Recurrent nephrolithiasis associated with keratinizing desquamative squamous metaplasia

Ryan Fitzpatrick, MD,[1] Luke F. Reynolds, MD,[1] James D. Watterson, MD,[1] Luke T. Lavallée, MD,[1] Trevor A. Flood, MD[2]

[1]Division of Urology, Department of Surgery, The Ottawa Hospital and University of Ottawa, Ottawa, Ontario, Canada

[2]Division of Anatomical Pathology, Department of Pathology and Laboratory Medicine, The Ottawa Hospital and University of Ottawa, Ottawa, Ontario, Canada

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Keratinizing desquamative squamous metaplasia (KDSM) in the renal pelvis is a rare condition with unclear malignant potential. Recent reports suggest it is likely benign and favor endoscopic treatment approaches. Medical record review was completed on two cases at our center to obtain history, physical examination, radiographic findings, and management. A literature review was completed to identify all published cases of KDSM. Both patients at our center suffered recurrent urolithiasis, hypothesized to be secondary to KDSM. Both were managed with a percutaneous approach to ensure complete stone and KDSM plaque removal. Our cases highlight that percutaneous surgery is an excellent management option for stone and KDSM eradication from the collecting system. This approach also allows adequate oncologic surveillance of the underlying urothelium.

Key Words: leukoplakia, keratinizing desquamative squamous metaplasia, nephrolithiasis, renal colic, percutaneous nephrolithotomy

Introduction

Keratinizing desquamative squamous metaplasia (KDSM) is a condition where normal urothelium is replaced by keratinizing squamous cells. KDSM is thought to be caused by chronic inflammation from conditions such as urolithiasis, tuberculosis, chronic infection, or vitamin A deficiency.[1,2] KDSM has rarely been reported in the renal pelvis and has previously been considered a pre-malignant transformation. Diagnosis is challenging because symptoms are non-specific and may include flank pain from obstruction, irritative voiding symptoms, and passing of gray debris (desquamated keratinized cells). KDSM may also present as a filling defect on imaging studies mimicking malignancy.[3] KDSM may serve as a nidus for development of nephrolithiasis. Because KDSM is rare and its association with malignancy undefined, there is no consensus on optimal follow up. In this paper we present two cases of recurrent stone disease associated with keratinizing desquamative squamous metaplasia.

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Address correspondence to Dr. James D. Watterson, Division of Urology, The Ottawa Hospital, General Campus, 501 Smyth Road, Ottawa, ON K2J 4Y1 Canada

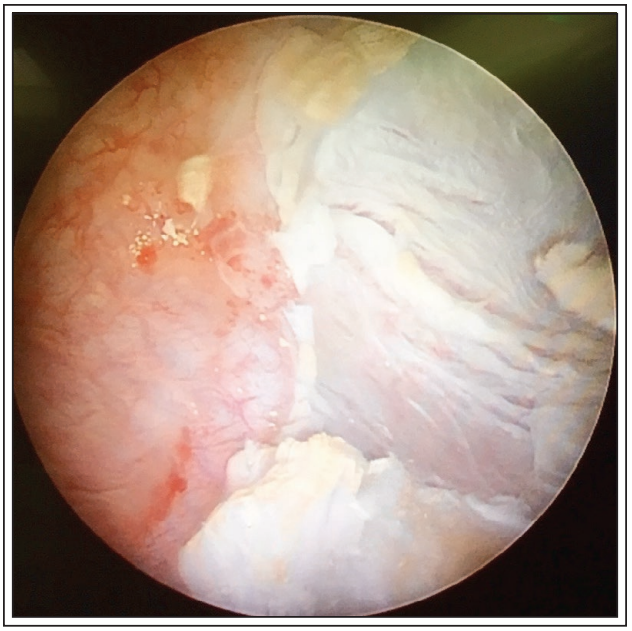

Figure 1. Direct visualization of the KDSM plaque during PCNL demonstrating the "white rind" on normal urothelium.

Case reports

Case 1

A 61-year-old Caucasian female with a prior history of bilateral urolithiasis presented with flank pain and microscopic hematuria. Computed tomography (CT) demonstrated a 3.2 cm left partial staghorn calculus which was treated with a percutaneous nephrolithotomy (PCNL). Intraoperatively, a white urothelial rind was visualized and sampled. Pathologic analysis suggested a keratinizing squamous epithelial lesion. Stone composition was calcium carbonate-phosphate with magnesium ammonium phosphate. Following PCNL, the patient was lost to follow up. Three years later, she presented with left flank pain and was found to have a new cluster of stones measuring 2 cm. A repeat PCNL was performed and a white rind adherent to the urothelium of the renal pelvis was encountered, Figure 1. The white rind was gently peeled off the urothelium with atraumatic graspers. Pathology confirmed KDSM without evidence of dysplasia or malignancy. Repeat stone analysis revealed a combination of calcium oxalate and calcium carbonate-phosphate with a small amount of uric acid.

