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A case of self-inserted foreign body in the urinary bladder: Usefulness of three-dimensional reconstruction computed tomography for surgery planning

Megumi Yokoyama [a], Issei Suzuki [b], Toshiki Kijima [b,*], Hideo Yuki [a], Takao Kamai [b]

[a] Department of Urology, Dokkyo Medical University Nikko Medical Center, 632 Takatoku, Nikko, Tochigi, 321-2593, Japan
[b] Department of Urology, Dokkyo Medical University, 880 Kitakobayashi, Mibu, Shimotsuga, Tochigi, 321-0293, Japan

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ABSTRACT

Retrieving intravesical foreign bodies warrants open cystotomy; therefore, preoperative evaluation of the material, size, shape, and location is essential for surgical planning. A 79-year-old man presented with dysuria and admitted inserting a jump rope into his urethra. Reconstructed three-dimensional computed tomography showed an entangled jump rope; therefore an endoscopic surgery was deemed unsuitable. Instead, the rope was removed through a small open cystotomy. He had no complications. Intravesical foreign bodies are not rare, and they should be considered as a differential diagnosis in patients with lower urinary tract symptoms. Three-dimensional reconstruction computed tomography contributes to surgical planning.

1. Introduction

Intravesical foreign bodies are rare but are now increasingly being reported in the literature. Intravesical insertion may be self-inflicted, iatrogenic, or migration from an adjacent organ; various objects have been found as intravesical foreign bodies. Removal of foreign bodies should be individualized according to size, shape, and material. With the advent of novel surgical techniques[1] and energy devices,[2] many intravesical foreign bodies are removed with an endoscope. However, retrieving large and complicated foreign bodies remains challenging for urologists and warrants open cystotomy.

Here, we describe the case of a 79-year-old man who inserted a 230 cm long polyvinyl chloride jump rope. As three-dimensional (3D) reconstructed computed tomography (CT) images visualized an intricately entangled jump rope in the bladder, endoscopic surgery was deemed unsuitable. Instead, the rope was removed through a small open cystotomy. This case is characterized by the length of the foreign body completely inserted into the bladder, wherein the usefulness of 3D reconstruction CT in surgical planning has been highlighted.

2. Case presentation

A 79-year-old man presented to our hospital with dysuria. He had no history of urologic or psychiatric disorders. No distension of the lower abdomen was observed on physical examination, suggesting the absence of urinary retention. No foreign bodies protruded from the urethral meatus. Abdominal ultrasonography revealed that the bladder was filled with a large object accompanied by acoustic shadows, and plain radiography revealed a wire-like coiled foreign body (Fig. 1). He disclosed that he had inserted a jump rope made of polyvinyl chloride into the urethra. Cystoscopy was performed, however, there was not enough room in the bladder to find the tip of the rope because the bladder was filled with the rope.

CT was performed to assess the shape of the intravesical foreign body. Reconstructed 3D-CT images showed a jump rope intricately entangled and assuming the shape of the bladder (Fig. 2A and B). Transurethral extraction was difficult considering the length of the rope and its entanglement in the bladder. Intravesical cutting or untangling was also assumed to be impossible, considering the bladder capacity.

We performed a suprapubic open cystotomy with a 4-cm small skin incision under general anesthesia, and the entangled jump rope was completely removed. The total length of the jump rope was 230 cm (Fig. 3). The postoperative period was uneventful. He was followed up without any urethral stricture, urinary tract infection, or recurrence of urethral foreign body insertion.

* Corresponding author.
E-mail address: tkijima@dokkyomed.ac.jp (T. Kijima).

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Fig. 1. Plain radiograph revealing a wire-like object rounded to a circular shape at the center of the pelvis.

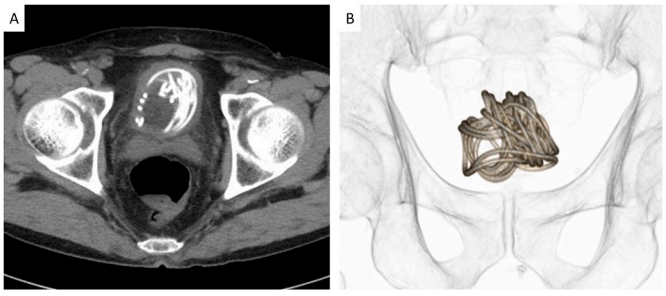

Fig. 2. (A) CT image revealing a jump rope in the urinary bladder. (B) Reconstructed 3D-CT image showing the jump rope intricately entangled in a spherical shape in the bladder.

