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ENDOUROLOGY

Case Report

Foreign body mimicking neoplasia of the renal pelvis on magnetic resonance imaging

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ABSTRACT

A 65-year-old male presented with an incidental magnetic resonance imaging (MRI) finding of a right renal pelvis (RP) tumor-like mass. He was subjected to nephrostomy tube (NT) placement due to hydronephrosis secondary to an impacted ureteral stone. NT was removed after successful Ho:YAG laser lithotripsy. Abdominal MRI performed 19 months later for another indication showed RP wall thickening/enhancement and an intrapelvic low-intensity linear structure presenting as a magnetic susceptibility artifact. He underwent diagnostic ureterorenoscopy/retrograde intrarenal surgery. A calcified NT locking suture remnant was found within the pelvis surrounded by reactive edema without evidence of tumor. Foreign body (FB) was removed after disintegration of surrounding calcifications using Ho:YAG laser. This is the first case of a calcified NT locking suture remnant mimicking RP tumor on MRI. The case underlies the importance of safe NT removal. Specific MRI findings may prove valuable for preoperative diagnosis of intrarenal FBs in cases with history of endourological interventions evaluated for upper urinary tract masses. Multidisciplinary-uroradiological approach of such cases is essential.

Keywords: Foreign bodies; laser lithotripsy; magnetic resonance imaging; percutaneous nephrostomy; retrograde intrarenal surgery.

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Introduction

Foreign bodies (FBs) are among the commonest urologic problems with different etiologies (iatrogenic, self-insertion, migration from adjacent organs).[1] Endourological/laparoscopic procedures represent the cornerstone of modern urologic disease management and therefore, accessories including NTs, pigtails, guidewires, laser fibers, and Hem-o-Lock clips are widely used. Consequently, the incidence of parts of such disposables accidentally retained in the urinary tract is increased nowadays.

Urologic surgery is the third commonest cause of iatrogenically-retained FBs.[2] Notwithstanding endoscopic surgery being one of the commonest causes of urinary FBs which is considered to be the treatment of choice.[3] Consequently, there have been reports of intrarenal FBs, including surgical sponges (textilomas), part of outer sheath of guidewires (Sensor™ PTFE-Nitinol Guidewire with Hydrophilic Tip; Zebra® Urologic Guidewire (Boston Scientific, Natick, MA)), laser fiber pieces and NT parts providing a nidus for calcification.[3-6] The preoperative diagnosis may be difficult since FBs can mimic tumors or abscesses. Clinical manifestations occur during early or late postoperative period, depending on the inflammatory reaction type induced.[1,7,8] Plain radiography allows accurate pre-operative diagnosis when radio-opaque markers are visible; otherwise, certain characteristic signs should be sought in renal ultrasonography (US), computed tomography (CT), or magnetic resonance imaging (MRI).[9] We

describe the first case of a calcified NT locking suture remnant mimicking RP tumor on MRI.

Case presentation

A 65-year-old, formerly healthy, heavy smoker male was admitted to our Department of Urology for an incidental MRI finding of right RP mass. Physical examination, and routine laboratory tests were normal. Nineteen months earlier he was referred for management of a radiopaque, shockwave lithotripsy-resistant 15 mm stone impacted at the right ureteral orifice for 3 months, causing extensive uretero-hydronephrosis. Due to history of life-threatening allergy to iodine contrast media, he was evaluated with digital kidney-ureter-bladder (KUB) radiograph/MRI rather than CT pyelography (our standard prior to endourological procedures for stone management). Based on imaging (Figure 1), after obtaining written informed consent from the patient, we proceeded with Ho:YAG laser lithotripsy but the ureter could not be accessed due to extensive edema of the orifice attributed to the impacted stone that precluded a retrograde pigtail stent placement.

The patient was subjected to nephrostomy tube (NT)/antegrade pigtail stent placement. Keeping both tubes in place, one month later, he underwent static renal scintigraphy that confirmed normal kidney function and successful Ho:YAG laser lithotripsy, followed by pigtail stent placement. He was dismissed the 1st postoperative day after NT removal at the ward. The stent was removed on an outpatient basis one week later. During follow-up at 6 weeks after stent removal, there was no evidence of residual stones.

