findings and evolution observed on sonographic follow-up were consistent with the diagnosis of urinoma, which extended to resolution at 1 month, though significant dilatation of both ureters persisted.

Voiding cystography allowed us to exclude both vesicoureteral reflux and urethral obstruction. At 1 month of age, diuretic renal scintigraphy (Tc-99 m MAG3) was performed and showed normal function of each kidney. Although scintigraphy ruled out obstructive ureteral pathology, it confirmed the presence of kinking and coiling of both dilated and elongated ureters. At 3 months of age, renal function was normal and US showed no dysplastic kidneys, although a hyperlucent precipitate was observed around the kidney (Fig. 2b).

Discussion

Differential diagnosis of perirenal and suprarenal masses covers a range of malignant and benign lesions: neuroblastoma, lymphangioma, extralobar pulmonary sequestration, congenital adrenal hyperplasia, partial multicystic dysplastic kidney, renal duplication, urinoma,

Fig. 1 Sonographic findings of the patient at birth; sector transducer. The right kidney appeared surrounded by an anechoic fluid collection with thin and rare septa **a**; the serial scans performed at different intervals showed the continuation of the anechoic mass in **b** the kidney was not visible. Scan showing the mild pelvic dilatation of the right kidney **c**. The bladder was not over distended or thickened, although a slight trabeculation was observed only on the first day of life **d**. Note the dilatation of distal ureters **d**

Fig. 2 Sonographic findings of the patient; sector transducer. After 2 weeks, multiple and thicker septa are present, forming a complex mass **a**; longitudinal scan resolution of fluid collection and presence of an hyperechoic and translucent component around the kidney **b**

gastric duplication cyst, splenic cyst, and bronchogenic cyst [9–12]. In case of cystic lesions near the kidney, the adrenal region should be carefully investigated. In fact, among neuroblastomas the complex cystic appearance is the most common, comprising 50% of cases. Furthermore, perinatal cystic neuroblastoma and adrenal hemorrhage may have a similar initial US presentation, and only the evolution of a cystic lesion into a purely solid mass accompanied by calcification and flow on color Doppler suggests the diagnosis of neuroblastoma [11]. Renal lymphangioma, a rare disorder that likely results from the developmental malformation of the lymphatic communicating vessels, typically manifests itself as unilocular or multilocular cystic structures with fine or gross septations [12].

Urinomas often are depicted as purely cystic collections with little or no internal architecture, and few urinomas with sparse linear echoes representing septations have been reported in literature. However, a case of perirenal extracapsular uro-haematoma secondary to posterior urethral valve and five neonates with multiple, marked septations of the urinoma have been described [13, 14]. In our case, US follow-up allowed us to verify the evolution of the fluid within the urinoma. In particular, we may speculate that the slight corpusculated

appearance of the fluid can be ascribed to urine sediment as well as to blood presence, and that the progressively developed septations, to a stroma-like appearance, can be attributed to proteins extravasated into the perirenal space at the time of renal parenchymal rupture. The fibrous encapsulation of urinoma should be the result of lipolysis of the perirenal fat, as the consequence of an inflammatory response triggered by the urine collection.

Renal rupture has been reported to occur at the time of birth, or in utero correlated to urinary tract obstructions leading to a “pop-off” mechanism to buffer high pressure in the upper urinary tract or correlated to a renal parenchyma fragility as the coexistence of kidney dysplasia [1–8]. In the case reported here, we were unable to identify an obvious cause of the perinatal urinoma, as we excluded the presence of proximal and distal obstructions, vesicoureteral reflux, and kidney dysplasia. Based on the persistence of significant dilatation of both ureters, we can speculate that the presence of laxity of connective tissue of the urinary tract and increased pressure acting on dilated ureters during labor led to a proximal rupture.

Close sonography follow-up of cystic urinoma in the newborn should be performed, as dissimilar and peculiar US images during mass evolution stages allow us to make complex differential diagnoses. Furthermore, US integrated with laboratory exams and other imaging workups can provide information about causes, evolution, and prognosis in the case of urinoma correlated to obstructions or parenchymal dysplasia.

Compliance with ethical standards

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Funding The authors have no financial relationships relevant to this article to disclose.

Informed consent Informed consent was obtained from all individual participants included in the study.

Conflict of interest The authors declare that they have no conflict of interest.

References

1. Gorincour G, Rypens F, Toiviainen-Salo S, Grignon A, Lambert R, Audibert F, Garel L, Fournet JC (2006) Fetal urinoma: two new cases and a review of the literature. *Ultrasound Obstet Gynecol* 28:848–852
2. Yitta S, Saadai P, Filly RA (2014) The fetal urinoma revisited. *J Ultrasound Med* 33:161–166
3. Kleppe S, Schmitt J, Geipel A, Gembruch U, Hansmann M, Bartmann P, Franke I, Heep A (2006) Impact of prenatal

- urinomas in patients with posterior urethral valves and postnatal renal function. *J Perinat Med* 34:425–428
4. Stathopoulos L, Merrot T, Chaumoitre K, Bretelle F, Michel F, Alessandrini P (2010) Prenatal urinoma related to ureteropelvic junction obstruction: poor prognosis of the affected kidney. *Urology* 76:190–194
  5. Cimador M, Castagnetti M, Rosone G, Lima M, De Grazia E (2003) A giant fetal urinoma in a neonate without detectable obstructive uropathy. *Eur J Pediatr Surg* 13:355–359
  6. Ito S, Ikeda M, Asanuma H, Shishido S, Nakai H, Honda M (2000) A giant urinoma in a neonate without obstructive uropathy. *Pediatr Nephrol* 14:831–832
  7. Zaccara A, Brizzi C, Mobili L, Nahom A, Carnevale E, Marciano A, Giorlandino C, De Gennaro M (2011) Fetal urinoma in females without obstructive uropathy. *Fetal Diagn Ther* 29:296–300
  8. Miller M, Korzets Z, Blumenfeld Y, Pomeranz M, Aviram R, Rathaus V, Pomeranz A (2003) Fetal urinoma as a sign of a dysplastic kidney. *Pediatr Nephrol* 18:65–67
  9. Maki E, Oh K, Rogers S, Sohaey R (2014) Imaging and differential diagnosis of suprarenal masses in the fetus. *J Ultrasound Med* 33:895–904
  10. Bagolan P, Bilancioni E, Nahom A, Trucchi A, Inserra A, Neri M, Spina V, Giorlandino C (2000) Prenatal diagnosis of a bronchogenic cyst in an unusual site. *Ultrasound Obstet Gynecol* 15:66–68
  11. Gali S, Anat I (2015) Purely cystic adrenal lesion in a newborn evolving into a solid neuroblastoma. *J Clin Ultrasound* 43:126–128
  12. Chaabouni A, Rebai N, Fourati M, Rekik S, Chabchoub K, Slimen MH, Bahloul A, Mhiri MN (2012) Cystic lymphangioma of the kidney: diagnosis and management. *Int J Surg Case Rep* 3:5879
  13. Merrot T, Oubejja H, Chaumoitre K, Alessandrini P (2005) Neonatal uro-haematoma secondary to posterior urethral valve. *Prog Urol* 15:63–66
  14. Feinstein KA, Fernbach SK (1987) Septated urinomas in the neonate. *AJR Am J Roentgenol* 149:997–1000