Case Report

The accuracy of noncontrast spiral computerized tomography in detecting lucent renal stones: A case report and literature review

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Abstract

Renal stones are one of the most common diseases in the urology field that are easily diagnosed by one of the standard imaging techniques. Noncontrast spiral computerized tomography (CT) can detect up to 95% of the renal, ureteric and bladder stones, especially those with calcium composition, and considered nowadays one of the most accurate methods for detecting undetectable stones by other modalities. We report a case of a 60-year-old female who presented with colicky right flank pain due to large calcium oxalate renal stone that is undetected by standard imaging technique including spiral CT scan. Uretroscopy diagnosed and ultimately treat this patient problem.

Key Words: Lucent stones, renal stone diagnosis, spiral computed tomogram

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INTRODUCTION

Renal stones are one of the most common diseases in the urology field that are easily diagnosed by one of the standard imaging technique like plain X-ray of the kidneys, ureters and bladder (KUB), ultrasonography scan (USS), intravenous pyelography (IVP), and recently the noncontrast spiral computerized tomography (CT) which can detect up to 95% of the renal, ureteric and bladder stones and considered nowadays one of the most accurate methods for detecting undetectable stones by other modalities.

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CASE REPORT

This report is about a 60-year-old consented female patient who presented with 5 days history of right flank pain that was colicky in nature and radiating to the groin. This pain was associated with burning micturation and mild nausea. The physical examination was unremarkable including normal vital signs. Laboratory investigation revealed the presence of microscopic hematuria and normal renal function. KUB plain X-ray was done and revealed no radio-opaque shadow in the area of urinary tract. Ultrasonography was carried out and showed moderate hydronephrosis with no hydroureter or renal stones [Figure 1]. Noncontrast thin cuts hi-speed advantage spiral CT (General Electric Medical Systems, Milwaukee, USA) using flank pain protocol-helical technique with breath-holding at 120 kV, 200 mA with 5 mm collimation and viewed using the abdominal window) was done to evaluate the possibility of ureteric stone and was unremarkable apart from mild hydronephrosis and perinephric fat stranding [Figure 2]. Patient was assured as the pain did subside after oral analgesics and advice to follow-up after few days to evaluate

the hydronephrosis with the impression of possibly passed stone. Patient was seen in an emergency department again after few days with worsening flank pain and worsening hydronephrosis that was evident by repeated USS. She was admitted and underwent diagnostic retrograde pyelography and then ureteroscopy that revealed the presence of 2 cm × 2 cm stone in the right renal pelvis [Figure 3] that was subsequently easily fragmented by laser intracorporeal lithotripsy. Patient had a smooth postoperative course and discharged the same day. Stone analysis revealed the following composition: 60% calcium oxalate, and 40% uric acid. It was negative for ammonium, magnesium, cystine or inorganic phosphorus.

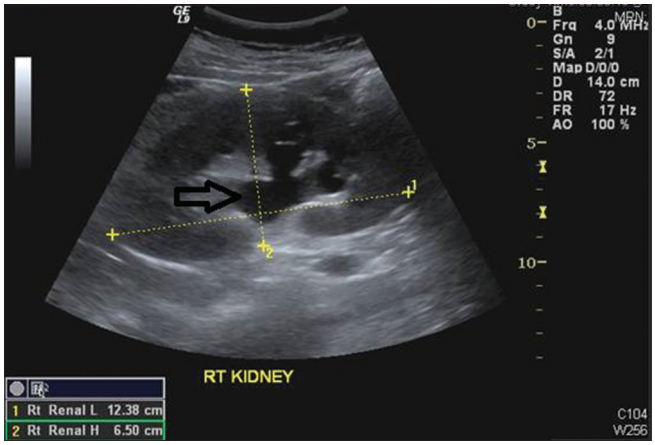

Figure 1: Ultrasonography scan demonstrating moderate hydronephrosis with no renal stone. Arrow indicate dilated pelvicalyceal system