Nineteen months later, he was subjected to MRI examination of the adrenal gland to determine the cause of primary hyperaldosteronism. Adrenals were normal. However, thickening of the right renal pelvic wall not evident in the initial MRI, was considered as an incidental tumor finding (Figure 2) and he was referred to the Department of Urology for further evaluation. MRI was finally in favor of an unexplained non-neoplastic process based on the pattern of smooth thickening of renal pelvis (Figure 2). Based on the available data, including repeated atypical urine cytology, we opted for active surveillance. A follow-up MRI was performed 5 months later, showing an unchanged renal pelvic thickening (Figure 3a). In addition, diffusion-weighted MRI, did not show significant restriction and therefore neoplasia was considered a rather unlikely diagnosis (Figure 3b). Furthermore, a linear low- signal intensity structure showing a magnetic susceptibility artifact was evident, potentially suggestive of an intrarenal calcification. Due to overall change in imaging findings, ambiguous results and increased patient concern, we proceeded with diagnostic uretero-renoscopy. A linear radio opaque shadow in the right renal area was detected on the preoparative KUB radiogram (Figure 4).

After obtaining written informed consent from the patient, a semi-rigid ureteroscopy was smoothly advanced up to the right ureteropelvic junction over a guidewire (Sensor™ PTFE-Nitinol Guidewire with Hydrophilic Tip (Boston Scientific, Natick, MA)) under general anesthesia. The ureter was wide and patent without evidence of any intraluminal pathology. A bizarre snake-like structure of about 5 cm in length surrounded by urothelial reactive edema was detected upon entry into the pelvis. (Figure 5a). Gentle removal was attempted using grasping forceps with serrated double action jaws that resulted in segmental crushing of its outer part revealing a nidus underneath (Figure 5b). The structure was free but atraumatic extraction was impossible due to size incompatibility with the junction. Retrograde intrarenal surgery was performed as previously described,[10] and the FB was smoothly removed after disintegration of surrounding calcifications using Ho:YAG laser (Figure 5c). It

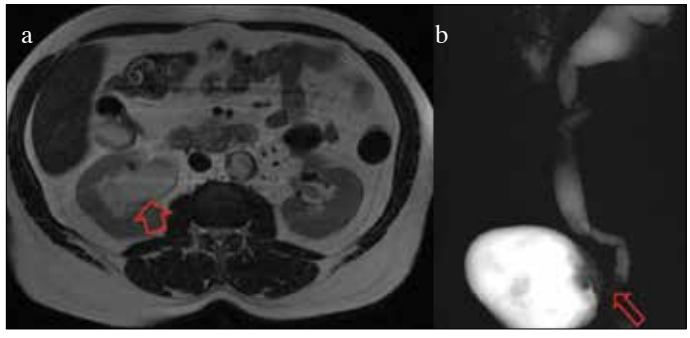

Figure 1. a, b. Initial MR imaging study. Axial T2w MR image (a) shows dilatation of the pelvis of the right kidney (arrow). Single shot T2w MR urogram (b) shows dilatation of the pelvis and the ureter with a filling defect in the distal ureter (arrow), attributed to a 15 mm ureteral stone visible on KUB (not shown)

MR: magnetic resonance; KUB: kidney-ureter-bladder

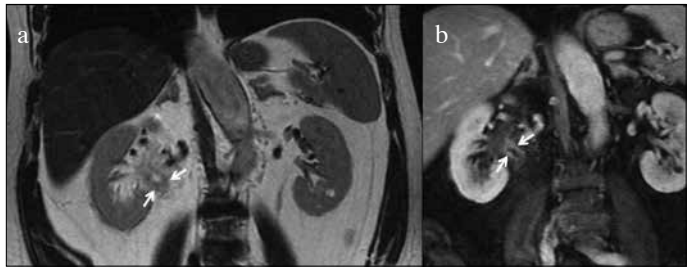

Figure 2. a, b. Second MR imaging study (19 months after the initial one, during investigation for primary hyperaldosteronism). Coronal T2w MR image (a) shows incidental thickening of the right RP wall (arrows). Coronal fat-suppressed contrast- enhanced T1 MR image (b) shows enhancement of the thickened pelvic wall (arrows)

