Case Report

Percutaneous cystolithotripsy of bladder stones in children: A case series, an experience from a tertiary hospital

Dahril, Jufriady Ismy, Arie Asnafi[1], Rovy Pratama[2]

Department of Urology, Faculty of Medicine, Zainoel Abidin Hospital, Universitas Syiah Kuala, [2]Medical Research Unit, Faculty of Medicine, Universitas Syiah Kuala, Banda Aceh, [1]Department of Urology, Faculty of Medicine, Hasan Sadikin General Hospital, Universitas Padjajaran, Bandung, Indonesia

Abstract

Urinary calculus is more commonly known in infants, and the urinary bladder is the most common location in the lower urinary tract for stone formation. There are three basic types of bladder calculus: Primary idiopathic/endemic, secondary, and migrant. The standard treatment of bladder calculus is open cystolithotomy or transurethral cystolitholapaxy. However, the use of a percutaneous approach has been promoted. We performed percutaneous cystolithotripsy with urethrocystoscopy guidance in children with bladder stones. The procedure was done without any ultrasound or fluoroscopic guidance. In children who required percutaneous cystolithotripsy with urethrocystoscopy guidance, we documented four cases of bladder stones. The diagnoses were made based on anamnesis, ultrasonography, physical examination, and X-ray imaging. In all patients, the operation was successful, and intraoperative results showed a single stone in each of the three patients and two stones in the same patient. This report aims to define the surgical challenges presented by bladder stones and the multidisciplinary approach needed to deal with them. Under ultrasound or fluoroscopic guidance, we performed percutaneous cystolithotripsy in children. The percutaneous cystolithotripsy was the most frequent outpatient treatment. The bladder was first filled with contrast material or water. A Foley catheter was inserted in the urethra and left for a period of 3–5 days. The rectus fascia defect was closed using the 2-0 vicryl suture. Percutaneous suprapubic lithotripsy is a safe and successful procedure for treating bladder stones in children. It is fast and linked to negligible complications.

Keywords: Bladder stone, pediatric, percutaneous cystolithotripsy

Address for correspondence: Dr. Dahril, Komplek Rumah Dokter RSUZA, Jl Kakap No. 15, Banda Aceh, Indonesia.
E-mail: dahril.fk@unsyiah.ac.id
Received: 23.12.2020, **Accepted:** 07.06.2021, **Published:** 20.01.2022.

INTRODUCTION

Urinary calculus is recognized more frequently in infants, in which the urinary bladder is the most common location in the lower urinary tract for stone formation. Consequently, the demand for pediatric urologists has increased for both simple and complex stone cases in all age groups.[1] Unfortunately, only a handful of case series have been published on pediatric bladder calculus.

There are three basic types of bladder calculus: primary idiopathic/endemic stones, secondary stones, and migrant stones. There is a greater prevalence of children from

Access this article online	
Quick Response Code:	Website: www.urologyannals.com
	DOI: 10.4103/UA.UA_177_20

How to cite this article: Dahril, Ismy J, Asnafi A, Pratama R. Percutaneous cystolithotripsy of bladder stones in children: A case series, an experience from a tertiary hospital. Urol Ann 2022;14:85-8.

developing countries; these stones are most often made of urate ammonium acid and are suspected of being endemically associated with malnutrition. However, in patients with congenital defects or spinal cord injuries, these stones are predominantly made of struvite.[2]

Open cystolithotomy, transurethral cystolithotripsy, shock wave lithotripsy (SWL), and percutaneous cystolithotripsy are several treatment methods available for the management of bladder stones. Transurethral cystolithotripsy may be more difficult in children, especially in boys, since urethral diameters are small and there are concerns about iatrogenic urethral restriction.[3]

Percutaneous cystolithotripsy is a safe alternative with low morbidity and complication rates for large-loaded bladder stones. On the other hand, percutaneous cystolithotomy has been performed safely for bladder stones up to 5 cm in size.[4] In this report, we present a case series of percutaneous cystolithotomy with instructions for urethrocystoscopy in children with bladder stones.

CASE REPORTS

Case 1

A 5-year-old boy experienced pain during urination. The patient complained of cloudy urine intermittently, and there was no history of passing a stone. He complained of recent signs of renal colic as well. His physical examination outcomes were unremarkable, although laboratory tests indicated mild bacteriuria and sterile urine culture. The patient underwent urologic ultrasonography as part of the preoperative workup, which revealed hyperechoic regions with heavy posterior acoustic shadowing [Figure 1].

In January 2019, the patient underwent percutaneous pneumatic cystolithotripsy access with 28 Fr Amplatz sheath. The surgery was carried out under general anesthesia and lasted 50 min [Figure 2]. A single vesical stone measuring 8 mm × 6 mm was found during surgery [Figure 3]. The patient was admitted to the hospital for 3 days with an 8 Fr indwelling catheter, which was removed on the 2nd day of admission. The patient showed no signs of complications during his most recent follow-up visit to the outpatient clinic [Figure 4].

