

CASE REPORTS

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# Intravesical holmium laser fragmentation and removal of a retained piece of tree branch from the urinary bladder of a young male

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## Abstract

**Background:** Holmium laser has been used primarily for lithotripsy, and on soft tissue and tumor. Its effect on wood has never been described in the literature. Here-in case we were able to successfully laser intravesical wood particles in a young male.

**Case presentation:** A 12-year-old boy was referred to our urology center following a history of recurrent urinary tract infection to which an intravesical foreign body was picked up upon investigation. Imaging studies of an abdominal ultrasound had revealed an intravesical foreign body. He was found to have a piece of wood in the bladder that was too big to be extracted through the cystoscope and was lasered into fragments.

**Conclusion:** Our case showed a more versatile use of the holmium laser and concluded that it can be used successfully on wood.

**Keywords:** Holmium: YAG laser, Laser lithotripsy, Recurrent urinary tract Infections, Wooden foreign bodies

## 1 Background

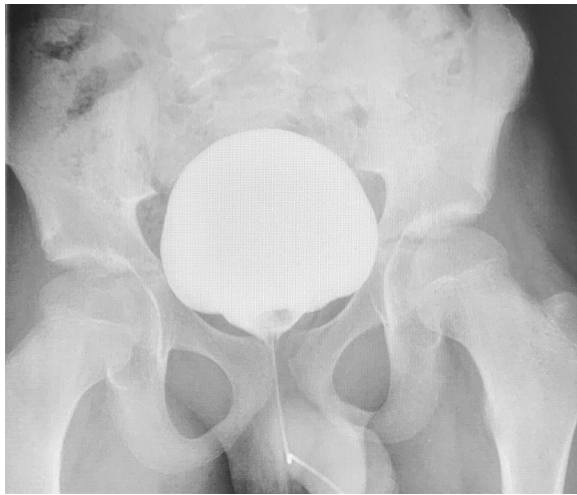
Foreign bodies in the urinary tract have been reported in the literature previously. Various objects including pebbles, metal fragments, and wires have been described in adults, usually linked to mental illness, substance abuse or sexual gratification [1]. Treatment is aimed at removing the foreign object and avoiding complications. In this case, a 12-year-old boy referred to the Urology Department for workup for recurrent urinary tract infections (UTI) which subsequently revealed a retained piece of tree branch on cystoscopic evaluation. The encrusted twig was fragmented using holmium laser and fragments evacuated. The use of holmium laser on wood in the urinary bladder has not been documented in the literature. We report the case as an extension of the usage of Holmium laser for treatment of wooden foreign bodies in the urinary tract.

## 2 Case presentation

A 12-year-old boy was referred to the Urology Department for evaluation of a recurrent urinary tract infection of more than 4 documented episodes within 4-month period. The patient's history includes a fall from a guava tree in May 2019, in which he sustained an impaling injury to the rectum from a tree branch. Exploratory laparotomy with primary repair of a bladder and rectal injury were performed at the peripheral hospital, along with a defunctioning colostomy and a period of transurethral catheterization. Closure of the colostomy was done 5 months after the initial surgery and a subsequent voiding cysto-urethrogram was performed, which confirmed no fistula formation (Fig. 1).

He has since been having episodes of dysuria, intermittent hematuria and occasional lower abdominal pain. Examination revealed a well-nourished, comfortable child with midline laparotomy scar and left lower abdominal scar from previous colostomy. Urogenital examination showed no abnormalities. He had good anal tone with no defects visualized over the perineum.

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**Fig. 1** Voiding cysto-urethrogram post-initial bladder repair

Previous urine culture results had *Candida albicans* on 3 different episodes which were treated with oral fluconazole and clear urine upon subsequent culture before reinfection. Ultrasound was done to assess upper and lower urogenital tract and a 2 × 1 cm foreign body noted in the bladder (Fig. 2).

Initial flexible cystoscopy at the referral hospital was thought to have revealed a large bladder calculus and he was subsequently referred to our institution for laser lithotripsy. Urinalysis performed showed mixed bacterial growth findings. An appropriate prophylactic antibiotic

was administered. The patient was assessed and then taken to theater for cystoscopy and laser lithotripsy. A foreign body composed of wood with calcium deposition on its edge was visualized during cystoscopy. Holmium laser lithotripsy (1.0 Joules; 10 Hz) of the wood body was performed, with an Ellick bladder evacuator to clear the fragments (Fig. 3).

