

Tablets of the potassium citrate may cause a stone-like image: a case report

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Abstract An 8-year-old girl with left proximal ureteral stone (4 mm) was referred to our hospital to treat with shock wave lithotripsy (SWL). Fifteen days after the first SWL session, a plain film of kidneys, ureters and bladder (KUB) demonstrated a new stone-like opacity (10 mm) on the left kidney location other than previous stone of 4 mm. We counseled with her parents and learned that she took a potassium citrate tablet 2 h before. Potassium citrate is a radio-opaque drug and may cause a stone-like image during the stone management. Urologists should consider this particularity of potassium citrate in patients using this drug to avoid unnecessary interventions. To our knowledge, this is the first case in the literature.

Keywords Potassium citrate · Renal stone disease · Shock wave lithotripsy (SWL)

Introduction

Stone disease is endemic in some regions of the world such as in our country [1]. Prevention of stone recurrence in the pediatric patients will be possible only with careful metabolic evaluation and appropriate management.

We report the first case showing a simple but very important particularity of potassium citrate.

Case report

An 8-year-old girl presented with ureteral stone to our department. A 4-mm left proximal ureteral stone with grade 2 hydronephrosis was determined on a plain film of kidneys, ureters and bladder (KUB) and intravenous pyelography (Fig. 1). Her parents reported that she has a history of recurrent calcium stones and has been taking potassium citrate (urocit-K 5 mEq, 1 mEq/kg tid, per oral—Mission Pharmacal Company, San Antonio, TX, USA) and hydrochlorothiazide (Esidrex 25 mg, 1 mg/kg once a daily, per oral) for 2 years for preventing recurrent stone due to hypercalciuria. The patient underwent SWL treatment with a Siemens Lithostar lithotripter (Siemens Medizinische Technik, Erlangen, Germany) under sedoanalgesia (midazolam 0.1 mg/kg and alfentanil 10 µg). Fifteen days after the first SWL session, KUB demonstrated an additional new stone-like opacity (10 mm) on the left kidney location (Fig. 2a). When evaluating the radio-opaque images in the various positions of the patient under the fluoroscopy, we determined that a stone-like opacity was mobile and out of the left kidney location (Fig. 2b). We counseled with her parents and learned that she took a potassium citrate tablet 2 h before. Figure 3 shows an appearance of the tablets of the potassium citrate under fluoroscopy. We continued to SWL treatment and she was stone-free after two SWL sessions.

Discussion

Potassium citrate has been widely used to prevent a stone recurrence in patients with calcium oxalate and cystine stone formation, since it increases urinary citrate and pH, thus reducing stone crystal formation [2–6]. Our patient has

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Fig. 1 An 8-year-old girl presented with left ureteral calculi