Case 2

A 52-year-old Caucasian female referred for incidental finding of left renal pelvic stones. The patient

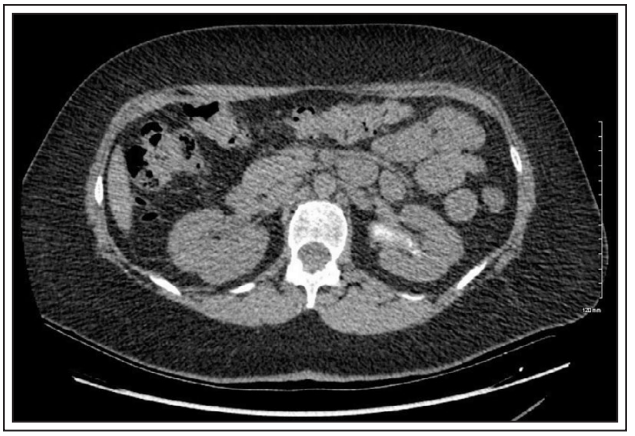

Figure 2. Axial CT image demonstrating radio-opaque lesion in the left renal pelvis with irregular borders.

denied a history of urinary tract infection, lower urinary tract symptoms, flank pain or previous urolithiasis. CT scan demonstrated a 3.6 cm x 4.6 cm left renal staghorn stone with contralateral small nonobstructing calyceal stones. A left PCNL was performed with complete clearance of all visible stone fragments. No signs of KDSM were noted intraoperatively. Stone analysis demonstrated calcium oxalate composition. The following year the patient underwent uncomplicated extracorporeal shock wave lithotripsy (ESWL) for non-obstructing stones on the right side. Plain film imaging at the time of ESWL suggested stone recurrence in the left kidney. CT scan demonstrated a 13 mm stone in the lower pole calyx with a 27 mm radiopaque lesion (Hounsfield units 175) in the renal pelvis with ill-defined borders, Figure 2. Urine culture was

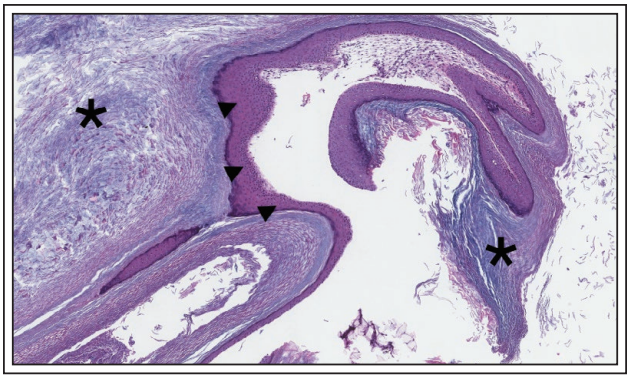

Figure 3. Biopsy of the renal pelvis showing superficial strips of metaplastic squamous epithelium (arrow heads) with associated keratinization (asterisks) [20X magnification].

negative. Repeat left PCNL revealed stone material adherent to a white mucosal plaque. Stone removal was performed and urothelial biopsies were taken to rule out malignancy. Atraumatic stone graspers were used to gently peel off the white rind from the renal pelvis. A temporary ureteral stent was placed to maximize urinary drainage postoperatively. The patient was placed on 6 weeks of low-dose antibiotic prophylaxis pending stone analysis. Stone analysis revealed calcium oxalate with a small amount of calcium carbonate-phosphate. Pathology exhibited extensive keratin debris consistent with KDSM with no evidence of dysplasia or malignancy, Figure 3. Follow up CT urogram at 6 months demonstrated adequate drainage without any evidence of stone recurrence or urothelial abnormalities. Metabolic evaluation showed low urinary volumes as the patient's only risk factor for recurrent urolithiasis.

