CASE REPORT

Persistent fetal lobulation of kidney mimicking renal tumour

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SUMMARY

Renal pseudotumour is a term coined to describe conditions of renal anatomic variants that simulate focal renal pathology like a tumour on ultrasonography. These include persistent fetal lobulation, hypertrophy of Bertin columns and dromedary humps. We report a case of a 30-year-old nulliparous woman who was managed in gynaecology clinic for menorrhagia and was subsequently referred to us for management of recurrent urinary tract infections. The clinical examination was normal and on ultrasound scan, she was found to have multiple enlarged heterogeneous solid masses in both kidneys with significantly increased vascularity, suspicious for neoplastic lesions. She subsequently underwent a CT urogram and her case was discussed in uro-radiology meeting where a diagnosis of persistent fetal lobulation was made excluding other diagnoses. She was managed conservatively. We also present grey scale and Doppler ultrasound and CT urogram findings of this condition along with the literature review.

BACKGROUND

Renal pseudotumours are defined as real or simulated kidney masses which resemble tumours on imaging, although they consist of benign renal tissue.¹ They fall in different categories such as developmental, infectious, granulomatous and vascular.² Persistent fetal lobulation of kidney is a rare anatomic variant and can pose pitfalls in diagnostic imaging.³ It can mimic a renal neoplasm and sometimes even diagnosed on subsequent surgery and histology as a wrong radiological diagnosis.² The classic radiological investigations including arteriography have failed to differentiate between this aberrant anatomy and tumour.¹ We report case of a young woman who was incidentally found to have multiple bilateral renal tumours on conventional greyscale and Doppler ultrasonography and later on CT urogram proved to have persistent fetal lobulation.

CASE PRESENTATION

A 30-year-old woman was referred to urology clinic by gynaecology department for evaluation of recurrent urinary tract infections (UTI). She had history of urinary frequency, urgency, fever, dysuria and suprapubic pain but denied any history of flank pain, haematuria, weight loss or tobacco use. She did not have any comorbid medical conditions and was married for past 8 years. She had history of menorrhagia and four episodes of culture-positive

UTI in the past 2 years. The prior medical and surgical history was otherwise unremarkable. On examination, the abdomen was soft, non-tender without any visceromegaly. The pelvic and genitalia examination was also unremarkable.

INVESTIGATIONS

Her basic haematological and biochemistry workup was normal. Urine culture showed growth of *Escherichia coli* and *Klebsiella* species which was treated with antibiotics. Serum creatinine was 1.1 mg/dL. Beta-human chorionic gonadotropin was normal (<2.0 mIU/mL). An ultrasound scan was done which showed multiple enlarged well-circumscribed heterogeneous solid appearing masses in both kidneys showing significantly increased vascularity on colour Doppler (figure 1). The larger one at the interpolar region of right kidney measured 36×27 mm and the one in left kidney measured 54×34 mm. These lesions were highly suspicious for neoplastic lesions. Ultrasound pelvis and bladder was unremarkable.

A CT urogram was done subsequently which showed both kidneys to be malrotated with irregular contour and persistent fetal lobulations. These lobulations showed homogenous contrast enhancement. No nephrolithiasis or obstructive uropathy was seen (figure 2). There was no suspicious mass lesion identified in either kidney to suggest neoplastic lesion. Liver, spleen, gall bladder, adrenals and major abdominal vessels were all normal. There was no evidence of any lymphadenopathy.

DIFFERENTIAL DIAGNOSIS

Differential diagnosis includes multifocal renal cell carcinoma (RCC). Renal tumours distort the cortical surface and contour of the kidney. This woman did not have any family history of cancers or history of weight loss or haematuria. Lymphomas and other metastatic disease being infiltrative lesions usually do not produce any deformity of the renal surface.⁴ She had a normal haematological profile excluding the possibility of renal lymphoma. This exclusion was also supported by negative lymph nodes on CT scan abdomen and pelvis. The other differential diagnoses include benign pseudotumours of kidney such as arteriovenous malformations and infectious processes such as multifocal bacterial nephritis. The infectious process is characterised by ill-defined, poorly marginated and wedge-shaped mass showing decreased contrast enhancement compared with normal parenchyma.⁵

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Figure 1 Greyscale and Doppler ultrasound longitudinal scans showing hypoechoic solid appearing foci mimicking mass lesions in bilateral kidneys.

