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Jack Stone in the Bladder: Is it Really a Rare Entity in Tropical Countries Like India

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Abstract

Vesical calculus accounts for nearly 5% of urinary system calculus. Of these, jackstone constitutes a rare entity. Jackstones are stones that have a specific appearance resembling child's toy. They consist of a dense central core and radiating spicules. Usually described in urinary bladder and rarely upper urinary tract, they are light brown with dark patches and an irregular shape. We here report multiple cases of jackstone from our hospital situated in hilly areas of Nashik district of Maharashtra, India and point out the possible reasons of their higher occurrence inspite of the rarity of the jackstone.

Keywords: Jackstone; Bladder Stone; Vesical Stone; Cystolithotripsy.

Introduction

Calculus disease affects all parts of urinary system- kidneys, ureter, urinary bladder, and urethra. Usually calculus diseases are symptomatic in occurrence but in few cases they can be asymptomatic. Vesical calculus accounts for nearly 5% of urinary system calculus [1] and usually occur because of foreign bodies, obstruction, or infection. Vesical calculi are commonly classified as primary or secondary. Primary vesical calculi are stones which passes from kidney via ureter and lodges in the urinary bladder, while, secondary vesical stones are due to the bladder outlet obstruction, bladder diverticulum, trauma, catheterization, neurogenic bladder, foreign body, etc.

Jackstones are stones that have a specific appearance resembling child's toy. They are almost always composed of calcium oxalate dihydrate,

consist of a dense central core and radiating spicules. They are usually light brown with dark patches and are usually described to occur in the urinary bladder and rarely in the upper urinary tract. They grow forming radiating spicules due to deposition of new minerals resulting in irregular shape. These types of stone are commonly described in the veterinary literature with common occurrence in cattle, cats and dogs [2]. Their appearance on plain radiographs and computed tomography in human patients has been described.

There are a number of techniques and modalities available to remove bladder stones. Relieving obstruction, eliminating infection, meticulous surgical technique, and accurate diagnosis are essential in their treatment.

Surgical treatment of vesical calculi has evolved over years from "blind" insertion of crushing forceps

into the bladder to open surgical removal, extracorporeal fragmentation, mechanical cystolithotripsy or recently cystolithotripsy with the use of various lasers. Open surgery has been the best-recommended modality for large stones [3]. In small or moderate sized calculi, endoscopic procedures as optical mechanical cystolithotripsy have an added advantage as it can be combined with corrective procedure for bladder outlet obstruction [4].

Materials and Methods

The study was carried out in the Department of Urology and Surgery, SMBT Institute of Medical Sciences and Research Center situated over Nandi Hills, at post - Dhamangaon, Taluka - Igatpuri, District - Nashik, Maharashtra in patients with lower urinary tract symptoms between August 2016 and October 2017. This study was approved by the Institutional Review Board of the hospital. A total of 13 patients were found to have jackstone during the study period. Preoperative evaluation included history and physical examination, hemogram, renal function tests, urine culture and sensitivity, X-ray KUB, and ultrasound abdomen. All patients received prophylactic antibiotics 24 hours prior to surgery. Cysto-urethroscopy was performed initially after administering spinal anaesthesia to the patient. Cystoscopy (Karl Storz 30° 4mm telescope with 20 Fr sheath) was performed to determine the size, number and shape of calculi, and presence of associated pathology. Pneumatic lithoclast was used to fragment the stones in case of endoscopic treatment. Open cystolithotomy was done in cases where the stone size was more than 4 cm or multiple stones when the combined size of all the stones exceeded 5 cm.

Results

Thirteen patients of bladder stone treated between August 2016 and October 2017 were included in the study. Five patients required open surgery, one of which was done on patient's request to retrieve the stone intact, in rest of the cases the stones were large so open cystolithotomy was done. Eight patients underwent cystolithotripsy for their stones. The male to female ratio was 3.3:1. Patients were aged between the age group 42 - 80 years. The mean age was 58.61 years (Table 1).

