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## CASE REPORT

### Calyceal Diverticulum Mimicking Simple Parapelvic Cyst: a Case Report

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**C**ALYCEAL diverticulum is a cystic intrarenal cavity lined by nonsecretory transitional epithelium that communicates with the collecting system via a narrow isthmus or infundibulum. It is a rare anatomic anomaly with an incidence of 0.2% to 0.6% in the patients undergoing renal imaging.<sup>1</sup> Single imaging modality usually cannot differentiate calyceal diverticulum from other cystic renal diseases.<sup>2</sup> Here, we report a 60-year-old male who was reliably diagnosed with calyceal diverticulum by retrograde urography combined with non-enhanced computed tomography (CT) and magnetic resonance urography (MRU).

#### CASE DESCRIPTION

A 60-year-old male was diagnosed with a 1.0-cm single cyst in the right kidney by ultrasonography in 1996. In 2011, ultrasound scan revealed multiple cystic lesions in both kidneys. Two cysts in the left kidney were measured 10.1 cm×8.1 cm and 7.3 cm×6.1 cm respectively in size, and two in the right kidney measured 6.1 cm×4.8 cm and

2.2 cm×1.9 cm. A diagnosis of simple parapelvic cysts had been made, and the patient was routinely followed up without symptoms.

The patient complained of a waist pain on March 23rd, 2012. Abdominal CT showed multiple low-density cysts in the kidneys. A well-defined cystic lesion was located in the middle and lower poles of the left kidney with a hairline thin wall, and did not contain septa, calcifications, or solid components within the cystic structure (Fig. 1). Following administration of intravenous contrast, the fluid attenuation of the cyst was similar to that of the right kidney (Fig. 1). Plain abdominal radiography of the kidney, ureter, and bladder (KUB) and intravenous urography (IVU) were performed. IVU revealed no seprum and no enhancement within the cystic lesions (Fig. 2).

The initial diagnosis was simple parapelvic cysts. The cyst unroofing was carried out to relieve waist pain. The patient underwent retrograde urography of the left urinary collecting system to further delineate the size, location, and position of the lesion preoperatively. Delayed imaging demonstrated opacification of the original cystic lesion in the left kidney with a similar density to that of the collecting system (Fig. 3), which was inconsistent with the diagnosis of parapelvic cyst. Subsequently, an abdominal nonenhanced-CT scan performed in 30 minutes after retrograde contrast injection, showed there was infilling of the lesion located in

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the middle pole of the left kidney, while other cystic lesions were still low-density (Fig. 4), indicating the presence of a calyceal diverticulum. MRU was performed to exclude the diagnosis of calyceal diverticula (Fig. 5). On the MRU image a cystic area of long T1, long T2 signal

communicating with the collecting system via a narrow infundibulum was seen on the inner back of the left pelvis. Finally, the diagnosis of calyceal diverticulum combined with hydronephrosis in the left kidney and renal cysts in the both kidneys was made.

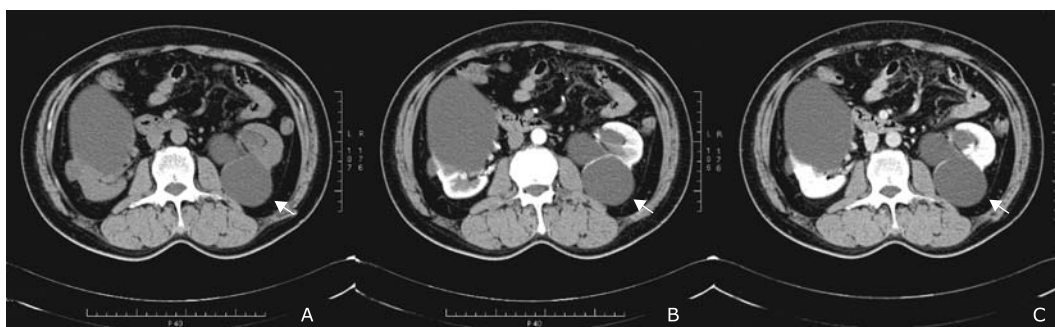


**Figure 1.** Computed tomography (CT) scan shows a well-defined cystic lesion with its lateral margin protruding from the surface of the renal parenchyma (arrows).

A well-defined cystic lesion can be seen on non-enhanced CT scan (A), without enhancement during arterial phase (B), and parenchymal phase (C) of enhanced-CT scan.



