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Milk of Calcium in Pelvicalyceal System of Kidneys Mimicking Contrast in Pelvicalyceal System – A Case Report

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Abstract: Milk of calcium of the kidneys and nephrolithiasis are two different entities. Milk of calcium in the pelvicalyceal system can mimic calculus and contrast in the pelvicalyceal system if bilateral. Their differentiation is important as their management differs. It can be seen in the urinary tract, in the GIT, bronchogenic cyst and adrenal cyst. The usual feature of milk of calcium is low calcium density in relation to apparent size, fuzzy, indistinct margins of calcifications, unusually large size of calcification, nearly circular shape of calcification and movement with gravity, atypical location of calcium density in relation to kidney. Milk of calcium primarily consists of small crystals of calcium carbonate. However, calcium oxalate, calcium phosphate, calcium hydroxyapatite and ammonium phosphate can also contribute to milk of calcium. We report a case of 25-year-old male patient whose computed tomography (CT) of abdomen showed hyperdensities within calyces of both kidneys extending into bilateral renal pelvis and left upper ureter mimicking contrast in pelvicalyceal system.
Keywords: Milk of calcium, calcium microliths, calcium carbonate, pelvicalyceal system

INTRODUCTION

Milk of calcium is a colloidal viscus suspension of precipitated calcium salts, calcium carbonate, phosphate, oxalate or a mixture of these compounds. It can be seen in the urinary tract (calyceal diverticula, pyelogenic cysts, ureteroceles and in collecting system of long standing hydronephrosis), in the GIT (gall bladder, duplication cyst), bronchogenic cyst and adrenal cyst. Etiology of milk of calcium is unclear. Obstruction, stagnation and infection are usual significant contributing factors. The supersaturation of calcium salts occurs due to obstruction and stagnation of urine with the resultant development of calcium microliths. These microliths do not increase in size and do not form calculus. The reasons are unknown. Disruption in the stone forming and inhibiting factors are usually responsible for the stoppage of accumulation of the calcium microliths. Rarely, it is seen in urethral diverticula, Mullerian duct cysts. Gravity and long term physical immobility (patients with chronic debilitating illness and spinal cord injury) contribute to development of milk of calcium [1].

CASE REPORT

A 25-year-old male patient was referred for computed tomography (CT) scan of the abdomen for persistent pain in right iliac fossa. His Ultrasound abdomen was normal. A plain CT scan of the abdomen showed hypertensives within calyces of both kidneys extending into bilateral renal pelvis and left upper ureter (CT density 70-180 HU) (Figures 1-3). No hydronephrosis and hydroureter was noted on either side. Rest of renal parenchyma appeared normal with normal sized bilateral kidneys showing smooth outlines. Perinephric and pararenal fat spaces on either side appeared normal. Urinary bladder was normal. There was no previous history of intravenous injection of contrast. His hemoglobin, hematocrit, platelet count, serum sodium, serum phosphorus, serum chloride, blood urea nitrogen (BUN), serum creatinine, total proteins, serum calcium, ALP, Alanine aminotransferase, Aspartate aminotransferase were normal.

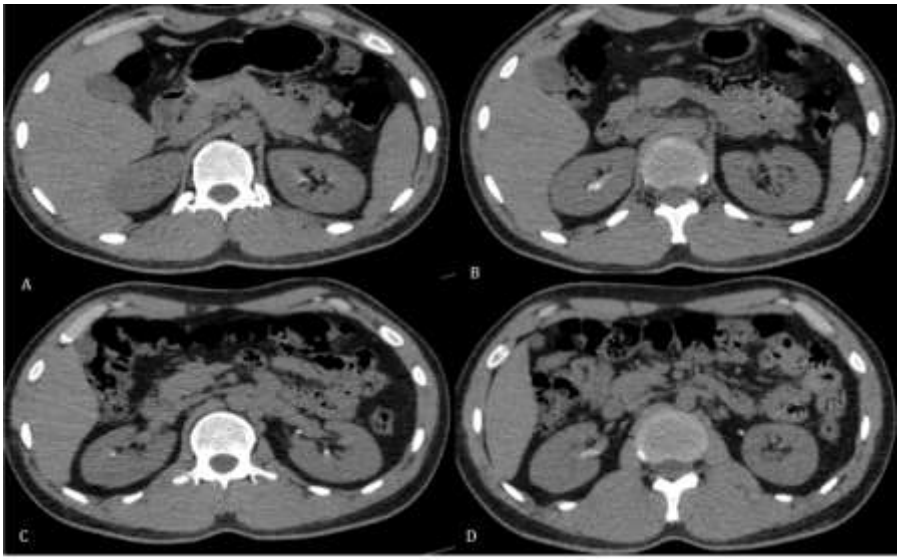

Fig-1(A-D): Serial axial non-contrast CT scan of abdomen showing hyperdensities in calyces of bilateral kidneys extending into renal pelvis.

Fig-2(A-C): Coronal reformatted non-contrast CT scan of abdomen showing hyperdensities in calyces of bilateral kidneys extending into renal pelvis.

