

Self-inflicted intravesical insertion of 83 magnetic balls in a 10-year-old boy: a case report and literature review

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ABSTRACT

Background. A magnetic ball is a toy for children that can cause physical injury when used improperly. The injury of urethra and bladder caused by magnetic ball is rarely reported.

Case. Here we present a case of self-inflicted intravesical insertion of 83 magnetic balls by a 10-year-old boy. Preliminary diagnosis was made by a plain radiograph of the pelvis and ultrasonic examination of bladder and all the magnetic balls were removed under cystoscopy successfully.

Conclusions. For children with recurrent bladder irritation, the possibility of bladder foreign body should be considered. Surgery is an effective method. For patients without serious complications, cystoscopy is the gold standard for diagnosis and treatment.

Key words: self-inflicted, intravesical, magnetic balls, children.

A magnetic ball is a common toy for children that can cause physical injury when used improperly. The most common clinical injury is accidental ingestion of magnetic balls, but the injury of urethra and bladder is rarely reported.^{1,2} Here we present a case of self-inflicted intravesical insertion of 83 magnetic balls by a 10-year-old boy. Through the diagnosis and treatment of this case, we hope to provide experience for diagnosis and treatment of self-inflicted intravesical magnetic balls in children.

Case Report

A 10-year-old boy was admitted to the pediatric surgery clinic for recurrent urinary tract infection for one month. The patient was a student and appeared mentally sound who denied any history of surgery or trauma. The family history was negative for urinary tumor and malformation.

Physical examination showed no abnormalities. The urine routine showed elevated red blood cells (+++) and white cells (++) . The laboratory testing showed elevated white blood cells (white blood cell count $14.7 \times 10^9/L$ ↑, neutrophil count $9.8 \times 10^9/L$ ↑, hemoglobin 12.5 g/dL, platelet count $255 \times 10^9/L$). Liver function, kidney function, cardiac enzymes and electrolytes were normal. Bladder color ultrasound showed a foreign body in the bladder, but no abnormalities such as perforation or diverticulum. The foreign body was irregular in shape, about 4 x 3 cm in size, and could move with the change of patient's posture. The plain radiograph of the pelvis showed a metallic dense foreign body that was composed of many small balls in the pelvic region (Fig. 1).

Cystoscopy was performed under general anesthesia and dozens of magnetic balls were found in the bladder (Fig. 2). All 83 magnetic balls were successfully removed with foreign body forceps under cystoscopy (Fig. 2). Mostly, a magnetic ball could be removed one at a time, yet occasionally several or more than ten magnetic balls could be removed at a time due to the balls arranging in a line. Because the

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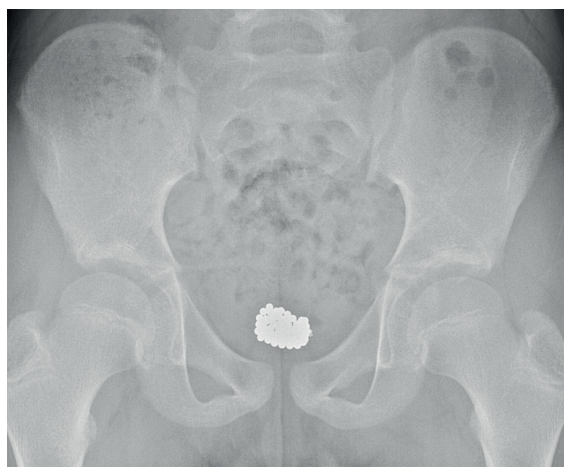


Fig. 1. Image of Pelvic X-ray. Pelvic X-ray showed a metallic dense foreign body that was composed of many small balls in the pelvic region.

cystoscope was used repeatedly, edema and bleeding occurred in the urethra, and a catheter was inserted after the cystoscopy.

The patient was discharged smoothly after 3 days. No complications occurred after 1-year follow-up. Informed consent was obtained from his parents for publication and photographs.

Discussion

Multiple magnetic balls in the bladder of children is rarely reported.³ We searched previous literature with “bladder”, “magnetic”, “foreign body” and “children” as keywords, and a total of 5 cases were retrieved (Table I).²⁻⁵ In one patient alone reported in the literature had the magnetic balls successfully removed under cystoscopy. Cystotomy was performed in 2 cases due to difficulty in removing foreign bodies under cystoscope and open cystolithotomy was planned in 1 case because of the size of the foreign body. Transurethral surgery was performed in 1 case because of urethrocutaneous fistula. We successfully removed all magnetic balls under cystoscope in this case, and our case had the largest number of magnetic balls among all reported cases.

