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Case of the Month

'Case of the Month' from the Universitaetsklinik für Urologie, Bern, Switzerland: management of an unusual foreign body in the renal pelvis

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Introduction

Foreign bodies in the upper urinary tract (UUT) represent a rare, but well-documented phenomenon. Most foreign bodies in the kidney and UUT represent remnants of previous endourological surgery, especially since the advance of endourological procedures for the treatment of stone disease and UUT urothelial cancer. Hence, the incidence of iatrogenic foreign bodies in the UUT has increased in recent years. Other routes of entry for foreign bodies in the kidney on the other hand are a rarely documented entity. Apart from iatrogenic causes, foreign bodies can reach the kidney by three routes: external violence or trauma, retrograde passage from the bladder to the kidney, and migration from the gastrointestinal tract to the kidney [1,2].

Case Report (Investigations, Treatment, Outcome and Follow-up, Table of Cases)

Patient Characteristics and Clinical Findings

A 77-year-old male patient was admitted to our department because of recurrent UTIs accompanied by fever up to 40°C and chills. Therapeutic response to antibiotics was usually rapid and with complete recovery. He denied attenuation of urinary flow or other symptoms of BOO. Considering the urological history, the patient reported a kidney stone passed in 1991 and a TURP 20 years previously. Further history was unremarkable. The physical examination on presentation was unremarkable as well.

Diagnostics and Therapy

During initial evaluation, urine dipstick showed leucocyturia and erythrocyturia. Urinary culture revealed growth of *Staphylococcus aureus*. The urinary flow analysis was unobstructive and without residual urine. The PSA level was 3.86 ng/mL. Serum creatinine was within the normal range. Ultrasonography showed hydronephrosis II–III° on the right side. Flexible urethrocystoscopy was inconspicuous.

A consecutive abdominal CT scan showed hydronephrosis III° and enhancement of the right ureteric soft tissue.

A percutaneous nephrostomy was placed. Urinary culture from the renal pelvis showed growth of *Candida dubliniensis* and *Candida glabrata*. After adjusting the antimicrobial to antimycotic therapy according to resistance testing, a ureteropyelography performed after normalisation of infectious parameters showed an abrupt contrast media stop in the medial ureter. The patient was scheduled for primary ureterorenoscopy (URS). Retrograde ureteropyelography showed a filiform narrowed proximal ureter, but no clear contrast media defect. Macroscopically the ureter and renal pelvis appeared unremarkable. Cytology was negative for high-grade urothelial carcinoma. Biopsies showed inflammatory alterations but no neoplasia. A pigtail catheter was placed, and the nephrostomy tube changed. The patient was treated with antiphlogistics and dismissed after completion of intravenous antimycotic therapy.

Subsequent follow-up by antegrade pyelography showed good drainage after pigtail catheter removal. Hence, the nephrostomy tube was plugged, and the patient dismissed. The patient was re-admitted the following day with symptoms of obstructive pyelonephritis. The nephrostomy tube was re-opened, a transurethral catheter placed and an antimicrobial/antimycotic therapy established. An abdominal CT scan showed a contrast enhanced renal pelvis and ureter, as well as an intraluminal, linear contrast media defect, adjacent to the wall of the ureter. Considering the repeatedly negative cytology, unremarkable retrograde URS and repeated detection of fungi, this was interpreted as being of fungal origin. A prolonged antimycotic therapy regimen was established, and follow-up scheduled 4 weeks later. Consecutive antegrade pyelography showed good drainage and the nephrostomy was closed and removed the following day.

The patient was re-admitted 11 days later with symptoms of obstructive pyelonephritis. Abdominal CT showed hypoperfusion of the right kidney and hydronephrosis II° with enhancement of the wall of the renal pelvis, as well as the upper third of the right ureter. Additionally, we saw an intraluminal lesion mimicking a strictured ureter. A pigtail

catheter was placed, and antibiotic therapy established. Urinary cultures showed persistent growth of *C. glabrata*, *C. dubliniensis* and in addition *Pseudomonas aeruginosa*. The existing tissue biopsy specimens—collected during the first URS—were re-evaluated to rule out amyloidosis, malacoplacia, tuberculosis, schistosomiasis, actinomycosis and pyeloureteritis cystica as potential causes for the intraluminal contrast media defect.

