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Severe calcification of forgotten Double-J ureteral stent in a patient with undiagnosed hyperparathyroidism

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Severe calcification of forgotten Double-J ureteral stent in a patient with undiagnosed hyperparathyroidism

Abstract

Background

Double J stent (DJ) is widely used in urological practice in patients with renal stones. However, its application is related to the risk of incrustation. We present a case of severe calcification of forgotten DJ in a patient with previously undiagnosed hyperparathyroidism (HPT).

Case presentation

A 30-year-old female was admitted to the Urology Department with renal colic. An initial kidney, ureter, and bladder X-ray revealed a completely calcified DJ catheter placed twelve months earlier. Unfortunately, the patient did not show up for a follow-up visit, and stent removal was not performed. Due to the extent of the disease, the patient was qualified for multistage endoscopic treatment. Total treatment lasted six months and consisted of five urereroscopies and one hybrid procedure. Simultaneously, diagnostics of a metabolic cause of the advanced stone disease suggested primary hyperparathyroidism, confirmed during parathyroid scintigraphy. After urological treatment had been completed, parathyroidectomy was performed. During a further 7-year follow-up, only one episode of renal colic occurred within the first year after treatment. The patient is stone-free until the present day.

Conclusions

Stents are designed to last usually up to six months, but they should be removed as quickly as possible after finishing treatment. Also, other causes such as a metabolic or hormonal imbalance should be considered. In our patient combination of forgotten DJ and HPT was the reason for excessive stone formation. Selective removal of the parathyroid gland was effective in the presented patient, with no stone recurrence observed.

Keywords: double-J stent; JJ stent; forgotten stent; endourology; urolithiasis; hyperparathyroidism

Introduction

Double J stent (DJ) is widely used in urological practice in patients with renal stones. However, due to the risk of incrustation, it is crucial to set up regular checkups and timely removal of the stent. The major risk factor of stone formation is prolonged indwelling time[1]. Hyperparathyroidism (HPT) alone accounts for 5% cases [2].

Even though encrustations of ureteric catheters are relatively common, unfortunately, in 71-83% of cases, simple cystoscopic stent retrieval is sufficient[1, 3]. Furthermore, patients with catheters indwelling for less than three years are almost always handled with one or two procedures[1]. On the contrary, patients with catheters placed three years and over usually need several procedures[1].
For those patients, there is no guideline on the best treatment method. Ureterorenoscopy, percutaneous nephrolithotomy, extracorporeal shock wave lithotripsy, and open surgery must be considered. An individual treatment plan must be prepared in each case. To help predict the number of surgeries needed and the prognosis of Alex Acosta-Miranda et al. [4] suggested the FECal staging system. Javier Arenas et al. [3] suggested the KUB scoring system. The higher the grade/points of both systems, the higher the risk of more surgeries and longer operative time [3, 4]. FECal stage 1 and 2 out of 5 for around 69% of patients [4, 5]. Based on minimal data, the highest FECal grade 5 is a risk for open surgery involving nephroureterectomy[5, 6]. FECal grade accounts for about 13% of all forgotten double-J stents[5].
We present a case of entirely calcified forgotten DJ indwelling for only 12 months in a patient with previously undiagnosed, asymptomatic hyperparathyroidism. Even though the catheter had 12 months, it was completely calcified with a FECal grade of 5 out of 5 and a KUB score of 15 out of 15.

Case presentation

A 30-year-old female was admitted to the Urology Department with renal colic. An initial kidney, ureter, and bladder (KUB) X-ray revealed a completely calcified DJ catheter (fig. 1a) – FECal Grade 5 (out of 5), KUB Score 15 points (out of 5).
The patient had ureterorenoscopy (URS) with DJ stent placement twelve months earlier. Unfortunately, the patient did not show up in the outpatient department for a visit, stent removal, and we failed to contact the patient. Initial metabolic evaluation, including calcium levels, was planned after stent removal. Therefore it was not conducted during the initial hospital stay.
Upon readmission, the patient had undergone an essential metabolic evaluation. Total calcium level was 2.76mmol/L, PTH was 220pg/mL, uric acid values were within the normal range. Ultrasound showed normal kidney parenchyma. Due to the extent of the disease, the patient was qualified for multistage endoscopic treatment. Open surgery was considered, but as we believed there was an increased risk of nephrectomy in a single open approach, severe complications, and the patient was highly motivated to undergo a minimally invasive procedure, the endoscopic approach was chosen. Sterile urine was ensured before every intervention. The first stage included URS with lithotripsy of the proximal one-third of the catheter. Deposit in the vesical part was left to avoid retracting the catheter toward the kidney during URS (Fig. 1b). The second stage was performed after three weeks and included removing deposits from the urinary bladder and distal part of the DJ stent. Only the deposit preventing catheter retracting was left (Fig. 1c). The third stage included the removal of concrements from the proximal part of the ureter, reaching the renal pelvis. Despite the removal of majority concrements, the DJ catheter remained irremovable (Fig. 2a-c). The fourth stage included URS with further lithotripsy; eventually, the DJ stent was removed. Left-sided nephrostomy was placed due to remaining stones (Fig 1d). The remaining deposits up to the renal pelvis were broken down during the fifth stage (Fig. 1e). The sixth stage was hybrid: simultaneously performing URS and PCNL allowed removal of all the deposits

(Fig. 1f). Total treatment lasted six months and consisted of five URS and one hybrid procedure.