MR: magnetic resonance; RP: renal pelvis

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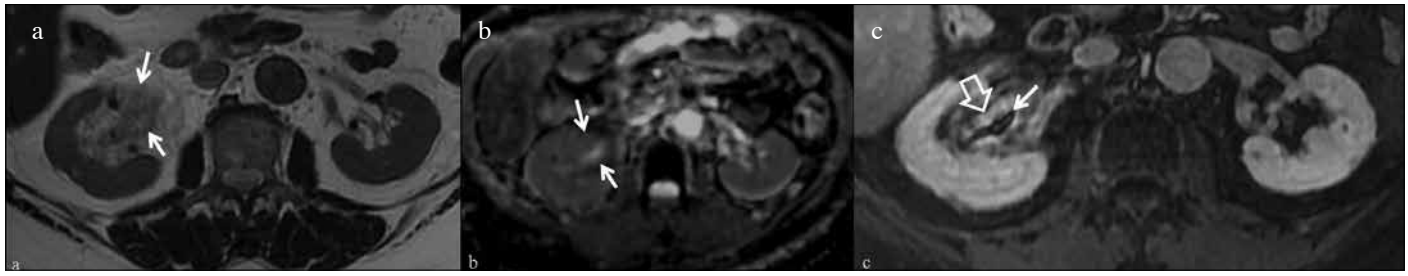

Figure 3. a-c. Third MR imaging study (5 months after the second one). Axial T2w MR image (a) shows the pelvic wall thickening with somewhat indistinct boundaries (arrows). Axial diffusion- weighted imaging (b) shows moderate restriction of the diffusion in the right renal pelvic wall (arrows). Axial fat-suppressed contrast-enhanced T1w MR image (c) shows enhancement of the pelvic wall (open arrow) and presence of a low signal intensity structure (arrow)
MR: magnetic resonance

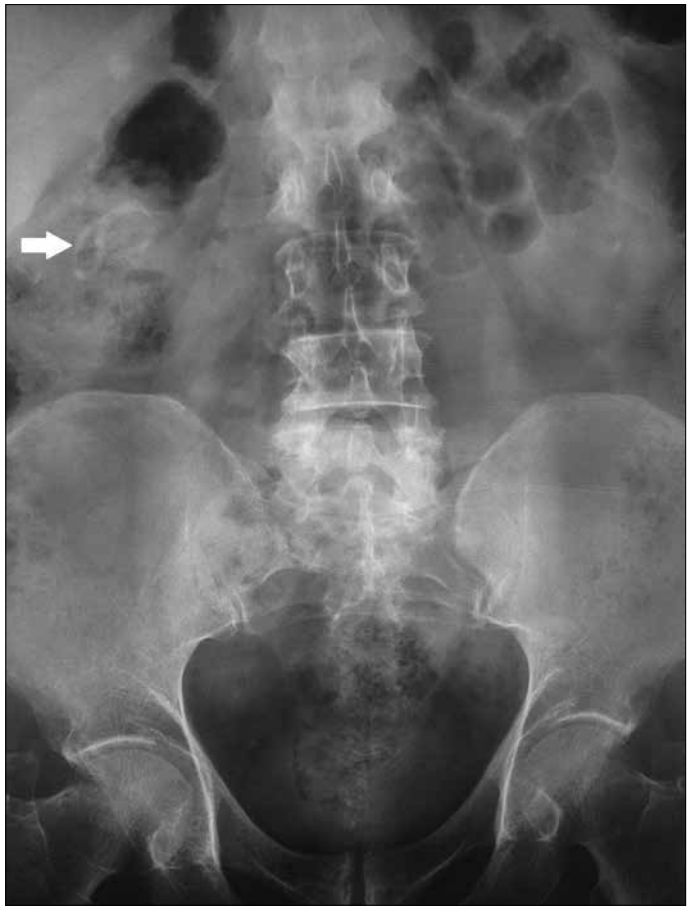

Figure 4. Preoperative KUB radiograph showing a linear radio opaque shadow in the right renal area (arrow)
KUB: kidney-ureter-bladder

became obvious that the structure was a malleable calcified FB curled into the pelvis, namely a NT locking suture remnant. There was no evidence of a pelvic tumor. Urine specimens collected intra-operatively for cytological investigation showed no evidence of transitional cell carcinoma. Only few, clinically insignificant stone residuals were detected on KUB radiograph postoperatively, which were eliminated during urinatipon after pigtail stent removal within the following days.