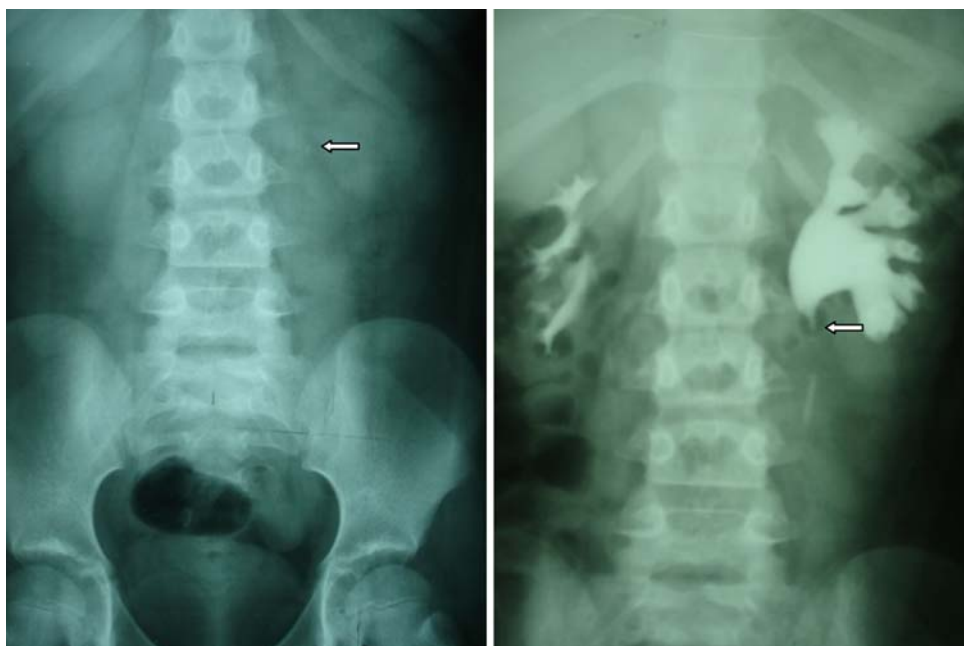
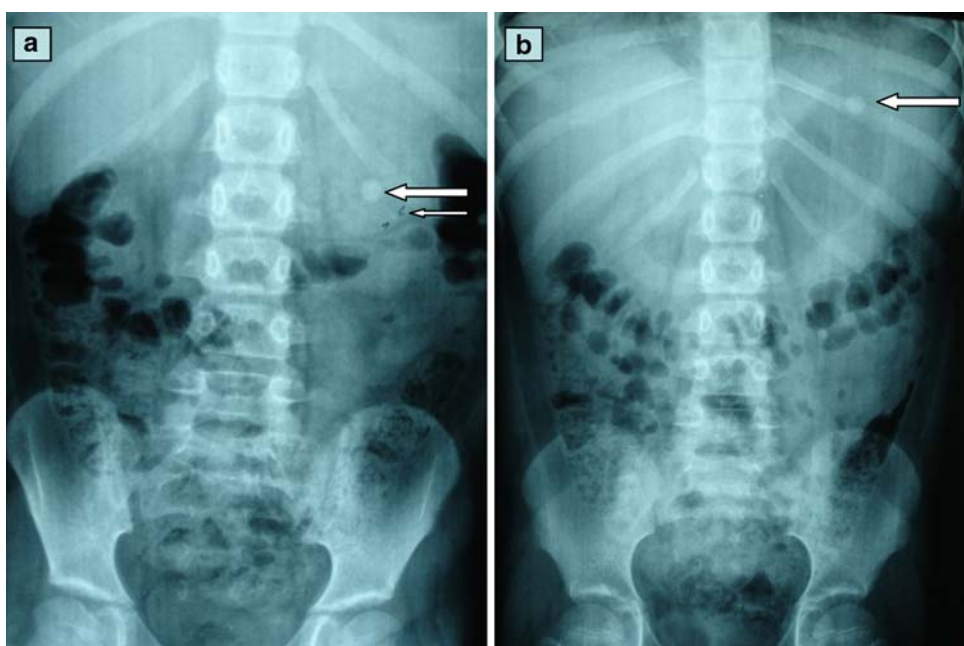


Fig. 2 At the control after first SWL session: **a** the stone performed SWL (*thin white arrow*) and a stone-like opacity (*thick white arrow*) in the localization of left kidney by KUB; **b** a stone-like opacity (*thick white arrow*) is out of the left kidney location in a control KUB



a history of recurrent calcium stones and has been taking potassium citrate and hydrochlorothiazide for 2 years to prevent a recurrent stone due to hypercalciuria.

Urolithiasis is an endemic disease in our country and has an incidence of 17% for the children as stated by Tellaloglu and Ander [1] in 1984. Hence, SWL treatment and medical therapy with potassium citrate has been widely used for the children with urinary stones, and the patients are usually evaluated by a direct fluoroscopy or KUB before each treatment session in our country. Thus, it is important to know that potassium citrate is a radio-opaque drug and may

mimic a urinary stone on KUB, as our patients. Further, this should be considered during the treatment and follow-up of patients with recurrent stone disease to avoid unnecessary interventions.

