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CASE REPORT

CASE REPORT OF AN UNUSUALLY LARGE RENAL CALCULUS

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ABSTRACT: Renal calculus is a solid or crystal aggregation formed in the kidneys from minerals in the urine. Many calculi are formed and passed without causing symptoms. A kidney stone is a hard, crystalline mineral material formed within the kidney or urinary tract. Renal calculi affect all geographical, racial and groups with a worldwide prevalence of between 2 and 20%. Majority of the patients are usually between the 20-55 years of age. The highest incidence of kidney stone is in 30-45 years of age group and the incidence declines after the age of 50 years of age. Stones that obstruct the ureter or renal pelvis cause excruciating, intermittent pain.

KEYWORDS: renal calculus, stone, nephrolithiasis, computed tomography, KUB, Extracorporeal shock wave lithotripsy (ESWL), percutaneous nephrolithotomy.

INTRODUCTION: Renal calculus (Also known as kidney stones or nephrolithiasis) derived its name from the Latin rēnēs, meaning "kidneys" and calculus meaning "pebble". It is a solid or crystal aggregation formed in the kidneys from minerals in the urine. Many calculi are formed and passed without causing symptoms. A kidney stone is a hard, crystalline mineral material formed within the kidney or urinary tract. Kidney stones form when there is a decrease in urine volume and/or an excess of stone-forming substances in the urine.

EPIDEMIOLOGY: Renal calculi affect all geographical, racial and groups with a worldwide prevalence of between 2 and 20%. Approximately 50 percent of patients with previous urinary calculi have a recurrence within 10 years. The lifetime risk is about 10 to 15% in the developed countries, but can be as high as 20 to 25% in the Middle East[1] where uric acid stones are more common than calcium-containing stones.[2] The epidemiology of kidney stones is evolving - not only is the prevalence increasing, but also the gender gap has narrowed.[3]

The majority of the patients are usually between the 20-55 years of age. The highest incidence of kidney stone is in 30-45 years of age group and the incidence declines after the age of 50 years of age. 50 Percent of the patients have the recurrence of the kidney stones.[4] In India upper and lower urinary tract stones occur frequently, but the incidence shows wide regional variation.[5] The incidence of renal calculi is comparatively low in the southern part of the country compared to other parts.[6] The prevalence of urolithiasis is as high as 7.6% in Satpura part of Maharashtra.[7]. High and progressively increasing incidence of urolithiasis in Udaipur and some other parts of Rajasthan have been reported by Pendse et al.[8]

CLINICAL FEATURES: Signs And Symptoms - Stones that obstruct the ureter or renal pelvis causes excruciating, intermittent pain that radiates from the flank to the groin or to the inner thigh (renal colic) and is commonly accompanied by urinary urgency, restlessness, hematuria, sweating, nausea, and vomiting. It typically comes in waves lasting 20 to 60 minutes caused by peristaltic contractions of the ureter as it attempts to expel the stone.

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CASE REPORT: Here, we report a case of a 45 year old male, farmer by occupation, who came for the Noncontrast Computed Tomography scan of the KUB region at BSR Hospital and Diagnostic Centre, Rajnandgaon (C.G.) and presented with the complaints of heaviness and pain in right lumbar and lower back region. He had frequent complaints of pain and burning micturition along with a few episodes of fever with chills. Our patient had similar complaints three years ago for which he took some medicinal treatment (records not available).

Non contrast Computed Tomography scan of KUB region revealed a well marginated hyperdense lesion (1240 HU) of size 74 mm (Craniocaudal) x 50 mm (Transverse) x 38 mm (Antero-posterior) involving the major portion of right kidney. The CT scan images revealed the characteristic appearance of calcium containing renal calculus. The renal calculus found in our case appeared to be unusually large. Right and left kidney measured 10.1 cm (craniocaudal) x 6.3 cm (transverse) and 9.8 cm (craniocaudal) x 5.6 cm (transverse) respectively. Right sided hydronephrosis was present, but could not be accurately graded as the study was non-contrast CT.

FIG. A

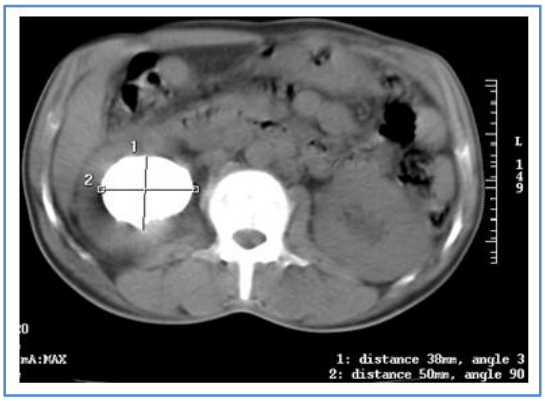

FIG. B

FIG. C

FIG. A: Scout CT image demonstrated a well marginated hyperdense lesion in right lumbar region.
FIG. B & C: Non contrast Computed Tomography scan of KUB region revealed a well marginated hyperdense lesion (1240 HU) of size 74 mm (Craniocaudal) x 50 mm (Transverse) x 38 mm (Antero-posterior) involving the right kidney.

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Pathological tests that were conducted at our institute included- Urine (routine and microscopy), Renal function test and serum calcium. Reports are as follows- Urine (routine and microscopy) - Pus cells = 15-20/hpf, Epithelial cells = 3-5/hpf., red blood cells = plenty. RFT reports showed Urea = 55 mg/dl, creatinine = 2.1 mg/dl, uric acid = 4.9 mg/dl, serum sodium = 139.4 mmol/L, serum potassium= 4.34 mmol/L. Serum calcium measured = 11.8 mg/dl.