After exclusion of the above causes, we decided upon a second URS. During URS, we encountered a linear, intraluminal foreign structure in the most proximal ureter, which protruded further into the renal pelvis and showed a honeycomb-like-structured surface. At this point, we were still suspecting it to be of fungal origin. We grasped the surprisingly resilient structure with a tip-less style basket at the very distal end and removed it without further difficulties. To our great surprise we found the structure to be a toothpick (Fig. 1). A pigtail catheter was placed, and the procedure finished by placing a transurethral catheter.

Follow-Up and Outcome

At 2 days after the removal of the toothpick, the patient was able to leave hospital on a prolonged antimycotic therapy regimen. After 4 weeks, the patient was re-admitted for removal of the pigtail catheter. Further follow-up remained unremarkable.

Discussion

The patient was questioned about the origin of the toothpick. Self-manipulation could be ruled out and the patient could not recall swallowing a toothpick as well; however, >50% of patients who accidentally swallowed a toothpick could not recall doing so in a study conducted by Steinbach et al. [3]. External violence was out of the question.

In the case presented, we suspect the toothpick to have perforated the duodenal wall and completely migrated into the renal pelvis of the right kidney due to the location of the toothpick high up in the renal pelvis as has been described before [4]. Perforation from the gastrointestinal tract and migration into the right renal pelvis without symptoms seems counterintuitive; however, several publications have shown similar patterns of rather uneventful clinical courses following perforation of the gastrointestinal tract and migration into adjacent organs after foreign body ingestion. This seems to be especially true for perforations of the duodenum, as the relatively sterile duodenal contents seem to favour an indolent course with only mild inflammatory responses [1,5].

In retrospect, the initially obtained images become obvious (Figs 2,3). We attribute delayed diagnosis to the rarity of the event, as well as negative case history and primary URS. The radiopacity of the foreign body in the obtained abdominal CT scans may have steered us further away from the correct

Fig. 1 The completely intact toothpick after extraction.

Fig. 2 The toothpick depicted as a linear contrast media defect in the ureter during antegrade pyelography.

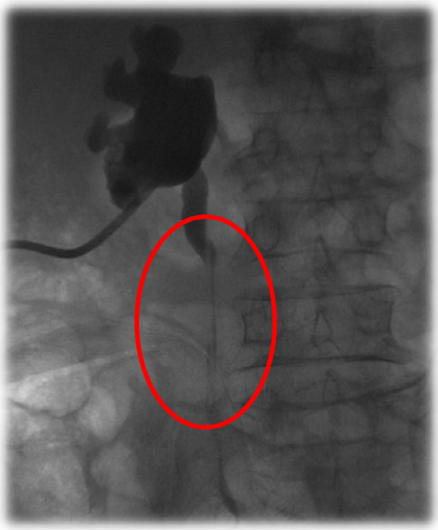
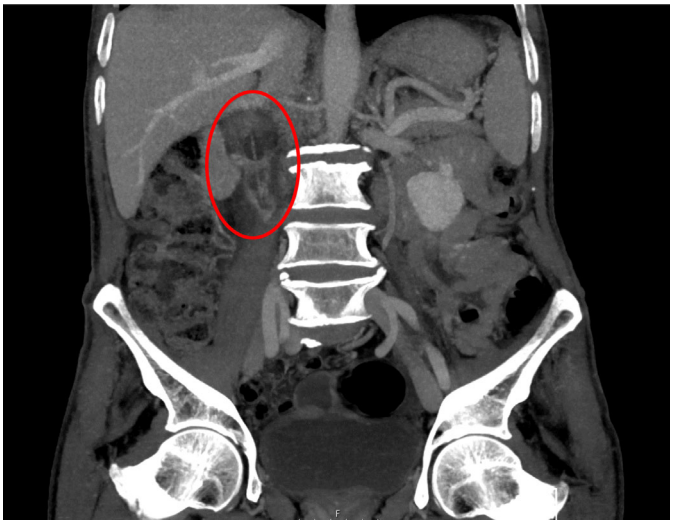


