CLINICAL CASE - TEST YOURSELF Genitourinary Imaging

Uncommon incidental imaging finding in patient with chronic kidney disease and flank pain

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PART A

57-year-old male with diabetes mellitus type 2, systemic hypertension, chronic kidney disease, multiple renal calculi, receiving biweekly dialysis for 3 years had presented with left flank pain. On examination he had tenderness in left lumbar region. Total leukocyte count and creatinine levels were raised measuring 12.2 x 109 /L (Normal range: 4.5 to 11.0 × 109/L).) and 7.35mg/dL (Normal reference 0.7 to 1.3 mg/dL) respectively. Urine culture revealed >103 colony forming units (c.f.u /ml) of Escherichia coli. Abdominal ultrasound revealed diffuse echogenicity in left lumbar region with non-visualization of left kidney and adjacent perinephric space. Non contrast CT imaging was done and later patient underwent percutaneous catheter drainage from left kidney.

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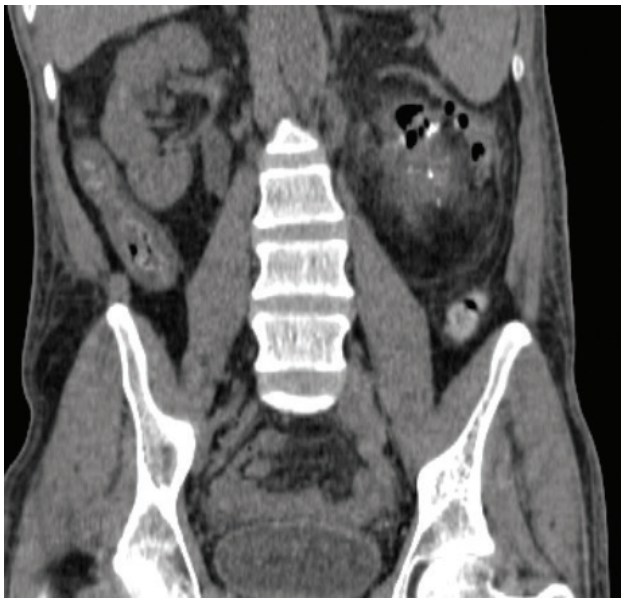