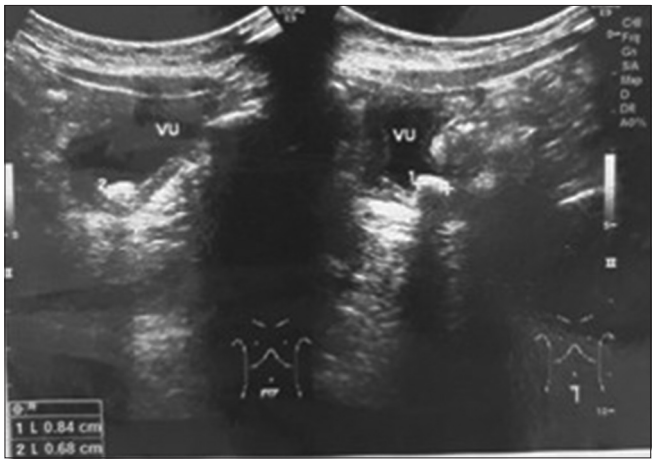

Figure 1: Bladder ultrasound

Case 2

Hematuria and sustained low fever occurred in a 2-year-old patient. With a visual analog scale score of 4, the patient seemed to be in pain. The patient noticeably shied away from suprapubic and abdominal palpation on general inspection. Laboratory testing revealed significant bacteriuria and gross hematuria in the urine. The patient had a history of malnutrition and underwent a malnutrition therapy program at a local healthcare center.

In September 2018, the patient underwent a percutaneous cystolithotripsy laser access with 18 Fr vacuum-assisted sheath. The surgery was carried out under general anesthesia and lasted 45 min. Intraoperative results showed a single 20 mm × 15 mm stone. The patient was admitted to the hospital for 3 days with a 10 Fr indwelling catheter, which was removed on the 3rd day of admission. The patient did not show signs of complications.

Case 3

A 6-year-old boy experienced pain when he was urinating. Pressure in the lower abdomen preceded the complaints. Upon physical examination, the patient notably shied away from suprapubic and abdominal palpation. Anemia was discovered by laboratory analysis, and the urine culture was sterile. As part of the preoperative workup, the patient underwent urologic ultrasonography, which showed a hyperechoic single stone in the bladder.

In January 2018, the patient underwent percutaneous pneumatic cystolithotripsy access with 28 Fr Amplatz sheath. The surgery was carried out under general anesthesia and lasted 55 min. Intraoperative results showed a single (22 mm × 20 mm) stone. The patient was admitted to the hospital for 3 days with a 10 Fr inpatient catheter, which was removed on the 5th day of admission. The patient did not show any signs of complications during the most recent follow-up visit to the outpatient clinic.

Case 4

A 5-year-old boy experienced lower abdominal colic pain. The patient complained 3 days of being unable to void. He also complained of 4 days of dysuria before his inability to

Figure 2: Cystolithotripsy procedure with cystoscopy guidance

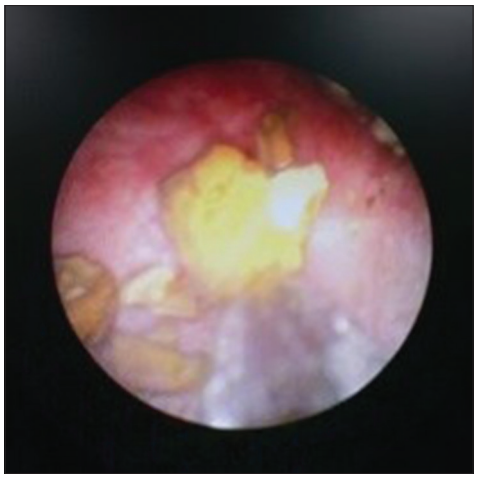

Figure 3: Percutaneous cystoscopic view of the bladder stone

Figure 4: Postoperative wound

void. The results of the physical test were unremarkable. Laboratory examination revealed marked bacteriuria. The urine culture was sterile. The patient underwent urological ultrasonography as part of the preoperative workup, which revealed two hyperechoic stones in the bladder.

In February 2018, the patient underwent percutaneous pneumatic cystolithotripsis access with 28 Fr Amplatz sheath. The surgery was carried out under general anesthesia and lasted 50 min. Intraoperative findings revealed two (30 mm × 25 mm and 15 mm × 10 mm) stones. The patient was admitted to the hospital for 3 days with a 10 Fr indwelling, which was removed on the 3rd day of admission. The patient did not show signs of symptoms during the most recent follow-up visit.

