

# Giant stones in neobladder and accompanied with a leak of cystotomy repair site: Case report and literature review

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## Case Report

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# Abstract

**Introduction:** Neobladder urolithiasis is a rare but important long-term complication of orthotopic urinary diversion. A giant stone may grow asymptotically for a few years or be discovered incidentally by a radiological examination. Open cystolithotomy is an effective intervention for the removal of large stones in neobladder.

**Case description:** We report the case of a 62-year-old male patient, submitted to a radical cystoectomy with a T pouch orthotopic neobladder 16 years before. Computed tomography scan showed a giant stone in the lumen of the neobladder without evident hydronephrosis. In view of the size of the stones, an open cystotomy was made over the neobladder and approximately 4 stones with dimensions varying from 0.8cm to 6.5cm, and weighing a total of 610g, were removed. The post-operative course has been characterized by a leak of neobladder cystotomy repair site and wound infection, which was resolved after timely cystostomy plus bilateral nephrostomy and complete patency of drainage.

**Conclusion:** Calculi in neobladders often related with metabolic disturbs, mucus overproduction and inefficient voiding. In this case, a giant stone had been growing asymptotically for a few years. Open surgical removal may be complicated or accompanied by cystotomy leak. but preferred, management option. As illustrated in this case, timely cystostomy and bilateral nephrostomy and complete patency of drainage facilitate the healing of the cystotomy leak.

## Introduction

Radical cystectomy with urinary diversion is the standard treatment for muscle invasive bladder cancer<sup>[1]</sup>. Orthotopic neobladder (ONB) reconstruction procedures have been performed across the world, primarily for the surgical treatment of bladder cancer. The neobladder as an ONB substitute approaches the ideal urinary diversion by providing a low-pressure, easily emptied continent reservoir, allowing for the patient to be continent, allowing them to be able to control their urinary function and allowing for better quality of life in comparison to other non-continent procedures, such as ileal conduit formation<sup>[2]</sup>. Several types of orthotopic bladder substitutions have been developed, of which T pouch neobladder is one of the common procedures. T pouch is an orthotopic ileal neobladder that incorporates an effective, innovative antireflux mechanism created by a serosal lined ileal tunnel<sup>[3]</sup>. Early clinical and functional results of this type of urinary diversion have been excellent. However, it is not free of early and late complications. A pouch-related late complication rate between 11.6% and 23.5% has been reported in different series<sup>[4]</sup>. Urolithiasis is a delayed complication of ONB construction and ileal conduit urinary diversion after radical cystectomy. This has been known since Bricker in 1950 first described the procedures of urinary diversion<sup>[5]</sup>.

Herein, we report a rare case of giant calculi occurring in T pouch ONB.

## Case Presentation

62 year-old male patient with long-term diabetes, submitted to a radical cystectomy with a T pouch ONB 16 years before due to pT3N0M0 bladder urothelial carcinoma. He presented poor postoperative urinary function and required self-catheterization to avoid retention, beginning to refer voiding complaints with high post voiding residue evaluated through ultrasound. Urodynamic test showed that the patient's urinary flow rate was near zero, so the patient had been requiring long-term catheterization to void. Six years after the surgery, he did not continue the oncological follow-up.

One month ago, the patient went to the emergency room with fever and was found to have a giant stone in the lumen of the neobladder by Computed tomography(CT)of the abdomen and pelvis.(Fig. 1).No dilatation of the upper urinary tract was revealed. On abdominal examination,there was unremarkable apart from a huge lower midline abdominal scar.Numerous red and white blood cells were detected in urine sediment. Urine culture was positive to *Pseudomonas aeruginosa*.In view of the size of the stones, he proceeded to an open neocystolithotomy via an incision through the lower half of his previous midline scar.Bowel loops were found adherent to each other and to the neobladder. These were carefully separated with blunt and sharp dissection(Fig. 2).Four stones were removed varying from 0.8cm to 6.5 cm, and weighing a total of 610g(Fig. 3). The subsequent stone biochemistry analysis showed Ammonium magnesium phosphate hexahydrate, Carbonate apatite and small amount of calcium oxalate stones.Finally, The neocystotomy was closed in two layers and a pelvic drain inserted.