Bladder outlet obstruction was the primary reason for most of the bladder stones. BEP constituted the major reason in males with 6 patients, stricture urethra came next with 3 patients two males and one female patients respectively. Two patients had meatal stenosis one each male and female. One of the female patient had neurogenic bladder leading to bladder stone. In one patient the stone was primary as he had history of ureteric stone for which he took conservative treatment and later came with a large bladder stone. There was no evidence of bladder outlet obstruction in this patient (Table 1). The mean stone size in open cystolithotomy group was 5.1 cm and 3.37cm in the endoscopic cystolithotripsy group (Table 2).

Operative time was more in cases where open cystolithotomy was done. It was 45-60 minutes for open cystolithotomy and 15-45 minutes for endoscopic cystolithotripsy. Per urethral catheter (PUC) was removed next day in endoscopic cystolithotripsy cases and after seven days in cases of open surgery. No post-operative complications were observed except mild discomfort due to PUC in open surgery cases (Table 2). Complete stone clearance was achieved in all the patients. Stricture

Table 1:

No	Age(years)	Sex(M/F)	Cause
1.	50	F	Neurogenic bladder
2.	54	M	Benign Prostatic Enlargement
3.	49	M	Stricture Urethra
4.	62	M	Benign Prostatic Enlargement
5.	70	M	Benign Prostatic Enlargement
6.	74	M	Benign Prostatic Enlargement
7.	42	M	Stricture Urethra
8.	58	F	Stricture Urethra
9.	57	M	Benign Prostatic Enlargement
10.	63	F	Meatal Stenosis
11.	80	M	Benign Prostatic Enlargement
12.	53	M	Meatal Stenosis
13	50	M	Primary bladder stone

urethra and meatal stenosis patients were advised calibrations according to standard follow-up protocols. CISC was advised for the neurogenic bladder patient. Transurethral resection of prostate was done in all BEP patients.

Discussion

Vesical calculus usually occurs due to some secondary factors leading to obstruction of the bladder outlet. In few instances, the stone travels from

Table 2:

	Stone Size (cm)		Operating Time (minutes)	
	Cystolithotomy (Mean = 5.1)	Cystolithotripsy (Mean = 3.375)	Cystolithotomy	Cystolithotripsy
	6	3	50	20
	5	4	60	30
	5	4	45	40
	6(multiple)	3.5	50	25
	3.5	2.5	45	15
		3.3		30
		4		30
		3.2		25

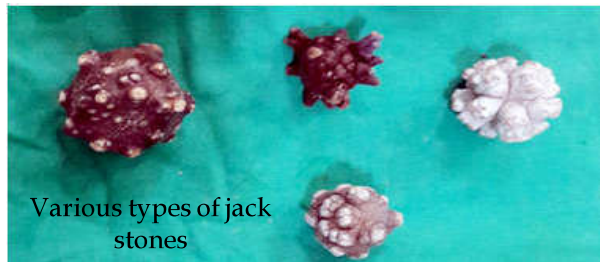


Fig. 1:



Fig. 2:

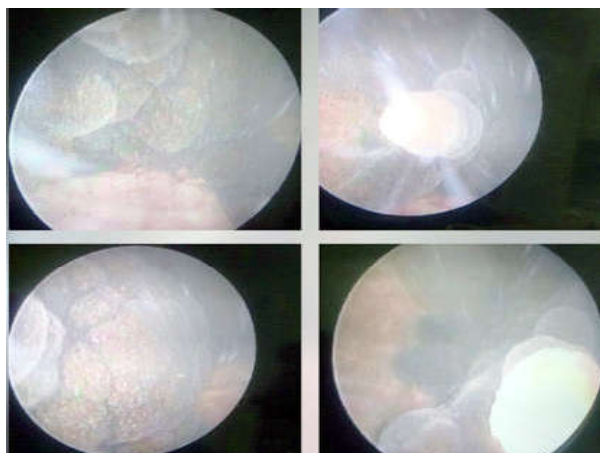


Fig. 3:

kidney via ureter and gets lodged in the urinary bladder. The stones in the latter situation are known as primary bladder stones. Variety of treatment modalities have been mentioned in literature regarding removal of bladder stone-open surgical, lithotripsy, percutaneous, and transurethral [1,3,4,5,6,7]. All procedures aim to achieve complete stone-free state in shortest possible time, with short hospital stay and minimal complications associated with it.