Fig. 1 *Coronal non contrast CT image.*

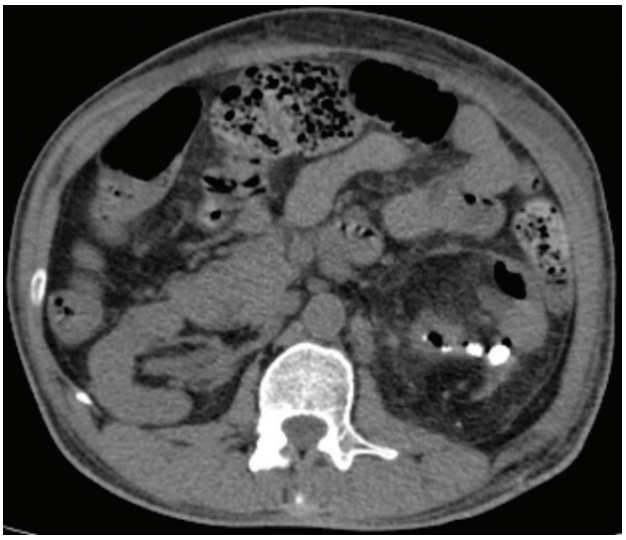


Fig. 2 *Axial non contrast CT through the level of bilateral kidneys.*

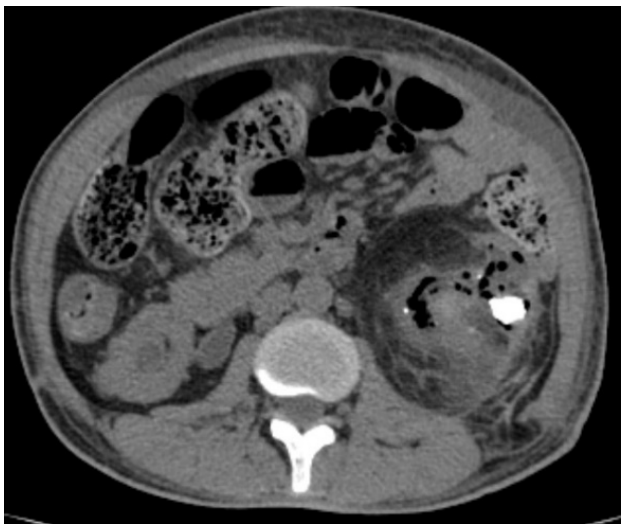
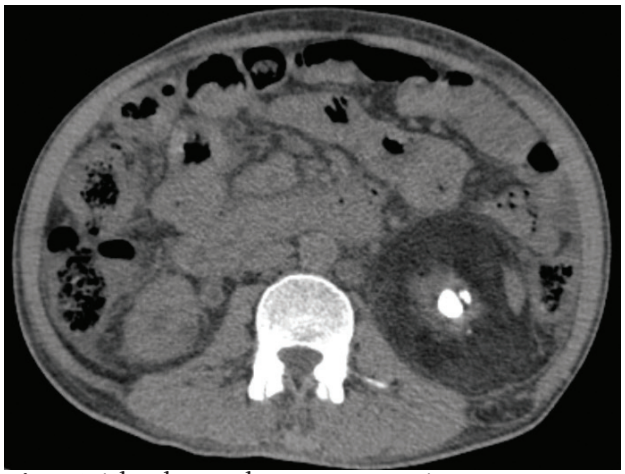


Fig. 3 *Axial non contrast CT image.*

Fig. 4 *Axial non contrast CT image.*



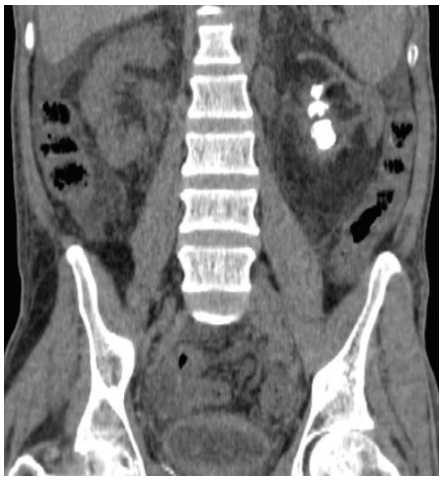


Fig. 5 *Axial and coronal non contrast CT image.*

PART B

Diagnosis: Left Renal replacement lipomatosis coexistent with emphysematous pyelonephritis.

Non contrast computed tomography (CT) of abdomen showed multiple calculi within renal pelvis of left kidney largest measuring 30 x 20mm. Ill-defined collections with multiple air pockets were noted in the left renal pelvicalyceal system and left ureter in keeping with emphysematous pyelonephritis. There was significant left perinephric and periureteric fat stranding and thickening of left renal fascia. The left renal cortex was atrophic and there was fatty replacement of renal sinus, renal parenchyma and perinephric space consistent with renal replacement lipomatosis. Figures 1-4 show representative images. In view of emphysematous pyelonephritis, patient underwent percutaneous catheter drainage and pus was drained from left pelvicalyceal system which revealed $>10^3$ colony forming units (c.f.u /ml) of Escherichia coli in culture. He was started on intravenous antibiotics. He was offered simple left nephrectomy for which he did not consent. Follow up non contrast CT of abdomen after 3 months showed interval resolution of emphysematous pyelonephritis with persistent renal calculi and renal replacement lipomatosis (Figure 5 A and B).

Renal replacement lipomatosis (RRL) is a severe form of renal sinus lipomatosis resulting in adipocytic infiltration into renal parenchyma and perinephric space. It occurs due to prolonged inflammation or hydronephrosis secondary to renal calculi or infection resulting in atrophy of renal parenchyma [1]. RRL occurs unilaterally, but reports have also shown RRL bilaterally and in transplanted kidneys [2]. In imaging, renal calculi can be demonstrated through abdominal radiograph. Ultrasound shows hyperechoic mass in the renal sinus with associated renal calculi and atrophied echogenic kidneys. Computed tomography reveals profound renal parenchymal atrophy, fatty infiltration of renal sinus and perinephric space, and calculi. Intravenous pyelogram reveals non-functional or poor-functional kidneys. Heavily T2 weighted MRI sequences like HASTE (Half Fourier Single-shot Turbo spin-Echo) which are unaffected by respiratory motion artifact reveals obstructed pelvicalyceal system and differentiates calculus due to its fluid sensitivity. Excretory function of kidneys can be assessed through post contrast VIBE (Volumetric interpolated breath-hold examination) sequence. Fat-suppression sequences in MRI identifies fat containing lesions within renal sinus and parenchyma [3].