Discussion

Foreign bodies are often seen in the upper urinary tract and the etiology is usually iatrogenic, especially in the era of minimally invasive urologic management due to widespread use of endourological accessories, parts of which are accidentally retained in the collecting system.[1,3] There are reports of various intrarenal FBs, including textilomas, part of guidewires, pieces of laser fibers and NT parts, providing a nidus for calcification.[3-6] Plain radiograph allows accurate preoperative diagnosis if a radio-opaque marker is visible i; otherwise, certain characteristic signs must be sought in US, CT, or MRI.[9] This is the first report of a calcified NT locking suture remnant mimicking RP tumor on MRI.

This case delineates that safe NT removal is crucial to prevent complications from NT remnants in the pyelocalyceal system. NT removal should be performed under fluoroscopic guidance preferably by the same health professional who placed it after ensuring unlocking of self-retaining loop. Meticulous inspection of removed material is of paramount importance. A key point in this case is the fact that the patient did not undergo CT pyelography. This modality would have been diagnostic demonstrating the characteristics of FB. Analysis of the 2nd MRI study favored a non-neoplastic renal pelvic wall thickening, an incidental finding not evident in initial MRI. The decision to refrain from immediate laparoscopic/open nephro-ureterectomy was therefore justified. Nevertheless, the proper decision of immediate RIRS instead of active surveillance could have been taken at that time since presence of a linear intrapelvic structure with low signal intensity on all sequences presenting a susceptibility artifact was overlooked which was only detected in mRI retrospect in this study (Figure 6a, b). Magnetic suscep-

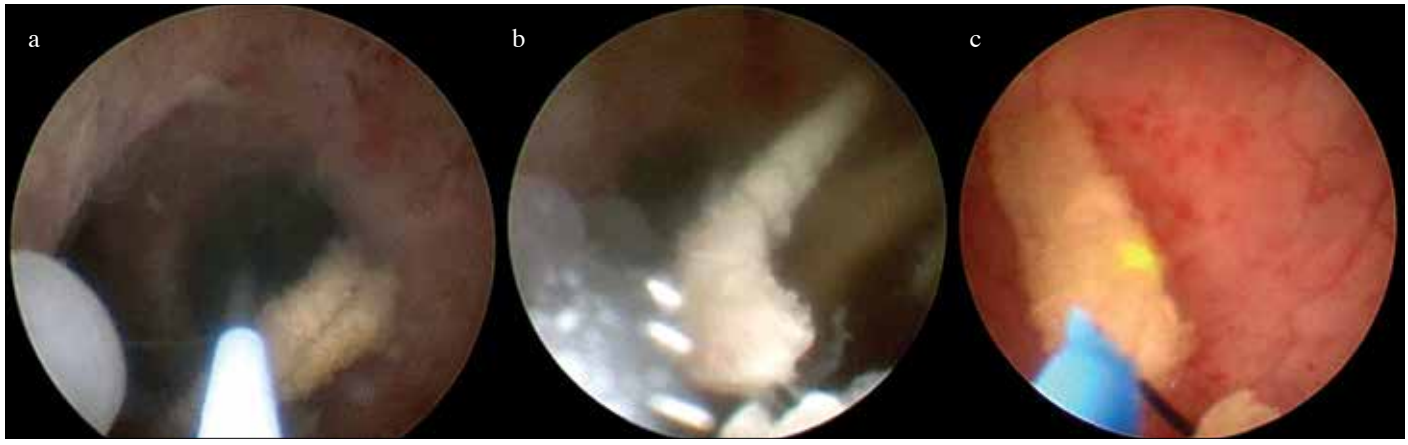

Figure 5. a-c. Intraoperative findings. Bizarre snake-like structure of about 5 cm length curled in the right RP, with concomitant urothelial reactive edema (a). Removal of the structure attempted using grasping forceps with serrated double action jaws resulting in segmental crushing of the outer part revealing a nidus underneath (b). Disintegration of the surrounding calcifications using Ho:YAG laser (c)