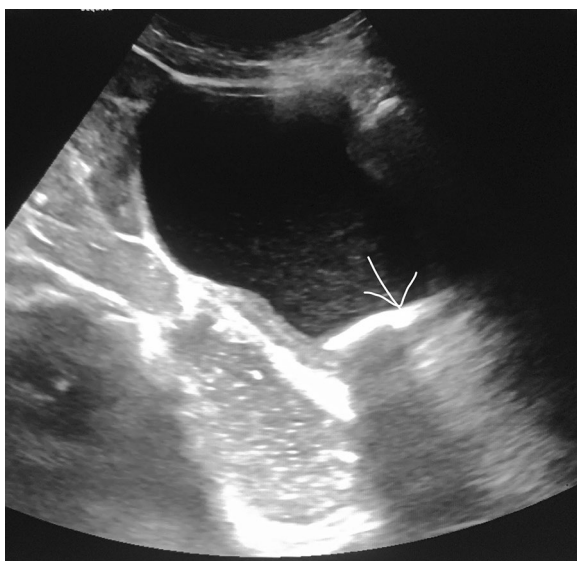
Upon follow-up of the patient 4 weeks after the procedure, he was asymptomatic, and was voiding well.

### 3 Discussion

Foreign body in the bladder typically present with hematuria and recurrent urinary tract infection. Stone formations and obstructive urinary tract symptoms are among the common presentation of foreign body in the urinary bladder. Hematuria was reported as the most common presenting symptoms of foreign body in the bladder symptom [2].

Diagnosis depends on a high index of suspicion from a carefully obtained history. Radiological investigations including bed side ultrasound is diagnostic. Cystoscopy is usually indicated especially in the evaluation of recurrent UTI in a patient with prior history of urinary tract surgery [3].

The retrieval of urinary bladder foreign bodies depends on the size of the foreign body, the type of foreign body and the presence of associated complications such as stone formation or urinary tract fistula. A large number of foreign bodies can be retrieved using minimally invasive endoscopic techniques [1]. The holmium: YAG (Ho:YAG) laser is among the newest wavelength device available for urological applications. The Ho:YAG laser is



**Fig. 2** Ultrasound showing intravesical foreign body



**Fig. 3** Part of the fragments retrieved using Ellick bladder evacuator

a solid state, pulsed laser that emits light at 2100 nm. The initial experiences with earlier laser (light amplification by the stimulated emission of radiation) technology created an understanding of the necessary requirement for successful laser apparel, including the ability to deliver energy through optical fibers, need to limit distant thermal effects and production of a shock wave of sufficient force to exceed the tensile strength of a stone [4] and in this particular case the shock wave force generated was enough to break the wood into pieces small enough to be retrieved via an Ellick bladder evacuator. Since the holmium wavelength can be transmitted down optical fibers, it is especially suited for intracorporeal/endoscopic lithotripsy [4]. Its use on other particles or substances has been uncommon.

The Holmium laser has become established in surgery due to its unique combination of mechanical and thermal properties induced by explosive vapor bubbles.

Holmium lasers are used in urological cases primarily for lithotripsy, but they are also used to cut soft tissues or tumors [5]. Ho:YAG was reported to be used in cutting sutures and synthetic mesh in the urinary tract [6]. While the effects of the Ho:YAG on soft tissue in human body was extensively studied, its effects on wooden material in vivo was not reported. Our case demonstrates the usefulness of holmium laser in the management of wooden foreign bodies in the urinary tract.

#### 4 Conclusion

Holmium laser fragmentation can be used on wood, or twigs in the bladder, and it is safe and efficient. Perhaps its versatility should be assessed on other foreign body substances as a minimally invasive option.

#### Abbreviations

UTI: urinary tract infection; Ho:YAG: holmium: yttrium–aluminum–garnet.

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#### Author's contribution

PA wrote the manuscript with input from all authors, contributed to the conception of the case report and was involved in acquisition of data. EA conceived the idea of the case report, was involved in acquisition of data and contributed to the manuscript, and supervised it. AS involved in acquisition of data and contributed to the manuscript. SP involved in acquisition of data and contributed to the manuscript. All authors have read and approved the manuscript.

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#### Availability of data and material

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#### Consent for publication

Written consent was signed by the mother of the child.

#### Ethics approval and consent to participate

Not applicable (N/A).

#### Competing interests

None.

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