RRL needs to be differentiated from fat containing lesions like angiomyolipoma, lipoma and liposarcoma. RRL is located within the renal sinus and may extended into the atrophied renal parenchyma. It does not exert mass effect on pelvicalyceal system. There would be additional features like calculi, hydronephrosis or pyelonephritis. Fat containing neoplasms may arise from renal parenchyma or extrarenal location and can cause mass effect or invasion on adjacent structures. Renal liposarcoma has fat and soft tissue component and shows heterogenous enhancement with thick septations or nodules. It is located peripherally within renal fascia or renal capsule and cause mass effect on renal cortex without invasion into renal parenchyma. Renal lipomas are smaller and usually arise from adipocyte cells within renal capsule [4].

Emphysematous pyelonephritis is life threatening severe infection of renal parenchyma leading to necrosis and presence of air within pelvicalyceal system, parenchyma and perinephric region. It is usually caused by gram negative anaerobic organisms like Escherichia coli, Klebsiella pneumonia and Proteus mirabilis [5].

Xanthogranulomatous pyelonephritis (XGP) should be differentiated from renal replacement lipomatosis and emphysematous pyelonephritis. It also occurs in the presence of chronic renal disease or renal calculi or urosepsis. There is enlargement of the affected kidney with dilated calyxes and several hypoattenuated areas giving an appearance of 'bear paw' in cross sectional CT imaging [6]. CT imaging do not show fat density lesion within the renal parenchyma or renal pelvis in XGP while RRL shows fat density lesion replacing the renal parenchyma and perinephric region. Histopathological examination shows lipid laden macrophages within the renal parenchyma in XGP while adipose tissue and renal parenchyma are separately

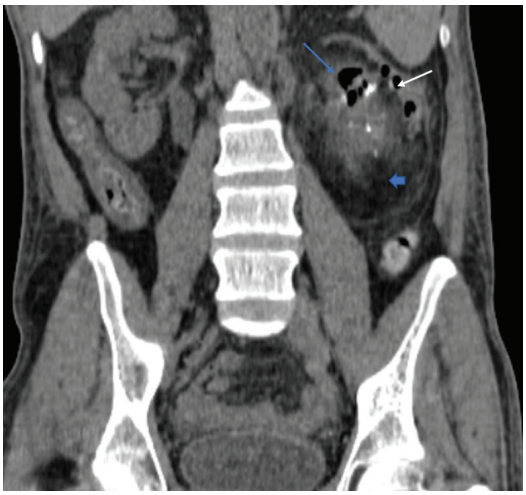


Fig. 1. *Coronal non contrast CT image shows atrophied left renal parenchyma (white arrow), presence of air (blue arrow) within the left renal pelvicalyceal system and fatty proliferation within left renal sinus and perinephric space (blue blocked arrow).*

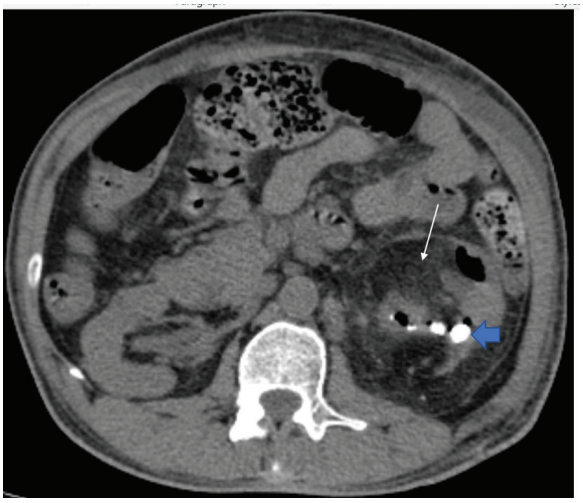


Fig. 2. *Axial non contrast CT through the level of bilateral kidneys shows fatty infiltration into the left renal pelvis and renal parenchyma (white arrow). Multiple calculi are noted in the left renal pelvis and adjacent calyces (blue block arrow).*

