Endourology

Cystolitholapaxy in Ileal Conduit

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A R T I C L E   I N F O

Article history:
Received 19 June 2015
Received in revised form 10 July 2015
Accepted 20 July 2015
Available online 1 October 2015

Keywords:
Bladder exstrophy
Urolithiasis
Ileal conduit

A B S T R A C T

Urolithiasis is a common complication of surgically treated bladder exstrophy. We report the case of a 43-year-old woman with a history of exstrophy, cystectomy, and ileal conduit urinary diversion presenting with a large calculus at the stomal neck of her conduit in the absence of a structural defect.

S C I E N C E D I R E C T

Urology Case Reports

journal homepage: www.elsevier.com/locate/eucr

Urology Case Reports 3 (2015) 185–187

Introduction

Urolithiasis is a known complication of surgically treated bladder exstrophy, with roughly 15% of patients with exstrophy developing urinary stones. Only a minority of these cases, however, involve calculi in the diverting conduit, and rarely do they require operative intervention. Moreover, urolithiasis in a diverting conduit tends to occur secondary to a structural defect in the conduit neck or stoma. In this paper, we report the case of a 43-year-old woman presenting with a large calculus at the stomal neck of her ileal conduit urinary diversion in the absence of a structural defect.

Case presentation

The patient is a 43-year-old woman with a history of bladder exstrophy, human immunodeficiency virus (HIV), hepatitis B virus, and hepatitis C virus. In 1971, she underwent ureteroileocutaneous anastomosis at 16 months of age due to bilateral hydronephrosis and hydroureter detected on intravenous pyelogram. Ten months later, at age 26 months, she underwent cystectomy. She also underwent vulvoplasty, clitoroplasty, genitoplasty, and monsplasty at age 17 for associated genital malformations.

More than 25 years later in July of 2013, at age 42, she was diagnosed with pyelonephritis and subsequently found to have a staghorn calculus with additional calculi in the lower pole of the right kidney, requiring nephrostomy tube placement. Her creatinine at that time was 1.3 mg/dL, from 0.9 mg/dL in 2007. She was then lost to follow-up and re-presented to the Emergency Department in March of 2014 with flank pain, nausea, and vomiting. Her nephrostomy tubes had been removed at an outside hospital without additional intervention, and her serum creatinine was 3 mg/dL. A CT of the abdomen and pelvis demonstrated right hydroureteronephrosis, multiple non-obstructing renal calculi, as well as a 3 cm urinary calculus at the ileal conduit neck (Figs. 1 and 2). Her urine culture returned positive for multi-drug resistant Escherichia coli and Enterobacter, for which she was treated with trimethoprim/sulfamethoxazole. One week later, she underwent outpatient cystolitholapaxy with removal of the urinary diversion stone. A rigid nephroscope was introduced directly into the ileal conduit ostium (without balloon dilation), with visualization of the stone approximately 1 cm past the skin level. The stone was fragmented using a combination of pneumatic and ultrasonic energy and extracted with alligator forceps, suction, and irrigation. The entire ileal conduit was inspected following stone retrieval, without evidence of stomal stenosis or other structural abnormality. On analysis, the stone weighed 1.38 g and was comprised of 100% carbonate apatite (dahllite).
Bladder exstrophy is a rare genitourinary malformation involving protrusion of the urinary bladder through a defect in the abdominal wall as well as a spectrum of anomalies of the genitalia, pelvic bones, rectum, and anus. Our female patient was born with bladder exstrophy and genital abnormalities in 1970 and underwent ileal conduit urinary diversion and cystectomy for hydro nephrosis and hydroureter. The use of ileal conduits for urinary diversion following cystectomy has been utilized since the early 1950s. Despite advancements in surgical technique and equipment, complications persist. In a retrospective study conducted on 1057 patients undergoing cystectomy with conduit diversion from 1980 to 1998, 60.8% of patients had at least one complication, with 15.3% suffering urolithiasis. The majority of calculi form within the upper tract or ureter; rarely are they present within the conduit unless some form of anatomical abnormality, such as stomal stenosis or obstruction, predisposes the patient to urinary stasis. A structural abnormality combined with a urinary infection puts the patient at higher risk for lower tract stone formation.

Similar to anatomically normal patients with urolithiasis, diverted patients have a range of clinical presentations. Some patients are asymptomatic, with incidentally discovered stones, while others experience voiding dysfunction, abdominal, flank or suprapubic pain, hematuria, or recurrent or persistent urinary tract infections (UTIs). Symptomatic UTI is a less common presentation in the general population, but it predominates in patients with urinary diversion, occurring in up to 70% of patients. While calcium oxalate and uric acid stones predominate in the general population, the most common stones seen with urinary diversion are magnesium ammonium phosphate (struvite) and calcium phosphate, at 63.5% and 25% respectively, a finding that is explained by the fact that both struvite and calcium phosphate stones occur more frequently in the setting of UTI.

A thorough history and physical can help confirm a suspected diagnosis of urolithiasis in a patient with a diverting conduit. Important risk factors for stone formation include chronic bacteriuria (especially urease-producing), retained mucous, metabolic derangements, the presence of foreign bodies, and urinary stasis. Urinary stasis likely contributed to our patient’s stone formation, and it commonly occurs due to chronic urinary tract dilation secondary to ureteral reflux, stricture at the ureterointestinal junction, or stomal stenosis. Our patient has lived over 40 years with urinary diversion, and she reports her initial episode of nephrolithiasis to be at presentation in 2013. The patient’s history of UTI and HIV status increase her risk for chronic bacteriuria predisposing to stone formation. This serves to explain her propensity for upper tract nephrolithiasis. Notably, the extracted ileal conduit stone was carbonate apatite, rather than struvite or calcium phosphate stone, which would be expected with chronic UTI. It remains unclear how such a large stone formed in the distal portion of her ileal conduit, given the lack of stomal stenosis. Although not suggested by the stone analysis, chronic bacteriuria, UTI, and urinary stasis within the ileal loop may be contributing factors. Another potential explanation is that an upper tract stone passed into the loop and served as a nidus for further growth, becoming too large to pass out of the stoma.

While the patient’s obstructing stone was surgically removed, the risk of recurrence after surgical intervention in this patient population is high, measured at 63% over 5 years in one study. Consequently, follow-up prophylactic and surveillance measures are indicated. Like all patients with urolithiasis, high oral fluid intake and dietary modification (such as reducing animal protein) is recommended. Additionally, treatment of any underlying causes for stone formation is warranted.

Conclusion

We have presented a case of ileal conduit urolithiasis occurring in the absence of a structural defect forty years after a patient’s cystectomy with urinary diversion for bladder exstrophy. Potential etiologies for this unusual finding include susceptibility to chronic bacteriuria in this patient with a history of HIV, UTI, urinary stasis.

Conflicts of interest

The authors have no conflict of interest to report.

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