One week after the operation, the patient suffered an abdominal wound infection, with a large number of pus fetuses visible in the wound and a large amount of white flocculent blocking the urinary catheter.So we removed all of the sutures as well as a significant quantity of necrotic tissue.Pus and drainage fluid culture was positive to *Escherichia coli* and *Enterococcus faecalis*. Because of the urine leakage from the bladder anastomosis seen with a considerable volume of water injection into the ureter, we deemed the patient to have a complication with a cystotomy repair site leak. We then intermittently debrided the wound and continued urethral irrigation Plus three generations of cephalosporins anti-infection in the hope that the bladder leak would heal spontaneously. After one week of conservative management, the nearly 2 cm fistula in the bladder never healed. So we decided to operate again to solve the bladder leakage problem. Intraoperatively, we found that the bladder plasma membrane layer was severely adherent to the surrounding musculocutaneous tissue and difficult to separate, and the bladder anastomosis on one side was markedly edematous.so we performed secondary cystic suture repair with cystostomy T-tube drainage plus bilateral nephrostomy. Postoperatively, a small amount of exudate was still seen daily next to the patient's bladder suture, and we continued intermittent dressing changes. After 15 days of conservative management, the leak of cystotomy repair site showed a tendency to heal from the CT. (Fig. 4).The patient was discharged with continuing conservative management as given above in located hospital.

## Discussion

Formation of calculi within orthotopic urinary reservoirs is a relatively uncommon late complication. While there is only a reported incidence of 0.3% in ileal neobladders<sup>[6]</sup>, the rate of stone formation can range from 11 to 27% in some of the common catheterizable urinary diversion channels<sup>[7, 8]</sup>.

The underlying etiopathogenetic factors are multiple and include the mucus production of bowel mucosa, the presence of urine infected by urease-producing germs that alkalinize the urine, metabolic acidosis from ammonia absorption by urinary diversion, leading to hypercalciuria,

hypocitraturia, hyperoxaluria, hyperuricosuria, and hyperphosphaturia, which can all contribute to increased risk of stone formation<sup>[9]</sup>. Furthermore, the presence of chronic urinary retention and subsequent self-catheterisation promotes the stasis of lithogenic factors and introduction of microbes within the urinary diversion, respectively. Finally, even foreign bodies (as sutures in non-absorbable material, surgical staples) can act as a nidus for stone formation<sup>[10]</sup>.

A stone in the neobladder may be asymptomatic and can be discovered as an incidental finding on a radiological investigation. However, when symptoms occur they may include severe lower abdominal pain, dysuria, haematuria or lower urinary tract symptoms. Without appropriate follow-up, these can grow to remarkable dimensions as illustrated in this case.

The main treatment for small stones in the neobladder is represented by endoscopic, percutaneous, or a combined approach. For the large stones in the neobladder, the main treatment is the cystolithotomy with open access for complete stone clearance as demonstrated by our case<sup>[11]</sup> or endoscopic fragmentation which may require multiple treatments.

Even after clearing all the bladder stones, recurrence is still inevitable. Urolithiasis after urinary diversion poses a significant surgical challenge due to altered anatomy and carries a recurrence rate as high as 63% within 3–5 years after the initial intervention<sup>[12]</sup>. Prevention is one of the most effective measures to deal with this complication. Maintaining adequate intake of fluids, daily irrigation of the pouch with normal saline, voiding by clock or double voiding, performance of regular clean intermittent catheterization in those who void ineffectively, and antibiotic prophylaxis in those who develop recurrent urinary tract infections are the recommended preventive measures<sup>[13]</sup>.

The post-operative course has been characterized by a leak of neobladder cystotomy repair site and wound infection in this case, which was resolved after bilateral nephrostomy and secondary cystic suture repair with cystostomy. The reason for a leak of neobladder cystotomy repair site is still unknown, but we suspect that it was closely related to poor intraoperative wound protection and the retention of bacterial biofilm and debris on the stone surface in the incision. In addition, Unlike the blood supply to the normal bladder, the blood supply to the ONB is poor and very susceptible to ischemic necrosis, thus making healing at the bladder repair site very slow.

We learnt some lessons from this case. It is critical to be adequately prepared before conducting an open cystotomy on a patient with large stones in the neobladder. To begin, preoperative anti-infection using

sensitive antibiotics, as well as bladder irrigation and drainage to treat pre-existing urinary tract infections is required. Second, blood glucose should be regulated as much as possible in diabetic patients to minimize high risk factors for postoperative infection. Finally, during surgery, precautions should be made to protect the neobladder incision and blood supply against infection by infectious stones. Tension-free suturing of the neobladder incision should also be a priority. Additionally, postoperatively post-pubic drainage tubes, cystostomy tubes, and urinary catheters should be left in place as much as possible to allow for proper urine drainage and to avoid tension in the neobladder.

