

Incidental finding of a rare anomaly: Bilateral maternal pelvic kidneys

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Abstract

Pelvic kidney occurs when kidney fails to migrate above the pelvic brim during embryologic development. Bilateral pelvic kidneys are rare. We present a 31-year-old multigravida [G4 P3⁺⁰] female, who presented for routine early obstetric scan which revealed non-fused kidneys located postero-lateral to the fundus of the gravid uterus and anterior to the sacrum. Pelvic kidneys are largely asymptomatic; and this was the case in our patient who had three previous uneventful pregnancies and vaginal deliveries without diagnosis of bilateral pelvic kidneys.

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Key words: Pelvic kidneys; gravid uterus; multigravida.

Conflict of interest: The authors declare no conflict of interest.

Availability of data and materials: All data underlying the findings are fully available.

Ethics approval and consent to participate: No ethical committee approval was required for this case report by the Department, because this article does not contain any studies with human participants or animals. Informed consent was obtained from the patient included in this study.

Consent for publication: The patient gave her written consent to use her personal data for the publication of this case report and any accompanying images.

Received for publication: 16 June 2022.

Revision received: 4 July 2022.

Accepted for publication: 4 July 2022.

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Annals of Clinical and Biomedical Research 2022; 3:221

doi:10.4081/acbr.2022.221

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Introduction

Pelvic kidneys are rare, with an incidence of 1:2100-3000 autopsies.¹ Bilateral pelvic kidneys are even rarer and have been reported only a few times in literature.²⁻⁴ The kidneys, initially formed in the pelvis during foetal life, eventually ascend cranially into the abdomen, passing through the arterial forks of the foetal umbilical arteries. Occasionally, one or both kidneys may fail to ascend and remain in the pelvis as a pelvic kidney.⁵

Pelvic kidneys are largely asymptomatic unless when complicated by infection, obstruction and calculus, causing non-specific abdominal pain. However, when they coexist with pregnancy, their anomalous locations in the maternal pelvis could present unique obstetric challenges.² This report aims at reviewing available literature regarding pelvic kidneys in pregnancy and its possible complications.

Case Report

A 31-year-old multigravida [G4 P3⁺⁰] female, who at a gestational age of 8 weeks was referred to the radiology department for a routine first trimester ultrasound scan.

The obstetric ultrasound exam confirmed a viable 10 weeks + 5 days old intrauterine foetal pole. Abdominal ultrasound revealed empty renal beds (Figure 1). A dedicated search located non-fused reniform structures postero-lateral to the fundus of the gravid Uterus (UT in figure 2) and anterior to the sacrum.

The Right Kidney hilum (RK) faced medially while the Left Kidney hilum (LK) faced posteriorly (Figure 3). Colour Doppler highlighted the renal vessels. The right kidney was orientated longitudinal para-sagittal and to the right of the uterus and measured 9.4cm x 4.8cm, while the left kidney laid oblique, left para-median, and measured 9.3cm x 3.8cm. No caliectasis or calculus was seen. Renal sino-parenchymal differentiation was normal. 'Normal sino-parenchymal differentiation' is an ultrasound term used to state that at least sonologically, the kidneys are unremarkable and normal in appearance. There was no evidence of renal disease in the index patient. Routine antenatal urinalysis was unremarkable. Serum Electrolytes, Urea and Creatinine (SEUCr) were never done for this patient as it is not part of the routine antenatal investigations and in addition, there was no adverse event that necessitated its request by the managing obstetrician prior to presentation to the ultrasound unit.

The rest of the abdominopelvic organs were unremarkable. The patient had no idea she had this anomaly and reported that all previous pregnancies were uneventful and delivered *per vaginam*. Review of her medical records confirmed that there was no history of pelvic pain, dysuria or hypertension in previous confinements. Obstetric ultrasound reports from her three previous confinements did not detect the anomaly. Her blood pressure at the initial visit (at 8 weeks) was 125/70mmHg.

Discussion

During embryologic development, the kidney forms at the level of the iliac arteries but ascends to retroperitoneal position at lumbar region.⁵ In so doing, its blood is resupplied by new sprouts from the aorta and any interruption of this ascent leads to ectopic location of the kidney.⁵

Pelvic kidneys are largely asymptomatic and discovered incidentally.^{6,7} This was the case in our patient who had three previous

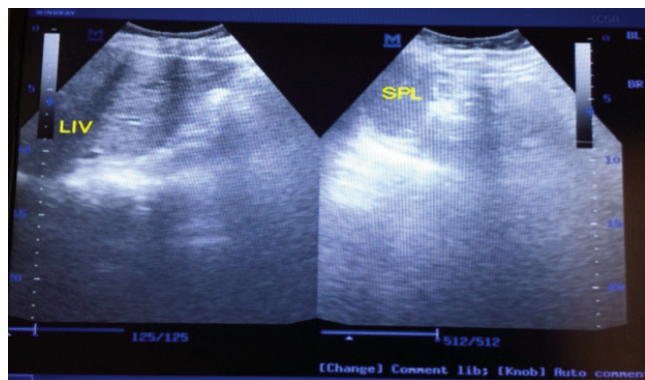


Figure 1. Right and left upper quadrant abdominal ultrasound showing the liver and spleen with empty renal beds.