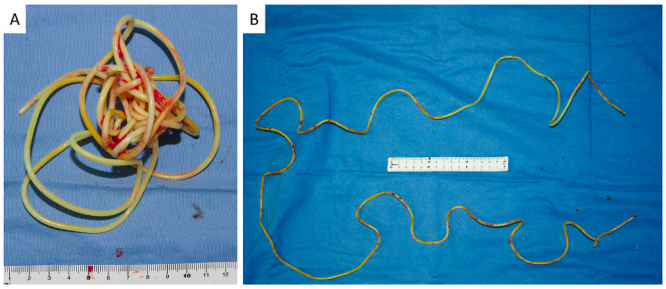

Fig. 3. (A) The entangled jump rope extracted through a small open cystotomy. (B) The jump rope, untied after extraction, measured 230 cm in length.

3. Discussion

As 3D-CT revealed that the rope was intricately entangled in the bladder, we performed open cystotomy in this case, and possible complications associated with transurethral removal, including urethral injury, urethral stricture, and urosepsis, were not recorded. Our case highlighted the usefulness of reconstructed 3D-CT images in surgical planning. Additionally, in a case report of an intravesical wire,[3] authors successfully removed the wire transurethrally. This was guided by CT findings which revealed the wire was looped but not tangled in the bladder. We recommend CT scans with 3D reconstruction, for any patients with wire-like bladder foreign bodies to determine the best surgical approach.

Plain pelvic radiographic images are sufficient for diagnosing radiopaque intravesical foreign bodies. Ultrasonography and CT are useful for further the analysis of foreign bodies' size, shape, and location. Cystoscopy is also used to identify foreign bodies and is an adequate method for their removal in most cases. However, any handling of the foreign body should be avoided until the precise materials, size, form, and position are determined because it can cause further urethral injury.

Initial management of patients with intravesical foreign bodies includes analgesic drugs to relieve pain and anticholinergic drugs to manage irritative voiding symptoms. Antibiotics are also needed to control urinary tract infections and prevent sepsis. The ultimate management of intravesical foreign bodies is their total removal through less invasive procedures with minimal complications.

A transurethral procedure can be used to remove most foreign bodies in the bladder. However, the optimal approach is dependent on the patient's general health, accompanying urinary tract injury, and foreign body's size, shape, and material. Traditionally, grasping forceps and retrieval baskets are used to remove foreign bodies. However, wires inserted into the bladder usually curl up as the bladder contracts; therefore, special consideration is required for wire-like foreign bodies.

To remove entangled intravesical wire-like objects, open cystotomy is needed to minimize injury during transurethral removal. In some cases, however, the wire can be removed endoscopically. Alibadi et al.[4] reported on 15 patients with foreign bodies in the lower urinary tract. Transurethral removal was performed successfully in six patients with foreign bodies in the anterior urethra. However, five of the remaining nine patients who had foreign bodies in the posterior urethra or bladder underwent cystotomy.

Improved techniques for intravesical foreign body removal have been reported. DeLair et al.[5] reported a technique combining cystoscopy with open cystotomy for a large intravesical foreign body. In their procedure, a foreign body in the bladder was visualized with a cystoscope, and they used the light of the cystoscope to navigate to the bladder. They entered the bladder through a small cystotomy, and the foreign body was rapidly removed under cystoscope guidance. Ejstrud et al.[1] reported using bladder laparoscopy to untangle the knot of a wire. Wyatt et al.[2] reported using holmium:yttrium-aluminum-garnet laser to break off a foreign material and facilitate transurethral removal. They confirmed that most reported intravesical foreign bodies can be broken by the laser, except for glass.

4. Conclusion

In summary, findings of intravesical foreign bodies are frequent and should be considered as a differential diagnosis of patients presenting with lower urinary tract. Pelvic radiography can sufficiently detect most intravesical foreign bodies. However, the contribution of 3D reconstruction CT to determining the size, number, and form of foreign bodies is invaluable. The optimal approach to bladder foreign body removal depends on the material, size and form; patient age; and instruments available. Open cystotomy is warranted for large, complex intravesical foreign bodies to avoid severe complications with transurethral removal.

Approval of the research protocol by an institutional reviewer board

Not applicable.

Informed consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Registry and the registration no. of the study/trial

Not applicable.

Author contributions

Megumi Yokoyama, Issei Suzuki, and Toshiki Kijima managed the patient and wrote the original draft. Hideo Yuki and Takao Kamai supervised patient management and reviewed the manuscript.

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Declaration of competing interest

None.

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None declared.

Abbreviations:

3D	three-dimensional
CT	computed tomography

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