**Figure 2.** At 30 minutes after contrast injection, all lesions are well visualized on intravenous urography image with no internal septations and enhancement.



**Figure 3.** Retrograde urography of the left urinary collecting system.

The 5-minutes delayed imaging demonstrates opacification of the original cystic lesion in the left kidney with a similar density to that of the collecting system (arrow).



**Figure 4.** Non-enhanced CT scan performed 30 minutes after retrograde contrast injection.

The infilling of the lesion indicates the presence of a calyceal diverticulum located in the middle pole of the left kidney (arrow).

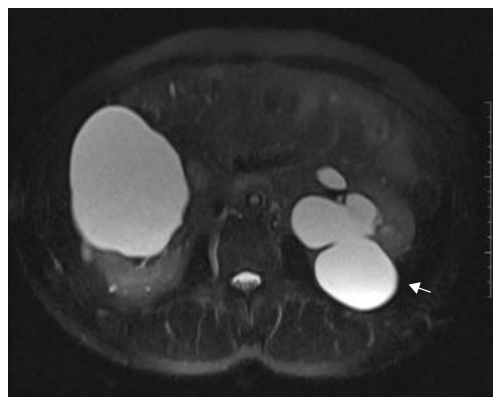


**Figure 5.** Magnetic resonance urography demonstrates a cystic area of long T1, long T2 signal communicating with the collecting system via a narrow infundibulum on the inner back of the left pelvis (arrow).

The patient received the non-surgical treatment. During two-year follow-up, his ipsilateral flank pain has not been aggravating and calyceal diverticulum has not enlarged.

## DISCUSSION

It is challenging to precisely diagnose calyceal diverticulum with imaging examinations. Calyceal diverticulum can be mistaken for simple parapelvic cyst on ultrasonography and CT images.<sup>2</sup> Diverticulum lined by nonsecretory transitional epithelium and/or with narrow diverticular neck cannot become apparent with enhanced CT scan or urography immediately.<sup>3</sup> But diverticulum usually opacifies later than the pelvicaliceal system on enhanced CT scan, because it is filled by retrograde reflux *via* diverticular neck. In addition, diverticulum may also be demonstrated as prolonged opacification, as contrast flows slowly out of diverticulum *via* thin neck. Previous reports have suggested that delayed enhanced CT scan can visualize calyceal diverticulum effectively, while the definite time of delayed imaging that detects diverticulum to best effect is still inconclusive.<sup>4, 5</sup>

Intestinal contents and renal function would affect the delineation of calyceal diverticulum on IVU images, while retrograde urography allows greater distension of the collecting system as compared with IVU. In our opinion, retrograde urography has a higher success rate in demonstrating diverticular neck and its communication with the renal collecting system, which is essential for differentiating calyceal diverticulum from simple parapelvic cyst.<sup>6</sup> Non-enhanced CT scan performed after retrograde urography is helpful in evaluating not only the relationship between the diverticulum and its adjacent tissues, but also the thickness of renal parenchyma outside of the diverticulum, both which provide the valuable information to plan the appropriate surgical procedure. At the same time, it avoids the harm to patients caused by frequent contrast agent injections and ionising radiation exposure. In our experience, retrograde urography combined with non-enhanced CT scan is necessary to accurately diagnose highly suspected calyceal diverticulum in the cases in which initial enhanced CT scan results are negative.

Although the role of conventional radiographic techniques such as delayed enhanced CT and retrograde urography in the diagnosis of calyceal diverticulum is well established, MRU could offer an alternative to patients

who do not desire contrast exposure or those with renal function insufficiency.<sup>7</sup> Furthermore, coronal and sagittal reformatted images provide valuable anatomical information and delineate the location of calyceal diverticulum and its relationship with the collecting system accurately.<sup>5</sup> In our case, a narrow infundibulum *via* which the diverticulum communicates with the collecting system can be identified accurately.

In conclusion, CT scan and urography are essential to definitively diagnose calyceal diverticulum when ultrasonographic findings suggest the presence of growing renal cystic lesions. In addition, a combination of retrograde urography with non-enhanced CT scan might be necessary in that it not only shows the appearance of calyceal diverticulum and its neck clearly, but also reduces the dose of contrast agents and X-rays. Moreover, for cases who do not willing to be exposed to ionising radiation or have the renal insufficiency, MRU will be commended.

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