THE FORGOTTEN SENTINEL: A COMPREHENSIVE SERIES OF RARE SPONTANEOUS STENT FRAGMENTATIONS IN NEGLECTED URETERIC STENTS

Palaniappan, S.R[*1], Lim W.S[2]

[1] Urology Department, Hospital Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur Malaysia
[2] Urology Department, Hospital Sultanah Aminah Johor Bahru Johor, Malaysia

***Corresponding author:**
Selva Raja Palaniappan, Urology Department, Hospital Sultanah Aminah, Jalan Persiaran Abu Bakar Sultan, 80100 Johor Bahru, Johor, Malaysia. Email: selvapalani14@gmail.com

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ABSTRACT:
Spontaneous stent fragmentation with encrustation is a rare complication of neglected ureteric stent offering a unique endourological challenge often requiring complex, staged or concurrent procedure for complete clearance. This study aims to evaluate the clinical presentation, surgical management strategies and outcomes of patients presenting with uncommon neglected and fragmented ureteral stents.

INTRODUCTION

Ureteric stents play a crucial role in urology services worldwide with use ranging from emergency ureteric calculi or tumor obstruction decompression, stricture bypass, prophylaxis for gynecology or colorectal operations, pre operative ureteric calibration for retrograde intrarenal surgeries.[1] Though it is a modern-day wonder, long term indwelling beyond 3 months risks secondary stone formation, chronic infection ,and obstructive uropathy.[2] A very rare complication of neglected stent are stent fragmentations which reported ranging from 0.3% to 0.5%[3-11]. We present 4 cases of spontaneous ureteral stent fragmentation from the year 2022-2025 and review of literature to understand better on their presentation, risk factors, management strategy and outcome to better understand a rare complication.

Case 1

A 40-year-old foreign national presented to the clinic initially with left loin to groin pain and fever for 2 days to emergency. X-ray noted that the patient had a coiled encrusted stent stone in his kidney and a column of encrusted stent with stone in the left ureter. Further history noted that the patient had endoscopic stone retrieval in his home

country 6 years ago and was not informed on the stent placement post operation. He missed his further follow up when he came to Malaysia for work purposes. The patient underwent emergency left retrograde pyelogram and stenting to decompress his left kidney for left obstructive uropathy and required antibiotics for 2 weeks. Patient had a 2- step operation to remove the stent fragments. He had initial left ureteroscopy with 7Fr semirigid ureteroscope in lithotomy position followed by prone percutaneous nephrolithotomy. Operation was challenging as the ureter was tight and mucosa was edematous. Post operatively the patient developed septic shock which required noradrenaline support and intensive care unit close monitoring for 1 week. The patient had ureteral catheter intubated in the left ureter post operation to prevent further complication and this was subsequently removed prior to discharge.

Case 2

A 50-year-old patient with a history of right proximal ureteric and renal stone for 5 years missed out on her follow up and defaulted subsequently. She presented back with passing out blood and foreign body in urine to emergency. Xray imaging noted her right stent fragmented into 3 pieces with missing distal coil likely passed out in her urine. The patient was admitted to ward following which she underwent endoscopic removal of stone and the stent fragments with flexible ureteroscope 9Fr. Operating and removing the renal coil was challenging due to the encrusted coil which was released with holmium laser energy.

Case 3

A 68-year-old man with an underlying gout and history of rectal malignancy 6 years ago in remission presented with right flank pain and dysuria to the emergency department. Xray noted heavily encrusted 3-part stent fragments in the right kidney right ureter and bladder. Further history from the patient noted that he had right ureteric stenting for right obstructive uropathy secondary to rectal malignancy compression and this stent was not removed after treatment for the rectal tumor 5 years ago. CT urogram noted right kidney was grossly enlarged with thinned out cortex and subsequent functional scan noted a nonfunctioning right kidney. The patient underwent 2 stage operation where he had percutaneous vesicolithotripsy and distal stent fragment removal followed by open right nephrectomy for nonfunctional kidney and removal of rest of the stent fragments. Stone analysis later showed predominantly uric acid content of the stone.

Case 4

A 40-year-old female patient presented with dysuria. Initial imaging noted a 4-part fragment of the right ureteric stent with heavy encrustation of the proximal 2nd coil and distal coil forming a bladder stone. This patient was followed up in another center previously for endometriosis with right obstructive uropathy for which she had a right ureteric stent inserted 4 years ago. She missed out on her subsequent appointments for the stent change. Her functional scan shows a right functioning kidney at 30% with moderate obstructive uropathy on CTU plain. This patient was co-managed with the gynaecology team where an initial right nephrostomy tube was inserted. She underwent vesicolithotripsy followed by an attempt to remove right ureteric and renal stone which was difficult due to stricture at the vesicoureteric junction. The patient subsequently underwent right antegrade percutaneous removal of renal and proximal ureteric stent fragments. Another combined operation was done with the gynecology team where on table ureterolysis and open removal of ureteric stent and ureteric reimplantation of distal ureter was done.

