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Case Report

Matrix calculus masquerading as a hydrocalyx secondary to obstructive infundibular renal calculus: a case report

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ABSTRACT

Matrix renal calculi are rarely encountered in practice and are difficult to detect and diagnose pre-operatively due to the inability to diagnose on computed tomography. We report a case in which a matrix renal calculus mimicked a hydrocalyx seen in patients with obstructive infundibular renal calculus. A 37-year-old man having chronic kidney disease (CKD) presented with right flank pain and, on evaluation, was diagnosed with right renal calculus. Retrograde pyelography revealed a filling defect in the dilated calyx. Percutaneous nephroscopy into the dilated calyx revealed the presence of matrix component instead of a hydrocalyx secondary to infundibular obstruction. The unique presentation in this case report demonstrates the possibility of matrix calculi in CKD patients with caliectasis secondary to infundibular stone. The rare encounter and ambiguous radiological findings in cases of matrix calculi result in difficulty in prompt diagnosis and surgical management.

Keywords: Matrix calculus, Caliectasis, Infundibular calculus, PCNL, Soft calculus

INTRODUCTION

Matrix calculi are a rare variety of renal calculi which was first described in detail by Gage and Beal in 1908.[1] They are otherwise called colloid calculus, fibrinous concretions, or blood calculi and are composed mainly of mucoproteins with varying degrees of mineralization.[2] The distinguishing gross characteristic is their pliability and amorphous nature. Matril calculi cannot be detected on conventional plain radiography or ultrasound, and their appearance on non-contrast computed tomography (CT) depends on the degree of mineral composition.[3]

The discrepancy in radiological findings leads to diagnostic difficulty and intra-operative surprises. Our case report describes a scenario in which matrix calculus was encountered in the dilated upper calyx of a patient who underwent percutaneous nephrolithotomy (PCNL) for an obstructive upper pole infundibular renal calculus causing hydrocalyx.

CASE REPORT

A 37-year-old man hailing from Karnataka, India, presented to the outpatient department with right flank pain for 3 weeks associated with nausea and burning micturition. The patient had co-existing non-oliguric, non-dialysis-dependent chronic kidney disease and systemic hypertension for the past 4 years. Serum creatinine at presentation was 3.24 mg/dl. Ultrasound of the abdomen and pelvis revealed right upper pole renal calculus with moderate hydronephrosis. We proceeded to do a non-contrast CT abdomen and pelvis, which showed a calculus of homogenous density in the upper pole measuring 16×9 mm with a Hounsfield unit of 900 causing upper pole caliectasis and a lower pole calculus of size 10×8 mm (Figure 1). After adequate pre-operative evaluation, patient was planned for PCNL.

A retrograde ureteric catheter was placed and a retrograde pyelography (RGP) was performed before proning for

PCNL. RGP revealed a filling defect of approximately 2×2 cm in the dilated upper calyx (Figure 2).

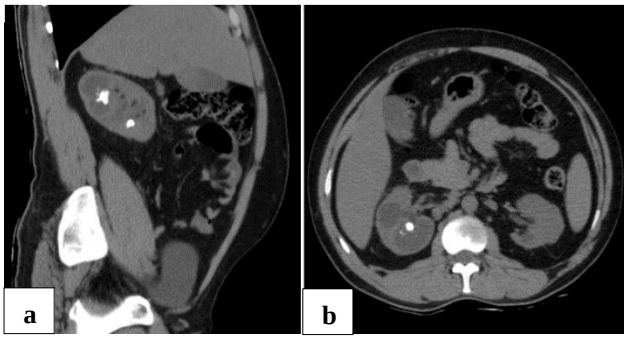

Figure 1: Non-contrast CT of the abdomen showing a calculus of homogenous density in the upper pole measuring 1.6 cm with a Hounsfield unit of 900 and upper caliectasis (a) sagittal view, and (b) axial view.

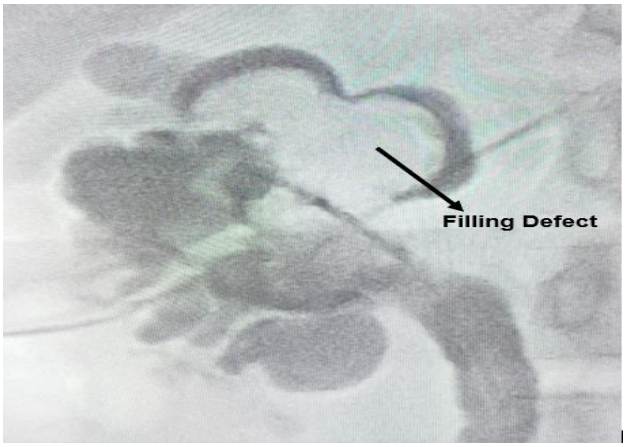

Figure 2: Retrograde pyelography showing a filling defect in the upper calyx.