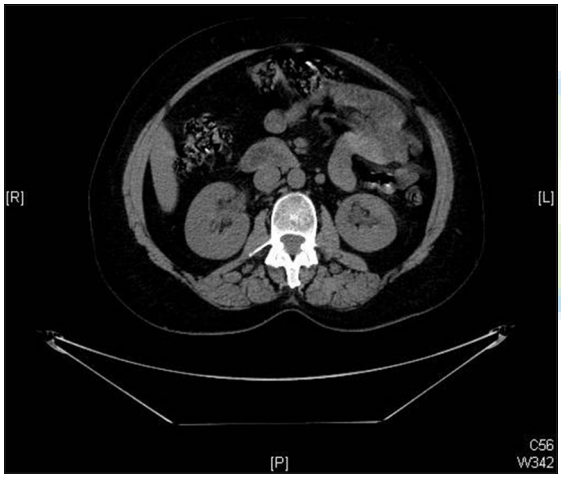

Figure 2: Computerized tomography scan of the same patient was unremarkable apart from mild hydronephrosis and perinephric fat stranding

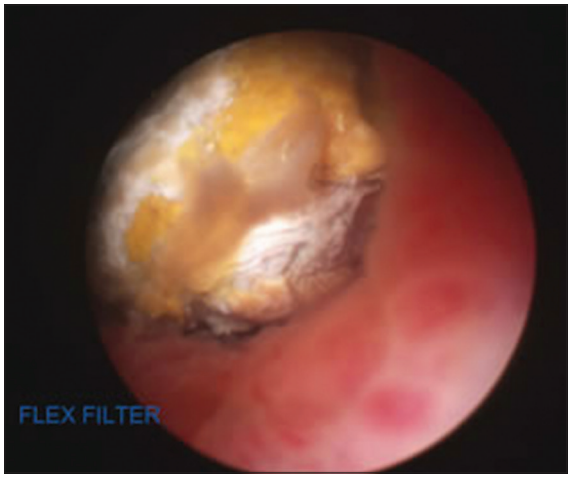

Figure 3: Large renal stone as seen during ureteroscopy

DISCUSSION

Imaging has an essential role in the diagnosis, management, and follow-up of patients with urinary stone disease. A variety of imaging modalities are available to the practicing urologist, including conventional radiography, IVP, ultrasound scan, magnetic resonance urography, and computed tomography scans, each with its advantages and limitations.[1] Traditionally, IVP was considered the gold standard for localizing radiolucent and ureteric calculi, but this modality has largely been replaced by nonenhanced spiral CT scans at most centers.[2] The usefulness of spiral CT scan in the study of urolithiasis nowadays is supported by a large literature which clearly supplies with documentary evidence the high sensitivity and specificity of such a method in diagnosing the presence of urolithiasis in general and, above all, of the ureteric stones. Such a method not only makes an accurate evaluation of the stones location possible, but it can also assess the calculi dimensions and the indirect signs of affected kidney functionality without having to use the contrast medium.[3] Although initial studies revealed that all stones, regardless of their dimensions, were detected with a sensitivity and specificity up to 100% using spiral CT scans,[4-6] other studies showed decreasing values based on stone composition. In one study, USS showed 93% sensitivity and 95% specificity in the diagnosis of ureterolithiasis, compared to CT scan that showed 91% sensitivity and 95% specificity, while the correspondence for IVP was 87% and 94% respectively.[7] In our case, although having a sizable calcium oxalate stone, most common imaging modalities used failed to give the correct diagnosis at initial presentation requiring more invasive approach to give a diagnosis and subsequent treatment.

CONCLUSION

Spiral nonenhanced CT scan is one of the most sensitive and specific diagnostic modalities for stone detection but in certain cases it fails to give accurate answers. Hence patient follow-up and combination of diagnostic techniques might be necessary.

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