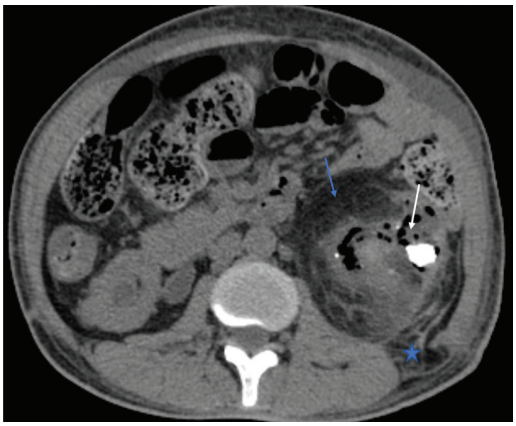


Fig. 3. *Axial non contrast CT image shows multiple collections with air foci and large calculus within left renal pelvicalyceal system (white arrow). Fatty replacement of renal pelvis (blue arrow) and extension into posterolateral abdominal wall (blue star).*

Fig. 4. *Axial non contrast CT image shows that fatty infiltration in left perinephric space (blue arrow) and air within the left upper ureter (white arrow).*

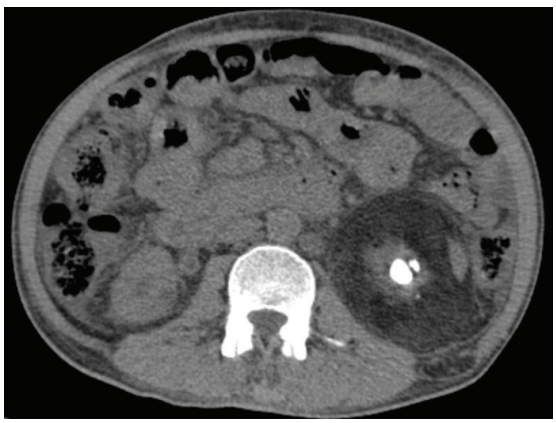


Fig. 5A and B. *Axial and coronal non contrast CT image taken after 3 months shows interval resolution of left emphysematous pyelonephritis. Multiple calculi within left renal pelvis, atrophied renal parenchyma with fatty infiltration are demonstrated.*

seen in RRL [7].

The management of RRL in non-functional kidney is nephrectomy. Emphysematous pyelonephritis needs to be diagnosed early, swiftly treated with broad spectrum antibiotic regimen against gram negative anaerobes and undergo percutaneous catheter drainage or double-J stenting to reduce the mortality and conserve the renal function. Nephrectomy is done in poor or non-functional kidneys.

To conclude, renal replacement lipomatosis can be confused with fatty neoplasm of kidney and this case could acquaint radiologists and clinicians of renal pseudotumor and differentiate renal replacement lipomatosis from other neoplasms preoperatively. **R**

Conflict of interest

None declared

Ethical consideration

Written informed consent was taken from the patient for inclusion and publication of study. The patient was informed that the identity of the patient would be anonymized.

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KEY WORDS

Pseudotumor; Lipomatosis; pyelonephritis; chronic renal insufficiency; renal calculi Languageen

REFERENCES

1. Shekar P A, Patel H, Shivakumar KS. Renal Replacement Lipomatosis—A Rare but Often Underdiagnosed Cause of Progressive Renal Damage in Calculus Disease. Urology. 2020 Jul 1;141:35–6.
2. Apicella L, Vallone G, Vitale S, Garofalo G, Russo L, Gallo R, et al. Renal Sinus Lipomatosis in Transplanted Kidneys: An Unusual Clinical Case. Case Rep Transplant. 2011;2011:161759.
3. Fitzgerald E, Melamed J, Taneja SS, Rosenkrantz AB. MRI appearance of massive renal replacement lipomatosis in the absence of renal calculus disease. Br J Radiol. 2011 Feb;84:041–4.
4. Collins K, Brocken E, Warmke LM, Tirkes T, Hwang M. Renal Replacement Lipomatosis Presenting in the Setting of Ureteral Stricture with Absence of Renal Calculus Disease. Case Reports in Pathology. 2021 Oct 23;2021:3640167.
5. Sokhal AK, Kumar M, Purkait B, Jhanwar A, Singh K, Bansal A, et al. Emphysematous pyelonephritis: Changing trend of clinical spectrum, pathogenesis, management and outcome. Turk J Urol. 2017 Jun;43:202–9.
6. Lee JH, Kim SS, Kim DS. Xanthogranulomatous Pyelonephritis: "Bear's Paw Sign." Journal of the Belgian Society of Radiology. 2019 May 13;103:31.
7. Rao M, Choudhary GR, Yadav T, Nalwa A. Renal replacement lipomatosis: A relatively uncommon and underreported entity. Indian Journal of Pathology and Microbiology. 2020 Feb 1;63:59.

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