Figure 2. Transabdominal transverse sonogram showing right and left kidneys posterior-lateral to the fundus of the gravid uterus.

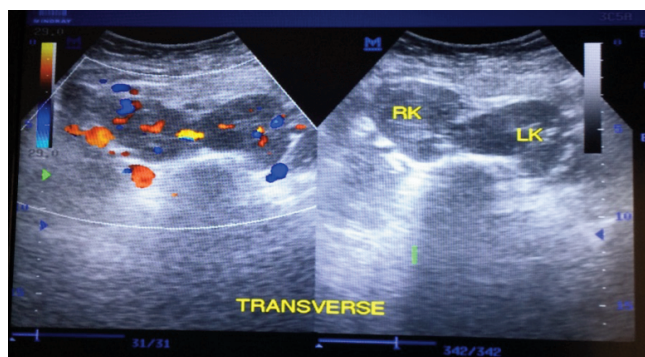


Figure 3. Transabdominal transverse sonograms show right renal hilum faced medially while the left renal hilum faced posteriorly, and colour Doppler highlighting the renal vessels.

uneventful pregnancies, three vaginal deliveries and had a diagnosis of bilateral pelvic kidneys in her 4th confinement.

Maternal pelvic renal hydronephrosis of mechanical aetiology is a rarity, supported by the fact that literature on its occurrence is rather scant.^{8,9} It is postulated that as the ureter of a pelvic kidney does not cross the pelvic brim, it is not prone to obstruction.⁸ However, when hydronephrosis does occur, it presents obstetric challenges from urine stasis resulting in urinary tract infection and formation of renal calculi.⁶ Another well-documented complication is tumour praevia, in which the pelvic kidneys cause narrowing of the birth canal resulting in fetal dystocia. There is also the danger of transient or permanent damage to the kidney during labour as the foetus negotiates the narrowed birth canal.⁴ The commonest causes of 'tumour praevia' in labour include leiomyomata¹⁰ and ovarian masses.¹¹ To the best of our knowledge, so far, only three cases of pelvic kidneys presenting as tumour praevia have been reported in literature.^{6,12,13} The index patient escaped this complication probably due to the cephalad location of the kidneys posterior to the uterine fundus. Pelvic kidneys could also cause symptoms related to pressure effect on nerves and blood vessels leading to abdominal pain, backaches and lower limb oedema.¹⁴

Pelvic kidneys are not usually associated with hypertension.⁶ However, in kidneys with long and narrow accessory renal arteries, there may be hypotension causing renin secretion which then leads to hypertension.² In obstetric procedures such as a Caesarean section, inadvertent injury to a pelvic kidney could occur, with dire consequences.⁶ Hence the role of the radiologist is crucial, in picking up anomalies such as pelvic kidneys as early as possible in order to inform the managing obstetrician. A hydronephrotic or calculus-laden pelvic kidney may be the cause of an acute abdomen in pregnancy.⁸ Detection of and serial ultrasound grading of hydronephrosis can be instituted early and in cases where conservative management fails, the radiologist could perform a retrograde pyelogram and assist with the placement of a ureteric stent to relieve the obstruction in symptomatic hydronephrosis.

During fluoroscopy, one has to abide by the As Low As Reasonably Achievable (ALARA) principle by employing low dose with collimation and covering the gravid abdomen with a lead gown.⁸ If the location of the pelvic kidney is not problematic, percutaneous nephrostomy is a preferred option and there will be reduced analgesic requirements and patients experience fewer episodes of lower urinary tract symptoms.¹⁵ To prognosticate on the possibility of a pelvic kidney causing tumour praevia in pelvic kidneys which are located caudal to the foetal head, a transvaginal ultrasound (B-Mode & 3D sonography) could be done, clearly depicting the relationship between the foetal vertex, pubis, pelvic walls and the pelvic kidney. If the distance between the most anterior edge of the kidney and the posterior surface of the pubis symphysis is shorter than the foetal Biparietal Diameter (BPD), the sonologist should strongly recommend an elective caesarean section.⁶

Conclusions

The accurate sonographic evaluation of the index case and promptly notifying the managing obstetricians of the presence of bilateral pelvic kidneys will help make informed follow up decisions and institute appropriate interventions when required.

This report is also a call to sonologists and sonographers to institute and follow ultrasound protocols to reduce the risk of missed diagnoses.

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