When a patient has a leak at the cystotomy repair site following an open neocystotomy for lithotripsy and the leak is unlikely to cure on its own with conservative therapy, prompt and correct treatment is required. To begin, a double nephrostomy is performed as soon as feasible in order to drain daily urine output and promote an open effect on the neobladder. Second, with an indwelling cystostomy, adequate drainage is essential. Finally, mucus overproduction by the gut may have a role in the creation of calculi and infection in ONB, resulting in the adherence of tiny crystals and the formation of bacterial biofilms, which are not favourable to the repair of bladder leaks. As a result, flushing the urine bowel fluid and keeping the drainage open is critical.

## Conclusion

lithiasis is a rare but important long term complication of orthotopic bladder , often related with metabolic disturbs, mucus overproduction and inefficient voiding. In this case, a giant stone had been growing asymptotically for a few years. Open surgical removal may be complicated or accompanied with cystotomy leak. but preferred, management option. As illustraeted in this case, timely cystostomy and bilateral nephrostomy and complete patency of drainage facilitate the healing of the cystotomy leak.

## Declarations

**Ethics approval and consent to participate:** We, the authors, openly state that this case report was conducted in accordance with the World Medical Association Declaration of Helsinki; additionally, that after the clinical management of the case had been concluded, the patient was informed about the authors' purpose to send his clinical data (including images) for a possible scientific publication, to which he has formally agreed and authorized it by signing a written informed consent.

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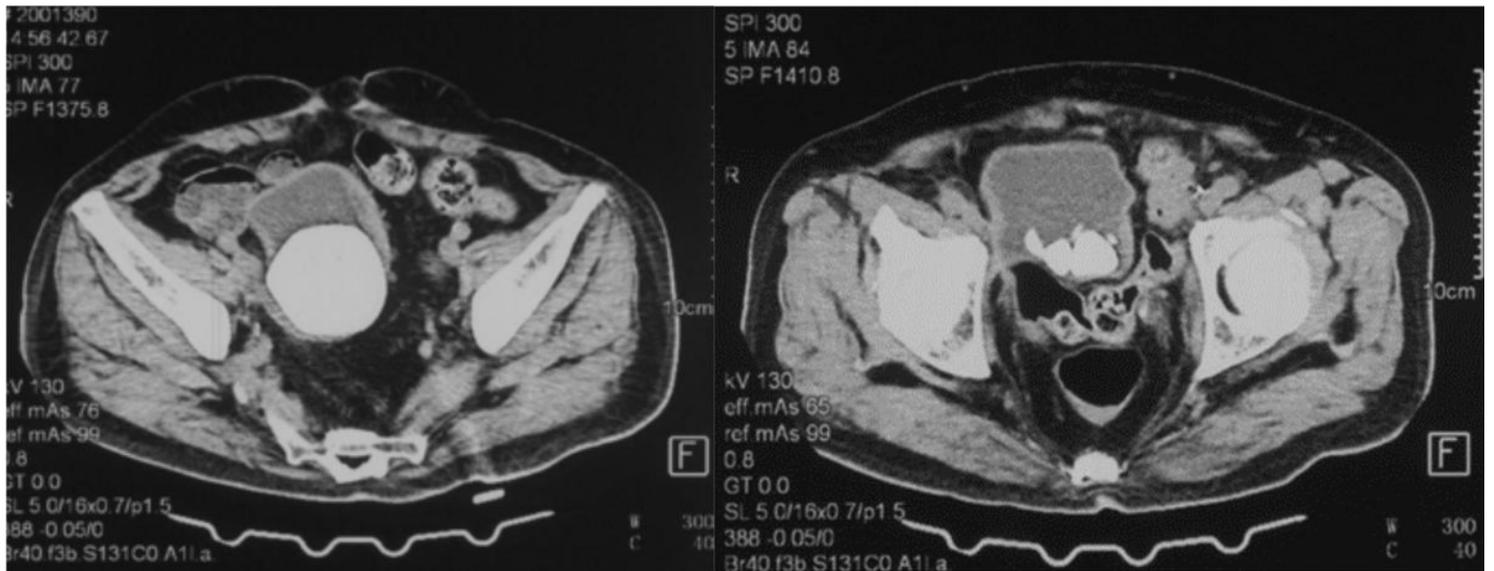
**Authors' contributions** Xiaobo Ye: Conception, design, and writing drafting. Yue Xu and Zhi Qiu : Proof check. The authors read and approved the final manuscript.