Discussion

KDSM is a rare condition, first reported in 1861, in which urothelium of the urinary tract is replaced with keratinized squamous epithelial cells.[1,2] The etiology of KDSM is not fully understood, although one theory is that it arises from chronic inflammation.[1,4] Presenting complaints vary, but patients may complain of flank pain (70%), as well as dysuria, pyuria, and hematuria. The hallmark sign of KDSM is the passage of gray debris or chalky stones with turbid urine.[4]

KDSM of the lower urinary tract has been documented concurrently with squamous cell carcinoma in 8%-12% of cases, but the relationship has never been shown to be causal.[5] Of all cases of KDSM of the renal pelvis we reviewed, only two report a synchronous malignancy following histopathological examination of nephroureterectomy specimens. One case was transitional cell carcinoma and one squamous cell carcinoma, however there was no histologic involvement of KDSM in the tumors.[1] There are no clear guidelines on the most appropriate management of upper tract KDSM due to the paucity of cases available in the literature. Identification of KDSM should prompt urologists to have a low threshold to rule out malignancy. Radical surgeries, such as nephroureterectomy, were previously used as treatment for upper tract KDSM to ensure removal of any potential malignant urothelium. Recently, there has been a trend towards nephron-sparing approaches combining endoscopic procedures and radiological surveillance because there is a decreased concern regarding the malignant association with KDSM.[6-8]

Management of upper urinary tract stones associated with KDSM should be directed at complete removal of all stone debris and keratin plaques because plaques left in situ may promote recurrent stone formation.[9] The appearance of ill-defined, low-density debris on preoperative non-contrast CT imaging may raise the possibility of co-existing KDSM. In the author's opinion, the optimal management strategy for urolithiasis associated with KDSM is PCNL as it is the most effective approach to adequately remove the keratin plaques that may be extremely adherent to the urothelium of the renal pelvis. This minimizes the future risk of stone formation and allows for adequate oncologic surveillance. Intraoperatively, it is important to consider temporary ureteral stenting to ensure optimal drainage and to avoid obstructive complications from sloughing of debris. If struvite stone composition is suspected, low dose antibiotic prophylaxis may be considered while awaiting stone analysis.

In our two cases of urolithiasis associated with KDSM, both patients exhibited stone recurrences. In an effort to further prevent recurrence, patients should undergo metabolic stone evaluations and be counseled and managed accordingly. Follow up imaging is recommended with CT scans, as ultrasound and plain film imaging will not adequately assess for recurrence of the low density stone material associated with KDSM. Due to the rarity of KDSM, particularly in the upper urinary tract, guidelines for follow up are lacking. In the absence of guidelines, our present strategy is to employ annual CT urogram imaging for an initial period of 3 years. CT imaging will assist in early identification of recurrent urolithiasis or KDSM, with the additional benefit of evaluating the urothelium of the renal pelvis for subtle abnormalities concerning for malignancy.

Conclusion

KDSM associated with urolithiasis in the renal pelvis is a rare entity. If suspected, PCNL is recommended as PCNL provides the optimal approach to remove stone debris, perform a biopsy to rule out malignancy, and to peel away adherent keratin plaques. Careful follow up with CT imaging will assist in the early identification of recurrences of urolithiasis and KDSM. The need for long term monitoring for development of malignancy is unknown. Individualized patient counseling and follow up strategies are recommended in the absence of standard guidelines. □

References

1. Reece RW, Koontz WW. Leukoplakia of the urinary tract: a review. *J Urol* 1975;(114):165-171.
2. Salm R. Combined intestinal and squamous metaplasia of the renal pelvis. *J Clin Pathol* 1969;22(2):187-191.
3. Ganeshappa A, Krambeck A, Grignon DJ et al. Endoscopic management of keratinizing desquamative squamous metaplasia of the upper tract: a case report and review of the literature. *J Endourol* 2009;(23)1277-1279.
4. Hertle L, Androulakakis P. Keratinizing desquamative squamous metaplasia of the upper urinary tract: leukoplakia—cholesteatoma. *J Urol* 1982;127(4):631-635.
5. Boswell P, Fugitt B, Kane C. Keratinizing desquamative squamous metaplasia of the kidney mimicking transitional cell carcinoma. *J Urol* 1998;52(3):512-513.
6. Coode-Bate J, Davies M, Cooke I. Keratinizing desquamative squamous metaplasia in the kidney of a patient with complex spinal cord injury. *J Spinal Cord Med* 2016;39(2):240-242.
7. Siderits R, Fingerman J, Hazra A et al. Renal pelviceal keratinizing squamous metaplasia with sparing of pyramidal zones. *Case Rep Urol* 2011;2012(242780):4.
8. Borofsky M, Shah R, Wolf S. Nephron-sparing diagnosis and management of renal keratinizing desquamative squamous metaplasia. *J Endourol* 2009;23(1):51-55.
9. Ghali F, Pattison E, Pais VM. Keratinized squamous metaplasia of the upper urinary tract resulting in recurrent renal colic. *Clin Nephrol* 2015;84(4):251-253.