Fig. 3 The toothpick depicted as a linear radiopaque intraluminal foreign structure during abdominal CT.



diagnosis. In the literature, the sensitivity of diagnostic studies for ingested toothpicks ranges from 29% to 32.6% for ultrasonography, 15%–42.6% for CT, 9% for X-ray, and 72.1% for endoscopy [3,5]. Another publication concluded imaging studies to be inadequate in detecting ingested toothpicks and thus, physicians must continue to rely on physical examination as the best indicator [6].

Considering the negative first URS, we suspect the toothpick to have been pushed back into the renal pelvis during guidewire insertion. Hence, the foreign body could not be identified during the procedure.

A literature search of PubMed revealed at least 47 more cases of accidentally ingested foreign bodies that migrated to the genitourinary tract or the renal hilar vessels. An overview of the cases is given in Table S1.

In general, for ingested foreign bodies conservative treatment is not applicable for sharp or pointy objects, especially toothpicks, which, once ingested, have been described as potentially 'lethal weapons', with 80% of ingested toothpicks perforating the gastrointestinal tract after ingestion [3]. Li and Ender [6] also showed a very high overall mortality rate of 18% after toothpick ingestion. According to Nigri et al. [5] toothpicks account for ~9% of ingested foreign bodies. Risk factors for toothpick ingestion are mental retardation, alcohol abuse, dental prosthesis (due to a diminished palatal sensitivity), rapid eating, and habitual chewing of toothpicks.

Therapeutic options for removal of ingested toothpicks depend on the exact location and site of perforation. Laparotomy remains the most frequently chosen option. Considering migration of foreign bodies into the genitourinary tract an open surgical approach seems to have been the preferred therapeutic approach in most cases as well, with reports going back as far as 1831, although also endoscopic approaches, especially in the lower urinary tract, have been described [7]. In addition to that, we found one case of successful ureteroscopic retrieval of a toothpick from the UUT [8].

Conclusion

Due to its low incidence, foreign bodies of the UUT present a unique challenge in terms of diagnosis and treatment. Imaging studies remain an unreliable diagnostic tool, without a high clinical suspicion, which remains inevitable in diagnosing a foreign body in the genitourinary tract. Therefore we strongly recommend consulting a dedicated senior uro-radiologist in doubtful cases and also point out the possibility of a foreign body as a potential cause of UUT obstruction.

Furthermore, we strongly recommend performing a flexible URS, when performing diagnostic URS in unclear cases of obstruction, so as not to miss a potentially pushed back foreign body, as suspected in our case.

Additionally, the presence of atypical microorganisms in the urinary culture may contribute to correct diagnosis of a foreign body. In our case, the growth of *C. dubliniensis* could have steered us in the right direction, as this organism is usually isolated from the oral cavity and only occasionally found in other anatomical sites of immune-compromised patients.

To the best of our knowledge, our case is the second one in which a foreign body that entered through the gastrointestinal tract was removed by ureteroscopy. The fact that the foreign body had migrated entirely into the renal pelvis clearly aided in that matter.

Knowing what entity one is dealing with is of utmost importance and subsequent management should be tailored to the patient in a case-by-case manner, taking into account the mode of entry, as well as other involved anatomical structures. Simple extraction of a foreign body might have fatal consequences in cases of involvement of the hilar vessels or the duodenum, potentially causing haemorrhage or severe sepsis.

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Disclosure of Interests

None declared.

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Abbreviations: URS, ureterorenoscopy; UUT, upper urinary tract.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Overview of cases of accidentally ingested foreign bodies that migrated to the genitourinary tract or the renal hilar vessels.