Difficulty in determining the nature of the filling defect was experienced at this point. A supracostal superior calyceal access was planned, and a puncture was done with an 18G Chiba needle followed by tract dilatation up to 26 F and amplatz placement. Upon nephroscopy, matrix calculus was identified instead of hydrocalyx secondary to obstructed infundibular calculus. The friable calcareous component and the matrix component were retrieved with a bi-pronged grasper. The matrix calculus was sent for culture and analysis. A 6 F and 26 cm length double J stent was placed in an antegrade fashion.

Culture revealed the growth of *Proteus mirabilis*, and analysis showed the presence of calcium, ammonia, oxalate, and phosphate. Postoperatively, the patient developed 2 episodes of low-grade fever, promptly managed with antipyretic and escalation of appropriate antibiotics. The patient recovered well and was discharged with antibiotics for 2 weeks. The patient followed up after 1 month for an OPD visit, and clinical evaluation and non-contrast CT showed no post-procedural complications were noted.

The patient's due consent was obtained at this stage for the possible reproduction of this case as a public, academic text, and this patient was given written assurance of maintaining anonymity.

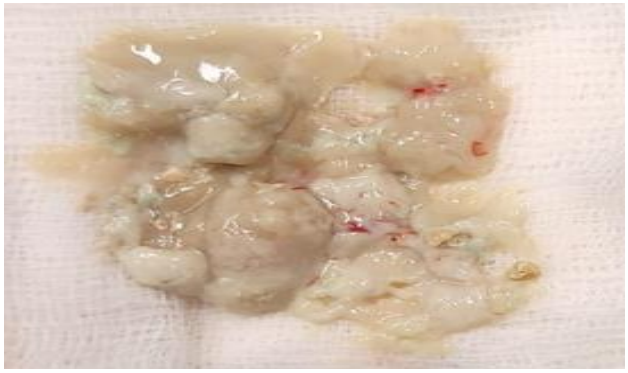

Figure 3: Image showing retrieved matrix calculi.

DISCUSSION

Computed tomography is heavily relied upon to confirm the diagnosis of renal calculus. Frequently encountered types of renal calculi are radio-opaque, making diagnosis easy. However, a matrix calculus may be radio-opaque or radiolucent, depending on the degree of mineral composition. Heterogenous radio-opacity may be seen in matrix calculi with a rim of mineralization and central proteinaceous composition.[4] A radiolucent matrix calculus on non-contrast CT will appear as a filling defect in contrast imaging.[5] Intraoperative RGP also helps delineate the calculus's location before proceeding with PCNL. In our case, pre-operative contrast CT was not done as the patient had chronic kidney disease and elevated serum creatinine levels. Calyceal outlet obstruction may be due to tumors, infundibular stricture or infundibular stone. Hydrocalyx is the dilatation of a calyx due to obstruction of its outlet.[6] Intraoperative RGP revealed a filling defect in the dilated calyx. Matrix calculi are composed of mucoproteins and minerals, and a study by Canales et al identified 33 unique proteins.[7] In our case, stone analysis revealed the presence of calcium, ammonia, oxalate, and phosphate. The increased incidence of matrix calculus in patients with chronic kidney disease or recurrent UTI suggests a correlation between them.[8] *E. coli* and *Proteus mirabilis* are the most commonly isolated organisms.[9] Very rarely, matrix calculi have also been noted to occur in transplant kidneys.[10] Our case report also observed that the patient had chronic kidney disease, and culture of the retrieved matrix calculus revealed growth of *Proteus mirabilis*.

CONCLUSION

Matrix calculus can have varied clinical and radiological presentations, making pre-operative diagnosis difficult. Our case report realizes the possibility of a matrix calculus mimicking a hydrocalyx caused by an obstructive infundibular renal calculus. A high degree of suspicion for

matrix calculi should be held in mind for patients with chronic kidney disease, recurrent UTI, and ambiguous radiological findings.

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