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## References

1. Joensen U N, Maibom S L, Poulsen A M. Surgical Management of Muscle Invasive Bladder Cancer: A Review of Current Recommendations [J]. *Semin Oncol Nurs*, 2021, 37(1): 151104.
2. Philip J, Manikandan R, Venugopal S, et al. Orthotopic neobladder versus ileal conduit urinary diversion after cystectomy—a quality-of-life based comparison [J]. *Ann R Coll Surg Engl*, 2009, 91(7): 565-9.
3. Skinner E C, Fairey A S, Groshen S, et al. Randomized Trial of Studer Pouch versus T-Pouch Orthotopic Ileal Neobladder in Patients with Bladder Cancer [J]. *J Urol*, 2015, 194(2): 433-9.
4. Madbouly K. Large orthotopic reservoir stone burden: Role of open surgery [J]. *Urol Ann*, 2010, 2(3): 96-9.
5. Pannek J, Senge T. History of urinary diversion [J]. *Urol Int*, 1998, 60(1): 1-10.
6. Hautmann R E, de Petriconi R C, Volkmer B G. 25 years of experience with 1,000 neobladders: long-term complications [J]. *J Urol*, 2011, 185(6): 2207-12.
7. Ginsberg D, Huffman J L, Lieskovsky G, et al. Urinary tract stones: a complication of the Kock pouch continent urinary diversion [J]. *J Urol*, 1991, 145(5): 956-9.
8. Terai A, Ueda T, Takechi Y, et al. Urinary calculi as a late complication of the Indiana continent urinary diversion: comparison with the Kock pouch procedure [J]. *J Urol*, 1996, 155(1): 66-8.
9. Marien T, Robles J, Kammann T M, et al. Characterization of Urolithiasis in Patients Following Lower Urinary Tract Reconstruction with Intestinal Segments [J]. *J Endourol*, 2017, 31(3): 217-22.
10. Ferriero M, Guaglianone S, Papalia R, et al. Risk assessment of stone formation in stapled orthotopic ileal neobladder [J]. *J Urol*, 2015, 193(3): 891-6.
11. Ouellet S, Jeldres C, Simard H, et al. Open cystolithotomy for very large calculi in a Studer ileal neobladder [J]. *Can J Urol*, 2015, 22(6): 8112-4.
12. Cohen T D, Strem S B, Lammert G. Long-term incidence and risks for recurrent stones following contemporary management of upper tract calculi in patients with a urinary diversion [J]. *J Urol*, 1996, 155(1): 62-5.
13. Kusuma V R, Reddy J, Divella R K. Endoscopic neo cystolithotripsy for multiple calculi in studer ileal neo bladder: a case report [J]. *Urol J*, 2011, 8(2): 159-62.