The present study aimed to notify that, as mentioned in the literature, the jackstones are not so rare. They are still found in the tribal, rural and hilly areas of India specially the Nashik division of the Maharashtra state. Only few case reports have been reported till now [8,9,10].

Jackstone, as the name implies, this variety of stone has a characteristic shape resembling a child's toy. These types of stone are commonly described in the veterinary literature with common occurrence in cattle, cats and dogs. Dogs are mostly commonly affected and canine jackstones are usually composed of silica [2].

Jackstone calculi (Figure 1,2,3) have a characteristic shape that suggests the specific mineral content of these stones. This can have therapeutic implications. Calcium oxalate monohydrate calculi are usually smooth and black, whereas stones comprising calcium oxalate dihydrate tend to be irregular and yellow. Dihydrate stones tend to be fragmented by lithotripsy more easily than monohydrate stones. Jackstone calculi in humans are usually specific for calcium oxalate dihydrate stones [11]. In our study one stone was of silver colour and looked like corals in the sea, as can be seen in the Figure 1.

Bladder outlet obstruction remains the most common cause of bladder calculi in adults. Most common factors predisposing to bladder stone formation are – prostatic diseases, previous lower urinary tract surgery, metabolic abnormalities, upper urinary tract calculi, intravesicular foreign bodies, spinal cord injuries, transplant surgery etc [12]. Stones forming due to the above mentioned factors are usually not jackstones. The presentation of vesical calculi varies from completely asymptomatic to symptoms of suprapubic pain, dysuria, intermittency, frequency, hesitancy, nocturia, and urinary retention. Other common signs include terminal gross hematuria and sudden termination of voiding with some degree of associated pain referred to the tip of the penis, scrotum, perineum, back, or hip. The discomfort may be dull or sharp and is often aggravated by sudden movements and exercise. Assuming a supine, prone, or lateral head-down position may alleviate the pain initiated by the stone impacting the bladder neck by causing it to roll back into the bladder. In our study the bladder outlet obstruction (BOO) is the main cause of this stone. BOO probably restricts the calculus into its eccentric location and contributes to the growth of stone by causing stasis of urine. It is important to recognize the characteristic shape of the jackstones as they are susceptible to lithotripsy.

The reason why we had so many jackstones' patients in our hospital could be many. First among many is the locality of the hospital. It is located in the hilly areas of Nandihills, Dhamangaon, Igatpuri in the holy city of Nashik. Most of the patients come here from hilly, tribal and rural areas. All the patients here are treated free of cost. The urologist is available daily and freely. Patients can come anytime like other medical colleges here, even if the hospital is located in outskirts and hilly region of the city, as there are special transport facility made available and feasible by the local government and the Hospital Authorities. Other reasons why patients came with so big stones and too late for the treatment could be the poor economic condition, treatment taken from quacks, drinking hard water, etc. Neglecting their own health either due to poor economic status or lack of time or unavailability to accompany someone to go to hospital also gives time for the otherwise small bladder stone to grow and for the classical jackstone.

Conclusion

Jack stones, although rare, are found commonly in the rural, tribal and hilly areas in India. Recognizing the characteristic shape of the jack

stoneduring investigation and diagnostic cystoscopy, proper documentation and reporting are important. Identification and treatment of the primary cause of calculi formation is important for improving the patients' symptoms and prevent recurrence.

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