DISCUSSION

Bladder stones are commonly found in children from underdeveloped and developing countries and are thought to be endemically related to malnutrition. In addition to Vitamin A deficiency, it is understood that diets low in animal protein and phosphorus (breast milk as opposed to cow's milk) are helpful.[3] Most commonly, children's bladder stones are composed of ammonium urate acid. Bladder stones are most often found in children from developing countries. However, children with spinal cord injury and/or congenital abnormalities such as spina bifida often undergo augmentation cystoplasty and/or are cleanly catheterized intermittently to manage their bladders. It has been documented that 50% of children with reconstructed bladders grow bladder stones in their lifetime. The development of bladder stones may lead to urinary stasis, bacterial colonization or infection with urea-splitting species, retained mucus, and foreign bodies. However, many of these bladder stones had a noninfectious origin. In addition, an infectious stone does not suggest a recurrent infectious stone, and no known clinical variables appear to be associated with stone composition, suggesting that there is a possible metabolic component in stone formation after bladder augmentation.[5]

The conventional approach for treating bladder stones is open cystolithotomy. Transurethral cystolithotripsy is an option, but in pediatric patients, it is not optimal. A lower caliber urethra prevents the successful treatment of large bladder stone loads in infants. However, with the benefit of shorter hospital stays, smaller scars, and less indwelling catheter time postoperatively, percutaneous cystolithotripsy is used worldwide.[6] Currently, percutaneous cystolithotripsy is the preferred method of treating bladder stones that have formed in reconstructed bladders. Percutaneous lithotripsy has been the first-line treatment procedure in developing countries for treating bladder stones in bladders that have not been enlarged. Percutaneous cystolithotripsy has been used successfully to clear bladder stones in infants younger than 1 year.

Under ultrasound or fluoroscopic guidance, percutaneous cystolithotripsy in children may be performed, and it is most frequently an outpatient procedure. The bladder is first filled with water or contrast content using either modality. The child is positioned in the Trendelenburg position to reduce bowel injury risk during access and tract dilation/formation. Into the distended bladder midline, one to two fingerbreadths above the pubic bone, an 18-gauge needle is inserted. A wire is passed through the needle and into the bladder when the correct location is validated by the return of fluid. It is then possible to create a tract that represents the stone's diameter and the size of the boy. A tract is most set up with a dilator to complement a sheath of 30-Fr Amplatz dilators may be used as well. A 26-Fr nephroscope is used to remove stones smaller than 1 cm using rigid stone forceps, or an ultrasonic lithotripter may be used to fragment stones larger than 1 cm. A Foley catheter is left in the urethra for 3–5 days after the percutaneous cystolithotripsy treatment, and the rectus fascia defect is closed with a 2-0 vicryl suture.[7]

CONCLUSION

In underdeveloped and developing countries, primary bladder stones are common in infants. Transurethral cystolithotripsy, open cystolithotomy, and SWL are the treatment options available to control bladder calculus (SWL). While most adult vesical calculi can be handled with transurethral lithotripsy, this technique is often limited in pediatric patients because of their small urethral caliber. A safe and successful procedure for the treatment of bladder stones in children is percutaneous suprapubic lithotripsy. It is quick and linked to negligible complications.

Declaration of patient consent

The authors certify that they have obtained all consent forms from the appropriate patient's parents. In the form, the patient's parents have permitted his pictures and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published, and efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Imran K, Zafar MN, Fatima N, Ozair U, Sultan S, Rizvi SA. Chemical composition of stones in paediatric urolithiasis. J Ayub Med Coll Abbottabad 2013;25:1-2.
2. Ahmadnia H, Kamalati A, Younesi M, Imani MM, Moradi M, Esmaeili M. Percutaneous treatment of bladder stones in children: 10 years experience, is blind access safe? Pediatr Surg Int 2013;29:725-8.
3. Szymanski KM, Misseri R, Whittam B, Lingeman JE, Amstutz S, Ring JD, *et al*. Bladder stones after bladder augmentation are not what they seem. J Pediatr Urol 2016;12:6.e1-6.
4. Alaya A, Nouri A, Belgith M, Saad H, Jouini R, Najjar MF. Changes in urinary stone composition in the Tunisian population: A retrospective study of 1,301 cases. Ann Lab Med 2012;32:177-83.
5. Gupta DK, Mishra S. Percutaneous cystolithotripsy as a reliable modality to treat pediatric vesiculolithiasis. J Nepalgunj Med Coll 2016;14:18-20.
6. Zhu J, Phillips TM, Mathews RI. Operative management of pediatric urolithiasis. Indian J Urol 2010;26:536-43.
7. Demirel F, Cakan M, Yalçinkaya F, Demirel AC, Aygün A, Altuğ UU. Percutaneous suprapubic cystolithotripsy approach: For whom? Why? J Endourol 2006;20:429-31.