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CASE REPORT

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Right renal stone on the trajectory of upper left ureter

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Abstract We report a 52-year-old woman with a right renal pelvic stone, mimicking a left upper ureteral stone in a kidney-ureter-bladder film. Computed tomography detected the exact anatomical location of the stone, which was not possible by intravenous urography and ultrasonography. In this study, we discuss diagnostic modalities of the urinary calculi in the light of the literature.

Keywords Ureter · Urinary calculi · Hydronephrosis · Computed tomography · Ultrasonography · Urography

Introduction

Urinary calculi are the third most common affliction of the urinary tract, exceeded only by urinary infections and pathological conditions of the prostate [1]. The prevalence of a urinary tract stone is estimated to be 2–3%. After plain kidney-ureter-bladder (KUB) film, urinary tract stones, their effects and urinary function could be confirmed by intravenous urography (IVU) or computed tomography (CT) [2]. However, ultrasound (US) is a noninvasive method for demonstrating both the urinary stone and the consequent hydronephrosis [2, 3]. CT has been used clinically with increasing frequency since 1972. In the last decade, CT has often been the imaging study of choice in many institutions for the detection of urinary stones in patients with acute flank pain, especially in the emergency department [2, 4].

Here we discuss a case of severe hydronephrosis due to a right ureteropelvic junction stone mimicking a stone localized in the left upper ureter on a KUB film in which the nature of the lesion could not be delineated with IVU and US, but with CT.

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Case report

A 52-year-old woman was admitted to the hospital with right flank pain. A KUB film demonstrated an opacity of 2×2.5 cm diameter on the left side of the L3 vertebra (Fig. 1). IVU revealed nonfunctional right kidney and opacity located on the trajectory of upper left ureter with functional left kidney (Fig. 2). US showed grade 4 right hydronephrosis and pelvic stones (Fig. 3). Before surgical planning for stone, noncontrast abdominal CT scanning was performed. It revealed an enlarged hydronephrotic right kidney with a renal pelvis that extended to the left side including an impacted stone in the right ureteropelvic junction (Fig. 4). Nephrectomy was performed through the flank incision and pus material was evacuated to facilitate the nephrectomy procedure.

Discussion

Urinary stones have disturbed humans since the earliest history. The etiology of stones remains speculative and stone recurrence rates can be as high as 50% within the next 5 years after stone removal [1]. After the KUB film was obtained, IVU was the imaging modality for the detection of urinary stones in the classical approach and is reported to have a sensitivity of about 95% [2]. IVU was often diagnostic but limitations included the need for proper bowel preparation, the risk of allergy to contrast agents, potential nephrotoxicity, the need to assess renal function before contrast injection, the inability of conventional radiography to visualize some stones (e.g. uric acid), and the time-consuming nature of the study [5]. In our case, KUB and IVU have not supported each other and the exact localization of radioopacity could not be revealed with either of the examinations.

Fig. 1 KUB film shows an opacity of 2×2.5 cm diameter at the L3 level

Fig. 2 The opacity is seen on the trajectory of left ureter and there is no function in the right kidney on IVU

US is a noninvasive, cheap, and easy method for the evaluation of urinary stones. A lot of studies have revealed that both a KUB film and US may be as effective

Fig. 3 Hydronephrosis and pelvic stones in the right kidney are seen on ultrasonography

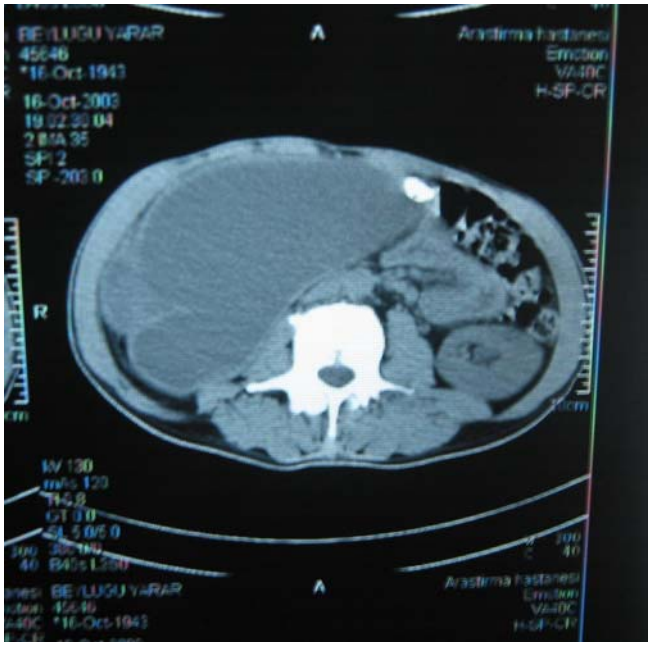

Fig. 4 Unenhanced abdominal CT demonstrated the hydronephrosis in the right kidney. Note that the pelvic stone is located on the left

as an IVU in establishing a diagnosis. The US examination should be directed by notation of suspicious areas seen on a KUB film [2]. Edema and calculi missed on an IVU can be appreciated with such studies. The combination of lithiasis plus obstructive signs showed a sensitivity and specificity of 90–100% for US and KUB film. But US is operator dependent and it has some other disadvantages such as obesity, bowel distention, and ureteral calculi [6]. In our case, US revealed right hydronephrosis with a pelvic stone but the radioopacity

superimposed on the left upper ureter could not be clearly evaluated whether it was the same or a different opacity.

CT for urinary calculi has gained widespread acceptance among radiologists and urologists at many institutions during the last decade. It is now the standard technique for evaluation of patients with urinary stone and it has been shown to have a high degree of accuracy with high sensitivity (94–97%), specificity (96–98%), and high positive and negative predictive values of 96 and 97%, respectively [2, 4, 6]. The combination of lithiasis plus obstructive signs showed a sensitivity and specificity of 100% for CT [3]. CT can be rapidly performed, does not require a contrast agent each time and, owing to the cost of intravenous contrast agents and the rapid nature of the study, is very cost effective compared with IVU [2]. Spiral CT is also more efficient than US in imaging patients with symptoms and signs of urolithiasis when KUB is inconclusive [7]. In our case, US and IVU were inconclusive for differentiation of the radioopacity; we needed an examination with CT before planning the operation.

As a result, right- or left-side opacity might be localized on the other side. Detection of urinary stones, especially with an unusual localization like in our case, may be confused on KUB film and differential diagnosis could not be done with IVU or US. CT is the most accurate technique and it could be the first and only modality for evaluation of urinary calculi without any need for KUB, IVU, or US.

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