DISCUSSION

3 out of 4 patients in this series (75%) had complication with neglected polyurethane stent which has 76.3% risk of encrustation and 0.3% risk of fragmentation with indwelling time more

than 12 weeks[12].We report one of few silicone ureteric fragmentation in literature as silicone consistently demonstrates a lower incidence of mineral deposition and structural degradation compared to polyurethane.[13][14] Majority of the patients in this study presented with significant renal function deterioration with one patient ending up with non-functioning kidney. This is attributed to persistent ureteral obstruction due to fragment encrustation luminal narrowing which ultimately limits urinary drainage and elevates retrograde pressure.[15] Interestingly, the patients in this series experience stent neglect during the period of coronavirus pandemic which occurred from the year 2020-2023.Worldwide "healthcare shock" attributed to delayed healthcare access, limited elective operative time and prolonged indwelling stent duration beyond recommended indwelling time.[16] This is preventable by the use of extraction strings, robust low technology tracking such as phone message alert on stent expiry and physical stent passport.[17] Operation was challenging with a multistep approach and multidisciplinary team involvement. Post operative sepsis is an expected complication due to micro biofilm formation, endotoxin release during intervention procedure and pyelovenous inflow with ureteric irrigation pressure exceeding 30mmHg.[18] can be reduced with preoperative decompression with percutaneous nephrostomy urine culture directed antibiotics pre operatively, and staged endourological procedures. [19]

CONCLUSION

Stent fragmentation encrustation is a rare complication of neglected ureteric stent which carry significant morbidity to patients pertinent to renal function deterioration and urosepsis risk. Management requires planned staged intervention to reduce operative complications and prevention is possible with low technology tracking and reminding systems.

CONFLICTS OF INTEREST

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FIGURE LEGENDS:

Figure 1: showing x-ray of case 1 with encrusted proximal coil and mid stent fragmentation encrustation. To note here is the missing distal coil on the imaging.

Figure 2: Image 2 depicting the x-ray of case 2 with 3 stent fragments with proximal renal stone and minimal encrustation to the proximal coil.

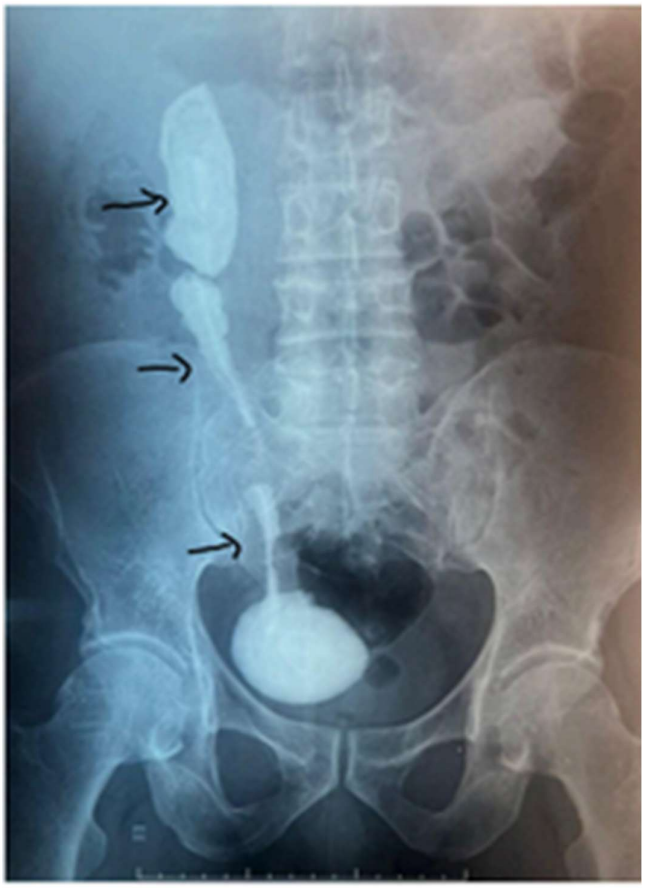

Figure 3: Image 3 depicting the 3 parts heavily encrusted ureteric and bladder stent.

Figure 4: Image 4 showing the 4-part fragment of the right ureteric stent fragments.

	Case 1	Case 2	Case 3	Case 4
Age /Sex	40/Male	50/Female	68/Male	40/Female
Indication for stent insertion	Post operative edema	Right ureteric obstruction	Relief obstructive uropathy secondary to rectal malignancy compression	Relief obstructive uropathy secondary to endometriosis compression
Stent Material	Polyurethrane	Silicone	Polyurethane	Polyurethane
Duration of stent neglect(years)	6	5	6	4
Presentation	Left flank pain ,fever	Heamaturia and stenturia	Right flank pain and dysuria	Stenturia
Renal Function(Chronic Kidney Disease Stage)	Deranged (3a)	Normal	Deranged(3a)	Deranged(2)
Forgotten Encrusted Classification (FeCAL)	4	1	5	4
Technique of retrieval	Ureteroscopy & percutaneous nephrolithototomy	Ureteroscopy	Percutaneous vesicolithotripsy and nephrectomy	Vesicolithotripsy, percutaneous nephrolithotomy and open removal of distal ureteric fragment and ureteric reimplantation
Post operative complication(clavien dindo)	4	3b	3b	3b

Table 1: Patient summary containing demography, stent indication, stent material, presentation to emergency, renal function at presentation, level of encrustation, operative technique of retrieval & post-operative complications.