RP: renal pelvis

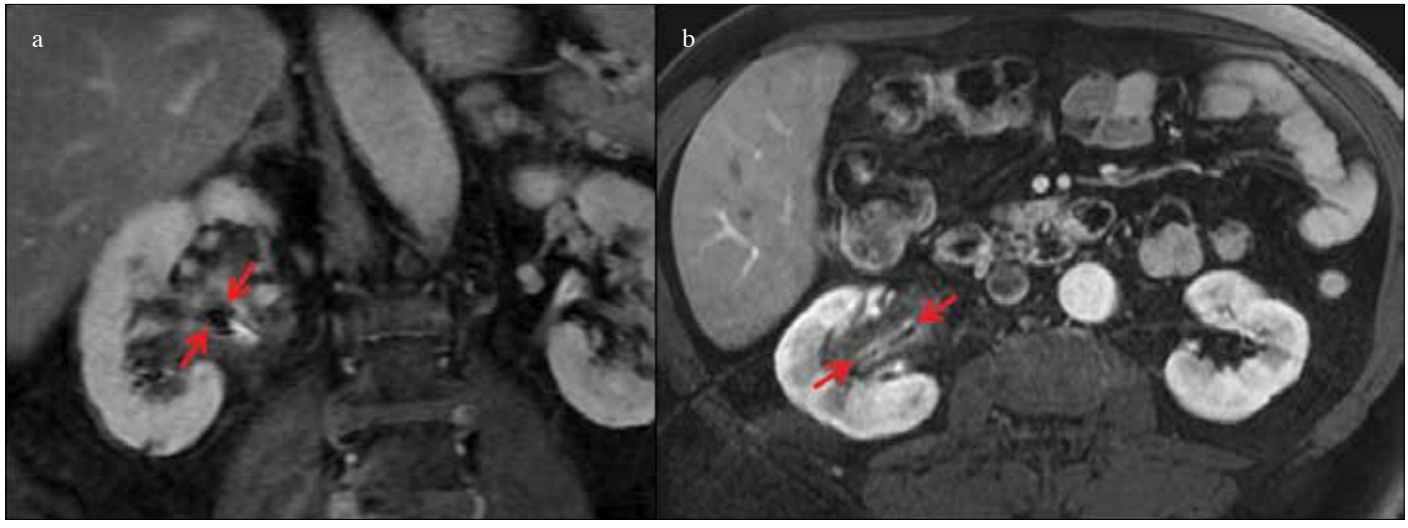

Figure 6. a, b. Second MR imaging study-retrospective evaluation. Fat- suppressed contrast -enhanced T1w coronal (a) and axial (b) MR images showing at more superior level a linear low signal intensity structure presenting a magnetic susceptibility artifact (arrows); finding detected in retrospect in this study

MR: magnetic resonance

tibility is the individual magnetization that a material develops if placed in an external magnetic field.[11] Susceptibility effects are given by osseous/metal structures located in tissues of different structures and are demonstrated with local signal drop.[12] Such artifacts are more pronounced on gradient echo sequences such as the 3D-T1w used for dynamic examination.[13] The T2w fast spin echo sequences do not reveal this finding. The linear intrapelvic structure was detected on the 3rd MRI, showing increased thickness compared to the 2nd MRI in retrospect. This can be explained by enlargement of the calcification component. Given a history of NT placement, such a finding should be definitely considered as clinically relevant, and indicative of encrusted FB. Finally, diffusion- weighted imaging was useful as it showed moderate restriction, confirming the absence of neoplasia. Special attention should be paid during evaluation of such patients for any radio opaque shadows detected on KUB radiographs. The preoperative KUB radiograph showed a linear radio opaque shadow (Figure 4). However, due to lack of suspicion, the finding was underestimated. In conclusion, to the best of our knowledge, this is the first report of a calcified

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NT locking suture remnant mimicking pelvis tumor on MRI. The case underlies the importance of safe NT removal. Specific MRI findings may prove valuable for preoperative diagnosis of intrarenal FBs in patients with a history of endourological interventions performed for the evaluation of upper urinary tract masses. A multidisciplinary-uroradiological approach of such cases is essential.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

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