V Edition of the Clinical Cases Contest on

non-surgical clinical management of Kidney Stones

Official template

Title: Stent Calcifications - A Case of a Forgotten Double J Stent

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1. Abstract (no longer than 150 words).

Double-J ureteral stents are essential in managing upper urinary tract obstructions, but prolonged indwelling times increase the risk of calcification, leading to complications like staghorn and intravesical stones. This case examines a 25-year-old female with a forgotten calcified stent causing a staghorn kidney stone and intravesical stone. She underwent open pyelolithotomy, cystolithotomy, and stent re-placement, followed by antibiotic prophylaxis and citrate supplementation. The patient remained free of stones after stent removal. Calcification risk factors include extended stent use, infections, and metabolic abnormalities, such as urine pH and oxalate levels. Managing these metabolic parameters through pH correction and citrate supplementation can significantly reduce encrustation. Additionally, targeted antibiotic prophylaxis against urease-producing bacteria like *Proteus* and *Klebsiella* can prevent biofilm formation, further minimizing stent-related complications. A tailored patient management approach, incorporating metabolic monitoring and dietary adjustments, is crucial in preventing double-J stent calcification and enhancing patient outcomes, avoiding invasive treatment.

2. Introduction

Double J ureteral stents have a major importance in the treatment of upper urinary tract obstruction. However, delay in removing them is associated with a higher probability of calcification, possibly resulting in staghorn kidney stones and intravesical stones[1]. There are several approaches to the removal of a calcified stent: extracorporeal lithotripsy, endoscopic lithotripsy, laparoscopic or open surgery, but the main question is: “What can we do to prevent double J calficications?”. The role of urease-producing bacteria, such as Proteus and Klebsiella, in forming biofilms that raise urinary pH and precipitate struvite has been highlighted to this question, as well as metabolic factors, such as pH, oxalate, and citrate levels, that may influence stent encrustations. It is postulated that correcting these parameters, could effectively prevent calcifications. [2-7]

3. Clinical Case description

a. Patient information / Medical records

A 25 year-old female patient presented in the emergency department with acute left flank pain. Five years before, during pregnancy, she had a left renal colic due to an ureteral calculus, motivating the placement of a double J stent. She was a non-compliant patient, missing multiple subsequent appointments.

b. Diagnostic support studies and results

The X-ray documented a left calcified double J stent, with a staghorn kidney stone and a large intravesical stone.

Fig. 1: Staghorn kidney stone around the proximal end of double J and intravesical stone around the distal end of the double J.

c. Diagnosis

We were facing a major double J calcification in a very young patient.

d. Treatment

Due to patient's pain complaints, socioeconomic status and probability of non-compliance with multiple surgeries and hospital admissions, we performed an open pyelolithotomy and a cystolithotomy plus a double J stent placement in the same operatory time.

e. Evolution and progress

The postoperative abdominal X-ray confirmed that the patient was stone free. The patient was discharged at the 4th postoperative day with no complications. She was given antibiotic prophylaxis and citrate supplements to prevent double J calcification.

f. Clinical results

Ureteral stent was removed after 2 months, and the subsequent month was uneventful. The patient missed the following appointment on follow-up, but no new events were reported since then.

4. Discussion

Calcification of ureteral stents is a well know problem, with a rate of incrustation of 76% at 12 weeks[8,9]. The main risk factors are: low schooling, time of use, post-operative pyelonephritis or sepsis, chronic kidney disease, recurring or residual kidney stones, physiological changes during pregnancy, congenital and metabolic abnormalities[4,8,9]. The most common encrustation type is calcium oxalate, but infectious phosphates may be predominant in the high-encrustation individuals[10]. There are

several approaches suitable for the treatment of both staghorn kidney stones and intravesical stones, going from minimally invasive surgery to open surgery. It has been known that metabolic conditions in urine significantly influence the development, severity, and composition of encrustations on double-J stents. Factors such as urinary pH, levels of oxalate, calcium, citrate, and other crystalline inhibitors contribute to the risk of mineral deposition[3,5,10]. By managing these metabolic parameters, such as correcting urine acidity or increasing citrate levels, the likelihood of encrustation can be effectively minimized, decreasing the need of invasive interventions.

5. Conclusions and recommendations

The prevention of double-J stent calcifications is a crucial aspect of managing patients requiring ureteral stents. Prolonged indwelling times are a major risk factor for encrustation, emphasizing the importance of timely removal[4]. Regular follow-ups and improved patient education are essential to reduce complications associated with stent calcifications. Additionally, metabolic conditions in urine significantly influence double J encrustations and intervene in metabolic management with citrate supplementation or pH correction, can effectively reduce the risk of calcification[3,5]. Targeted antibiotic prophylaxis against biofilm-forming bacteria, particularly urease-producing organisms like *Proteus* and *Klebsiella*, is another key preventive strategy. This approach minimizes biofilm development and the subsequent formation of infectious struvite deposits, especially in high-risk individuals[2]. Advances in stent materials, including hydrophilic or antimicrobial coatings, hold promise[6].

A tailored approach to patient management is recommended, particularly for individuals with recurrent stone formation, metabolic disorders, or barriers to accessing healthcare. Combining metabolic evaluations with appropriate pharmacological interventions and dietary adjustments can help mitigate the risk of stent-related complications. These measures collectively aim to minimize the need for invasive interventions while enhancing patient care and quality of life.

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