When considering the full prescribing and/or consumer medicine information leaflet of potassium citrate tablets (Urocit-K 5 and 10 mEq—Mission Pharmacal Company, San Antonio, TX, USA), there is no data about its digestion time and radio-opaque appearance on fluoroscopy. Each tablet contains 540 or 1,080 mg of the active ingredient (potassium citrate) and the inactive ingredients

Fig. 3 The images of the tablets of the potassium citrate under the fluoroscopy

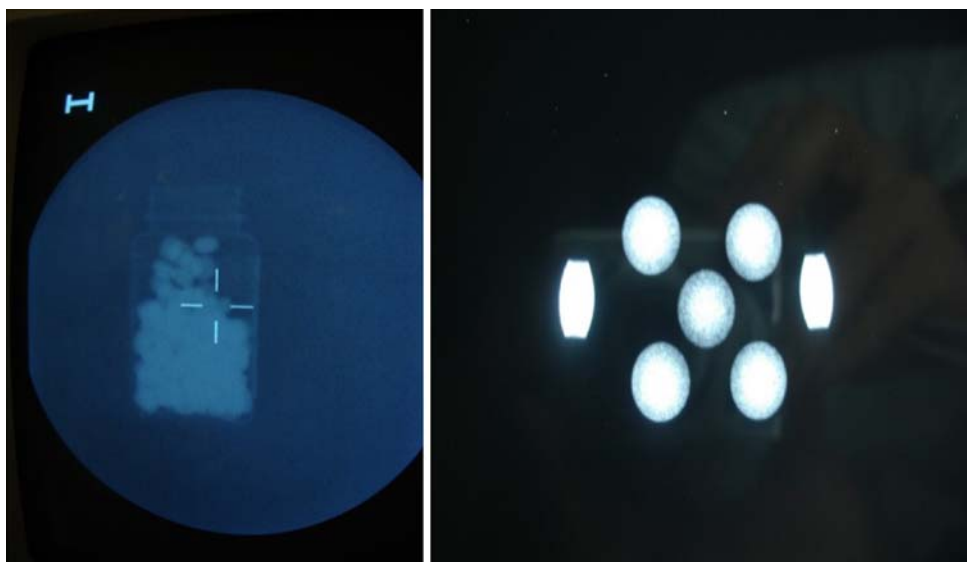
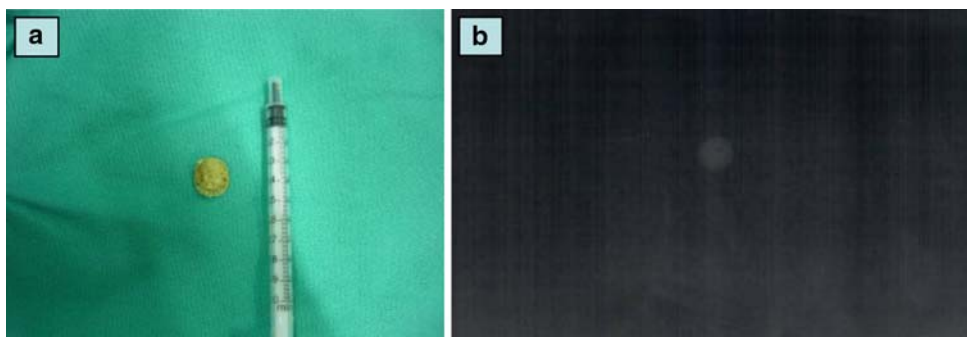


Fig. 4 **a** The remnant of potassium citrate tablet obtained from feces of the patient; **b** the appearance of this remnant under fluoroscopy



(magnesium stearate and carnauba wax). Urocit-K is supplied as wax matrix tablets and the active ingredient dissolves out of the matrix. Hence, consumer medicine information leaflet indicates that patients may notice a remnant of the wax matrix in their feces since the wax matrix itself may not disintegrate completely. Carnauba wax is one of the inactive ingredients of Urocit-K tablets and contains mainly esters of fatty acids, fatty alcohols, acids and hydrocarbons. It is known as the hardest and highest-melting natural wax and its many commercial uses include the production of high-gloss polishes, phonograph records, lubricants, surface coating of automobiles and floor waxes [7–9]. We do not exactly know which ingredient of this tablet reflects on X-rays, however, our possible explanation is that Carnauba wax might be responsible for radio-opaque appearance on fluoroscopy. Figure 4a, b shows a remnant of the tablet obtained from feces of the patient and the appearance of this remnant under fluoroscopy.

To our knowledge, there is no report in the literature. We report the first case showing a simple but very important particularity of potassium citrate. In addition, our data show that this particularity of the tablets might be indicated in

full prescribing and consumer medicine information leaflets.

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