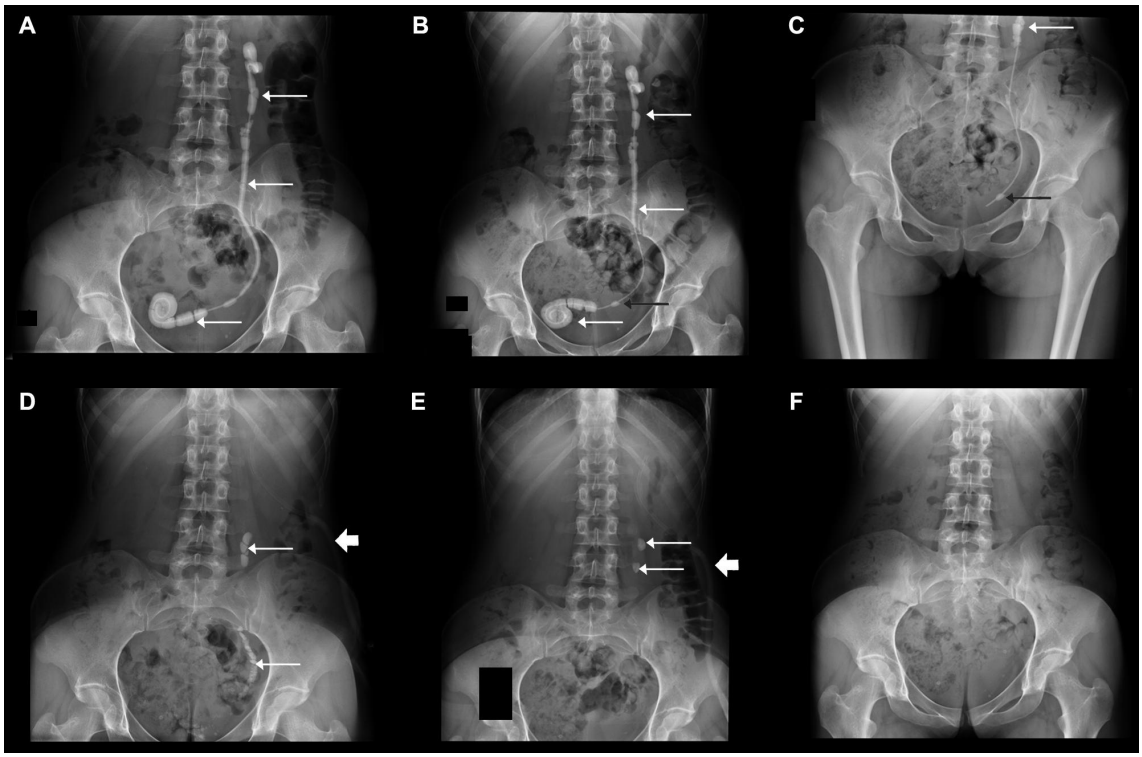

Figure 1: KUB X-rays present different stages of the surgery. White slim arrow show stones, dark arrow show a stone fragment left in the bladder in order to avoid stent retracting to the ureter during the URS, bold arrow showing nephrostomy tube, (A) initial stage (B) after first URS (C) after second URS and cystolithotrypsy (D) after fourth URS (D) after fifth URS (E) final result after hybrid URS/PCNL procedurę

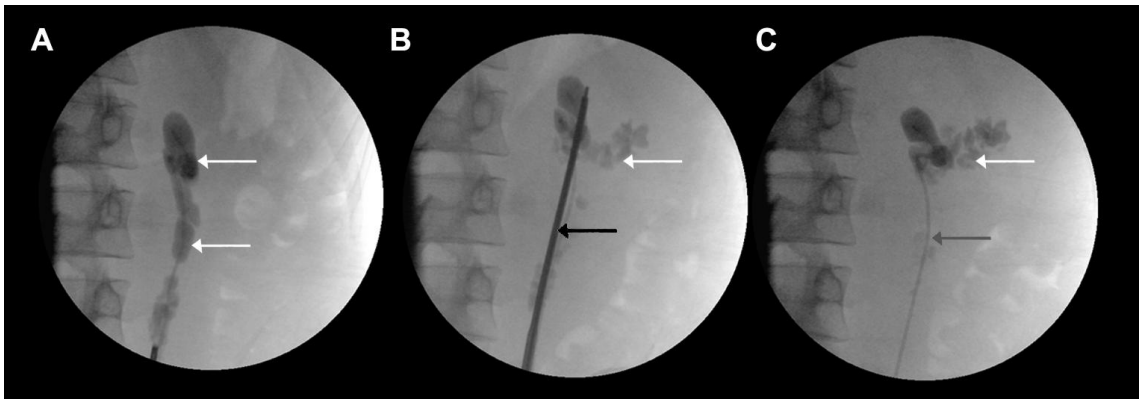

Figure 2: Fluoroscopy during third URS. The write arrow points at the stones, black: ureterorenoscope, and gray: remaining JJ catheter. Stages of URS: initial (A), URS is reaching the renal pelvis (B), after the procedure (C).