## Figures



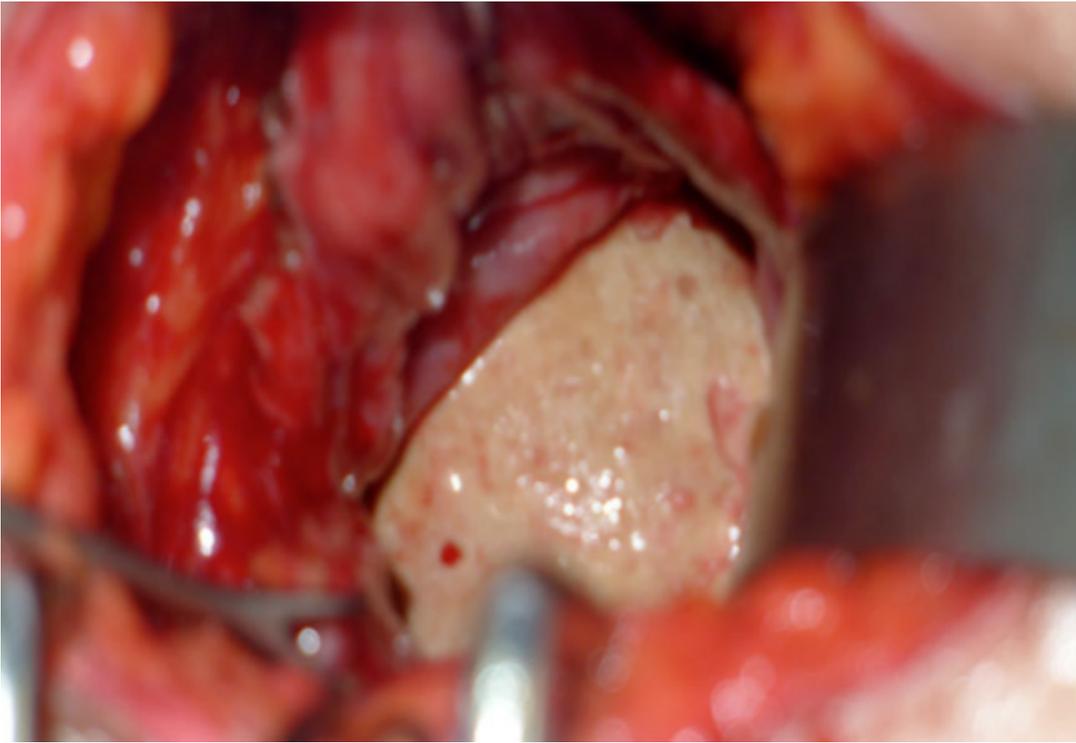
**Figure 1**

CT showed multiple high-density stone shadows in the bladder, the largest being 6 cm in diameter



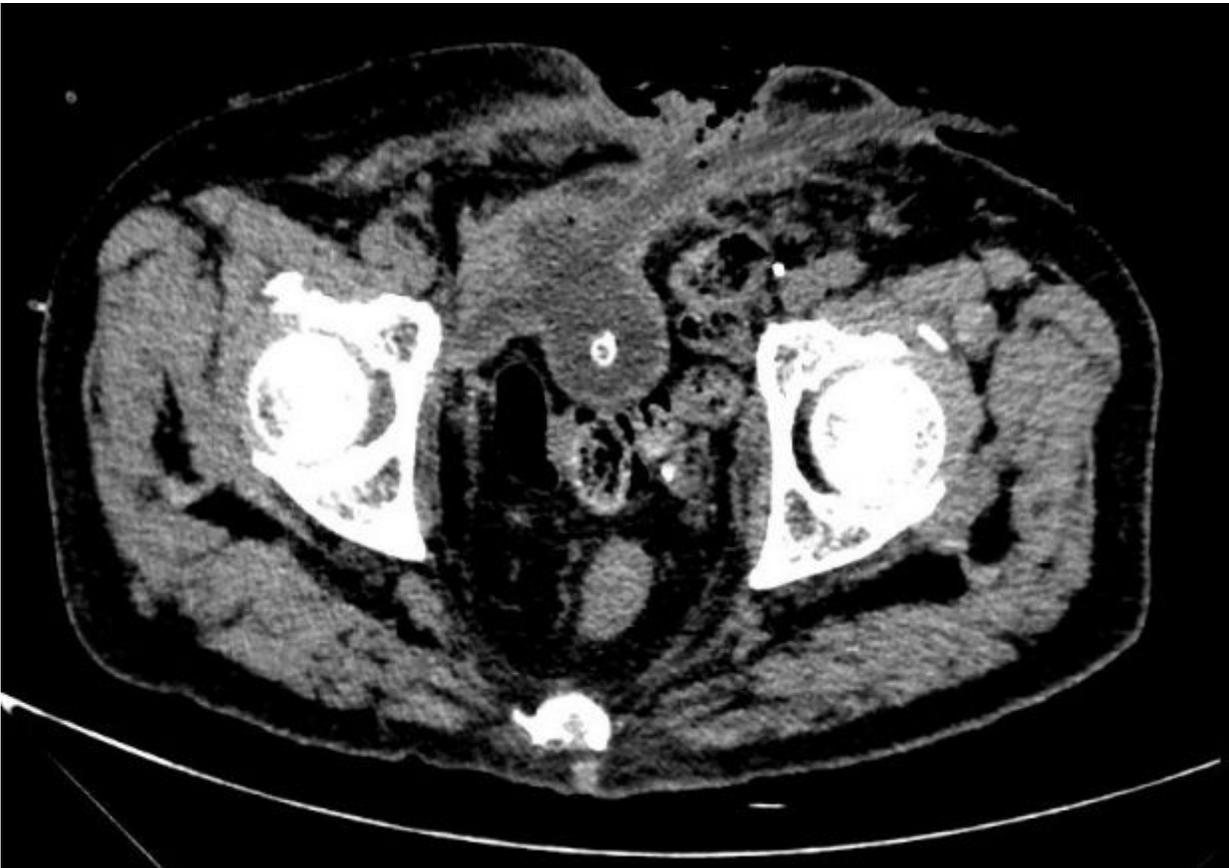
**Figure 2**

Four stones were removed varying from 0.8cm to 6.5 cm, and weighing a total of 610g



**Figure 3**

Intraoperative photograph showed a giant stone in the neobladder



**Figure 4**

CT showed the leak of cystotomy repair site displayed a tendency to heal