RISK FACTORS: Dehydration from low fluid intake is a major factor in stone formation. High dietary intake of animal protein, sodium, refined sugars, fructose, oxalate, grapefruit juice, and apple juice increase the risk of kidney stone formation. Some metabolic conditions, such as distal renal tubular acidosis, hyperparathyroidism, primary hyperoxaluria also lead to renal calculus formation.

PREDISPOSING FACTORS: Previous history of renal stones, medical conditions that cause incomplete bladder emptying (for example, spinal cord injury), immunocompromised people: AIDS and diabetes, men with an enlarged prostate, catheterized patients, ethnicity (Caucasians are more likely to have kidney stones than African-Americans), sex (although kidney stones are most often seen in men, the incidence in women is increasing), family history of kidney stones, obesity, inflammatory bowel diseases (which can cause increase calcium absorption).

PATHOPHYSIOLOGY: Small crystals are formed in the kidney, most common crystals are made of calcium oxalate and they are generally 4-5 mm. Stag-horn kidney stones are considerably larger. Crystal nucleus is formed by calcium and oxalate together. Continued deposition leads to the growth of the kidney stones. When the kidney stones block all routes to the renal papillae, this can cause severe discomfort. The displaced stones travel through the urethra. If they cannot be broken down, they must be physically removed surgically. Sufficient dietary intake of magnesium and citrate inhibits the formation of calcium oxalate and calcium phosphate stones; in addition, magnesium and citrate operate synergistically to inhibit kidney stones.

CLASSIFICATION: Renal calculi are typically classified by their location and chemical composition.

Composition	Population, %	Radiological character
Calcium oxalate	80%	Radio-opaque
Calcium phosphate	5–10%	Radio-opaque
Uric acid	5–10%	Radiolucent
Struvite	10–15%	Radio-opaque
Cystine	1–2%	Faintly Radio-opaque
Xanthine		Radio-opaque

Table 1

DIAGNOSING KIDNEY STONES: Diagnosis of kidney stones requires a complete health history assessment and a physical exam. Other tests include:- blood tests for calcium, phosphorus, uric acid and electrolytes, blood urea nitrogen (BUN) and creatinine to assess kidney functioning, urinalysis to check for crystals, bacteria, blood, and white cells, examination of passing stones to determine type. The following tests can rule out obstruction:- 1) abdominal X-rays, 2) intravenous pyelogram (IVP),

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3) retrograde pyelogram, 4) ultrasound of the kidney, 5) abdominal CT scans and 6) MRI of the abdomen and kidneys. Note: The presence of phleboliths in the pelvis, which can be misinterpreted as bladder stones.

IMAGING STUDIES: Calcium-containing stones are relatively radiodense, and they can often be detected by an x-ray abdomen KUB view film. Approximately 60% of all renal stones are radiopaque. In general, calcium phosphate stones have the greatest density, followed by calcium oxalate and magnesium ammonium phosphate stones. Cystine calculi are only faintly radiodense, while uric acid stones are usually entirely radiolucent. A noncontrast helical CT scan with 5 millimeter sections is the diagnostic modality of choice in the radiographic evaluation of suspected nephrolithiasis. Where a CT scan is unavailable, an intravenous pyelogram may be performed to help confirm the diagnosis of urolithiasis. Ultrasound imaging of the kidneys gives details about the presence of hydronephrosis, suggesting the stone is blocking the outflow of urine. Radiolucent stones, which do not appear on KUB, may show up on ultrasound imaging studies. Additionally, renal ultrasonography is less expensive with absence of radiation exposure and is of high importance in children or pregnant women.

PREVENTION AND DIETARY MEASURES: For calcium stones, drinking lots of fluids, thiazide diuretics and citrate are effective. as is Allopurinol is useful in those with high uric acid levels in the blood or urine.[9] Following are the dietary recommendations to minimize the formation of kidney stones:- Increasing total fluid intake to more than two liters per day of urine output, increasing intake of citrate-rich drinks, sufficient calcium intake, limited sodium intake, limited animal protein intake. Medical management of uric acid stones is alkalinization (Increasing the pH) of the urine. Acetazolamide (Diamox) is a medication that alkalinizes the urine. Sodium bicarbonate, potassium citrate, magnesium citrate, and Bicitra (A combination of citric acid monohydrate and sodium citrate dihydrate) also alkalinze urine.

TREATMENT OF RENAL CALCULI: Up to 98% of small stones (less than 5 mm (0.20 in) in diameter) may pass spontaneously through urination within four weeks of the onset of symptoms, but for larger stones (5 to 10 mm (0.20 to 0.39 in) in diameter), the rate of spontaneous passage decreases to less than 53%.[10]

Several agents, including alpha adrenergic blockers (such as tamsulosin) and calcium channel blockers (such as nifedipine), have been found to be effective in the expulsion of renal and ureteric.

Extracorporeal shock wave lithotripsy (ESWL) is a noninvasive technique for the removal of kidney stones. ureteroscopy, and percutaneous nephrolithotomy began to replace open surgery as the modalities of choice for the surgical management of urolithiasis. More recently, flexible ureteroscopy has been adapted to facilitate retrograde nephrostomy creation for percutaneous nephrolithotomy.

In our case, surgical treatment was advised to the patient but, unfortunately the patient did not return for follow up.

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