Simultaneously parathyroid scintigraphy confirmed and located the overactive parathyroid gland. Once urological treatment was completed, parathyroidectomy was

performed. During further, 7-year follow-up, only one episode of renal colic occurred within the first year after treatment. The patient is stone-free until the present day.

Discussion

Stents are designed to last usually up to six months, but they should be removed as quickly as possible after finishing treatment. Although time is one of the critical risk factors of calcifications [1], we should consider other causes. Bultitude M. et al. [7] analyzed 41 patients with 49 calcified DJ who needed surgical intervention before stent removal. Among those patients, only 14% had a stent for less than three months, but 75.5% got their stents incrusted within six months. Other reasons highly increasing the risk of incrustation were: sepsis, renal failure, metabolic or hormonal imbalance, pregnancy, and congenital abnormalities [1, 7]. Our patient had not only a forgotten DJ but also previously undiagnosed hyperparathyroidism (HPT).
In order to help determine the appropriate treatment modalities and have a better prognostic model, two grading systems were proposed. The FECal Grade system consists of 5 grades [4]. Proposed grades depended on parts of the ureteral stent incrustation: Grade 1 - sporadic incrustations, Grade 2 – complete encrustation of one pigtail or partial ureteral segment, Grade 3 - complete encrustation of one pigtail and partial ureteral segment, Grade 4 – complete encrustation of both pigtails, Grade 5 – complete encrustation of the whole stent. Grade 1 of the disease is diagnosed in 54% of patients and grade 2 in 15% of patients[5]. Only 12.8% of patients were diagnosed with grade 5 disease [5]. Patients with this stage were more likely to undergo open surgery or nephrectomy with ureterectomy [4]. Our patient developed FECal Grade 5 within 12 months. In the original work of Alex Acosta-Miranda, patients who had a FECal Grade 5 had a ureteral stent indwelling time of 27-36 months. Most probably, that happened due to undiagnosed HPT. The second grading system is called the KUB score. It consists of three parts evaluated in 1-5 point each. The first part is K-kidney, second is U-ureter and the third is B-bladder. The advantage of KUB score is that involves measurable parameters, and in addition in estimates the risk of multiple procedures better, as calcifications in the kidney pelvis are more demaning for the urologist, as odds ratio for having more than one surgery in case of $K \geq 3$ points is OR 3.59. In case of cumulative score of at least 9 points the OR for the need of performing more than one surgery is 4.19 [3]. Our patient obtained maximal 15 points in KUB score. The authors of KUB score did not specify what was the indwelling time of stents for different scores, but average score was 5.97 with mean stent indwelling time of 17.2 months [3]. In comparison to presented patient eventhough the time was significatnyl longer, the average KUB Score was smaller. This highlights how important it is to exclude HPT if we leave a double-J stent. Guner et al. [5] compared FECal Grades and KUB Score to predict the number of surgeries needed to remove stents and stone-free rate. Both systems were significantly correlated, but the KUB score was more accurate, especially on the prognosis of a higher number of surgeries needed to remove the stent. This is because it distinguished kidney and bladder localization of the stone, as well as the length and width of the stone. On the other hand, FECal Grades seem to be easier to use. As the stone formation was rapid, kidney parenchyma was not damaged, and we wanted to try to preserve the kidney. Therefore, a step-by-step endoscopic approach seemed to be more appropriate [1, 7]. The treatment depends on the severity of the disease and may consist of URS, PCNL, or extracorporeal shockwave lithotripsy. The most dangerous complications are infections which may account for up to 9.8% of patients

[8]. In order to reduce the risk, we should always perform urine culture and limit the time of a single surgery [8, 9].
HPT is estimated to be the reason for stone disease in 5% of cases. Increased PTH leads to hypercalciuria, leading to increased stone formation [2]. In our patient combination of forgotten DJ and HPT was the reason for excessive stone formation. Selective removal of the parathyroid gland was effective in the presented patient, with no stone recurrence observed.

Conclusions

Time of indwelling of the ureteral stent is the major risk factor of double-J stent encrustation. In combination with hyperparathyroidism, an extended stent calcification may rapidly occur. The KUB Score and the FECal Grade may help plan a proper treatment scheme. The endoscopic approach is feasible even in completely calcified ureteral stents and should be considered, especially in patients where we would like to avoid nephrectomy. Hyperparathyroidism should be excluded in patients with indwelling catheters.

Disclosure statement
The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.
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