OUTCOME AND FOLLOW-UP

The patient's case was discussed in uro-radiology meeting and subsequently the diagnosis was communicated to her. No further follow-up for persistent fetal lobulation was recommended. Her UTI was treated and she was educated about the lifestyle and other advice to prevent recurrent UTI and was started on low-dose suppressant antibiotic therapy with return to follow-up after 3 months with ultrasound scan and a urine culture test.

DISCUSSION

Persistent fetal lobation/lobulation is characterised by presence of fetal ranunculi (lobules) which are mistaken as tumour that is RCC or renal scar on imaging studies. They are characterised by fine, linear demarcations indenting the renal surface between

normal renal lobes and consisting of normal central pyramids and surrounding cortex.⁶ These cortical indentations overlie the space between two pyramids rather than a pyramid itself, differentiating it from cortical scarring.¹ Embryologically, the definitive kidney (metanephros) develops from repeated branching of ureteric bud and differentiation of its surrounding mesenchyme. Thus, it shows lobar development.³ Each fetal lobe/ranunculus is made up of medullary pyramid surrounded by cortex on all sides, separated by interlobar grooves and drained by single calyx.⁶ These grooves become invisible during the third trimester resulting in smooth renal surface.³

Incomplete fusion of fetal lobules may result in persistence of one or more interlobar grooves mimicking a scar tissue or renal neoplasm in adult.⁷ Aberrant development of lobar anatomy can

Figure 2 CT scan: postcontrast (venous) coronal and delayed axial images are showing same differential attenuation as that of the normal renal parenchyma confirming these to be persistent fetal lobulations.

also give rise to other tumour-like conditions of kidney such as lobar dysmorphism, hypertrophy of Bertin columns, polar hypertrophy and dromedary hump.²

Ultrasound scan is often the initial modality for kidney imaging. Besides the technical issues, radiologists can make potential errors during image interpretation due to defects and developmental variants. This can lead to inappropriate characterisation of a focus of normal renal tissue such as congenital variant as renal neoplasm on imaging.⁷ Some of the pseudotumours can be confidently diagnosed radiologically such as renal cysts and abscesses; however, in many of such cases, correct diagnosis is only apparent after pathological evaluation of nephrectomy specimen.²

Due to this diagnostic dilemma, cross-sectional imaging such as contrast enhanced CT scan or MRI is recommended which helps to avoid the need for any unnecessary surgery, further intervention and anxiety.⁸ Careful evaluation of imaging characteristics of each renal mass with background knowledge of pseudotumours should assist in proper diagnosis and appropriate patient management.⁹

Pseudotumours including persistent fetal lobulation are characterised by uniformity of vascular distribution with

the surrounding parenchyma.⁸ A pseudotumour remains isodense/intense to normal parenchyma in all phases of enhancement,^{8 10} while true tumours will show differential enhancement in at least one phase. Radiological confirmation of persistent fetal lobulation of kidney can be made by documenting the presence of renal pyramid in the bulge bounded by septa of Bertin on either side.¹¹

Contrast enhanced ultrasound (CEUS) is the imaging modality comprising the use of sonography along with ultrasound contrast agents.¹² It uses microbubbles to overcome the pitfalls associated with conventional ultrasound to characterise renal masses by differentiating between the anatomic variation and renal lesion. It is a real-time imaging that is cost-effective and avoids potentially nephrotoxic agents and ionising radiation.¹² Mazziotti *et al*¹³ assessed the accuracy of CEUS for characterisation of suspected renal pseudotumour in 24 patients in which conventional and power Doppler ultrasound failed to confidently exclude a neoplasm and found CEUS diagnosis to show complete concordance with CT and MRI. This therefore represents a credible alternative and obviating the need for expensive and invasive procedures such as CT and MRI.¹³ We did not use microbubbles as a contrast agent due to non-approval in our country and institution.

Learning points

- ▶ Renal pseudotumours include some of uncommon anatomic variations that mimic focal renal lesion on ultrasonography.
- ▶ Persistent fetal lobulation is a rare developmental variant characterised by fine linear demarcations indenting renal surface and are comprised of a central pyramid with surrounding cortex.
- ▶ Radiologist can make potential errors during image interpretation of persistent fetal lobulation especially on conventional and power Doppler ultrasound scan.
- ▶ To reach a secure diagnosis, a cross-sectional imaging such as CT or MRI should be done. Contrast enhanced ultrasound, where available, can be a credible alternative to this imaging.

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Reminder of important clinical lesson

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