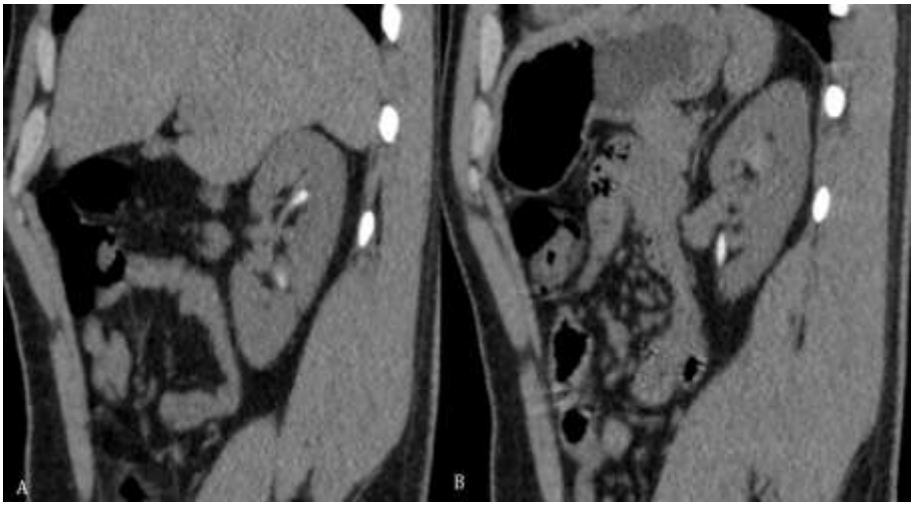

Fig-3(A, B): Sagittal reformatted non-contrast CT scan of abdomen showing hyperdensities in calyces of right kidney (A) and hyperdensity in left upper ureter (B).

DISCUSSION

The usual feature of milk of calcium is low calcium density in relation to apparent size, fuzzy, indistinct margins of calcifications, unusually large size of calcification, nearly circular shape of calcification and movement with gravity, atypical location of calcium density in relation to kidney [2].

Layering of calcification in upright decubitus or cross table views on a radiograph and the layering of calcific material in dependent portions of the cyst or

pelvicalyceal system on plain Computed Tomography is diagnostic. Ultrasound can demonstrate layers of calcific material with gravity. These techniques are essential to differentiate milk of calcium from renal calculi. Computed tomography scan demonstrates layering of calcific material in dependent portions of the cyst. Careful scanning with thin sections and without contrast is often needed. Ultrasound is more effective than plain radiography and computed tomography in detecting milk of calcium in small renal cyst. However, ultrasound is ineffective when the milk of calcium is suspended evenly in the cystic fluid and does not layer or when the calcified cyst wall completely obscures the contents of the cyst. Presence of reverberation echoes of suspended particles within a cyst or pelvicalyceal system gives a clue to its diagnosis. Presence of echogenic material causing acoustic shadowing, forming a distinct level in the dependent portion of the cyst is diagnostic of milk of calcium on ultrasound. However, small amounts of milk of calcium cause reverberation echoes and cast minimal or no acoustic shadows. Milk of calcium primarily consists of small crystals of calcium carbonate. However, calcium oxalate, calcium phosphate, calcium hydroxyapatite and ammonium phosphate can also contribute to milk of calcium [3].

Differential diagnosis of milk of calcium is 1. Renal calculus – they are round in profile, echo reflective and cause acoustic shadowing. No cysts or layering of calcification detected. 2. Cyst with focal calcifications in the wall – as calcification is fixed to the cyst wall it does not move to the dependent portion of the cyst with change in patient position. 3. Calcified or prominent interlobar or arcuate artery- it can be traced to other part of the artery; a tram track appearance is observed in real time imaging along long axis of artery. 4. Angiomyolipoma – small angiomyolipoma appear highly echogenic without casting any acoustic shadow with no layering [3].

The natural history of milk of calcium is not well known due to paucity of follow up information. Usually they are asymptomatic and hence observation with close surveillance should be usually considered. The main indication for surgical intervention for milk of calcium includes pain, hematuria, infection and local progressive renal damage. Extracorporeal shock wave lithotripsy is not an effective choice for Milk of calcium as no additional fragmentation is achieved. Proper treatment of milk of calcium in symptomatic patients requires several factors like details of renal anatomy, associated hydronephrosis, and presence of complex collecting system, PUJ obstruction, length and width of infundibular neck, infundibulopelvic angle, and horseshoe kidney apart from associated clinical conditions such as age, body habitus, obesity, coagulopathy, hypertension and renal functions [1].

Commonly performed procedures include percutaneous nephrostolithotomy and ureterorenoscopy. Due to the advent of newer endoscopic and percutaneous equipment, evacuation of milk of calcium by open surgeries like nephrolithotomy, pyelolithotomy, nephrostomy with closure of infundibular connection to collecting system, marsupialization with or without fulguration, total or partial nephrectomy are usually not performed. Recently laparoscopic unroofing, fulguration of diverticula and the placement of perinephric fat inside the cavity have been introduced. Regardless of surgical modality chosen, the aim is to eradicate the milk of calcium, preserve renal function, render the patient free of symptoms and prevent recurrence [3].

ESWL is unwarranted as it can crack solid calcium and not liquid material like milk of calcium. Percutaneous endourological marsupialization is the preferred method of treatment in case when milk of calcium causes hydronephrosis. Irrigation of milk of calcium with the irrigation solution after the introduction of urethral catheter or a flexible ureterostomy is also recommended [4].

In our patient the milk of calcium in the pelvicalyceal system in both kidneys was an incidental finding. It can mimic calculus and contrast in the pelvicalyceal system if bilateral [5].

CONCLUSION

Milk of calcium of the kidneys and nephrolithiasis are two different entities. Their differentiation is important as their management differs. Recognition of milk of calcium is important to avoid unnecessary procedures like ESWL and PCNL. This case has been presented to increase the awareness and attention for milk of calcium in the pelvicalyceal system as it can mimic calculus and can mimic contrast in the pelvicalyceal system if bilateral.

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