Most likely due to a feeling of shame or fear, patients often do not dare to tell the truth until complications occur. The case we report denied self-inflicting the foreign bodies at the initial diagnosis of bladder foreign body. As children may insert foreign bodies into the urethra

Table I. Case reports of magnetic balls in urethra or bladder in children.

| Authors | Time | Age | Sex | Symptoms | Number | Location | Treatment |
|------------------------------------|------|------|------|---|----------------|---------------------|------------------------------------|
| Ellimoottil C, et al. ² | 2013 | 11 y | male | acute onset of gross hematuria and difficulty voiding | 24 | bladder and urethra | offset pediatric cystourethroscope |
| Özdemir T, et al. ³ | 2017 | 3 y | male | intermittent hematuria and dysuria | 4 | bladder | open cystolithotomy |
| Kinjo T, et al. ⁴ | 2019 | 14 y | male | fever, left scrotal pain and urinary incontinence | 24 | bladder | transurethral surgery |
| Gibson E, et al. ⁵ | 2018 | 11 y | male | hematuria | 16 | bladder | cystoscope and cystotomy |
| Gibson E, et al. ⁵ | 2018 | 18 y | male | dysuria and gross hematuria | about 40 to 50 | bladder and urethra | cystoscope and cystotomy |
| Chao L, et al. (this study) | 2023 | 10 y | male | recurrent urinary tract infection | 83 | bladder | cystoscope |

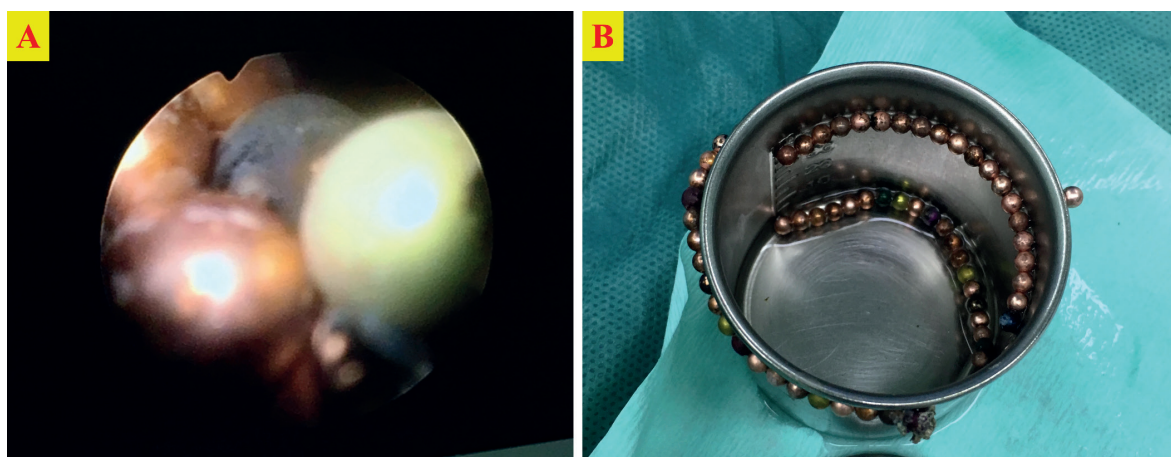


Fig. 2. Images of magnetic balls. (A) Cystoscopy showed dozens of magnetic balls in the bladder. (B) All the magnetic balls were removed successfully.

due to sexual curiosity or psychiatric illness, postoperative psychological consultation is necessary.⁵

Foreign bodies in the bladder are characterized by urinary retention, urinary tract infection, urethral or abdominal pain, hematuria.² The plain radiograph and color ultrasound of the pelvis are mostly used for diagnosis. While considering bladder diverticulum or perforation, computed tomography is also necessary.

Treatment of a foreign body in the bladder depends on the shape, size, sharpness and complications such as bladder perforation. The purpose of the operation is to remove the foreign body with minimal morbidity and damage to the urethra and bladder. Vesicotomy is the safest way in the case of perforation of bladder or difficulty in removal of foreign body through the urethra.⁶ For patients without serious complications, cystoscopy is the first choice for diagnosis and treatment.

There may be some difficulties in the treatment of magnetic balls in pediatric bladders under cystoscopy. Firstly, the urethra is too narrow to operate smoothly. Secondly, it is difficult to separate one from a pile of magnetic balls because of the magnetic force.⁷ Thirdly, metal foreign body forceps can also be pulled by the magnetic balls, making it difficult to grasp the

magnetic ball accurately. Lastly, most of the time we can only take out one ball at a time. In the case of multiple magnetic balls, cystoscopy is required repeatedly which may cause injury of the urethra. In the case we reported, urethral edema and bleeding occurred, but no complications such as urethral stricture occurred.

The possibility of bladder foreign bodies should be considered in children with recurrent bladder irritation. Surgery is an effective method. Cystoscopy is the gold standard for diagnosis and treatment in patients without serious complications.

Ethical approval

This study was approved by the Ethics Committee of Shandong University Qilu Hospital (Qingdao) [KYLL-KS-2021031].

Author contribution

The authors confirm contribution to the paper as follows: study conception and design: LC, LX; data collection: LC, LX, ZQ; analysis and interpretation of results: LC, ZL; draft manuscript preparation: LC. All authors reviewed the results and approved the final version of the manuscript.

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Conflict of interest

The authors declare that there is no conflict of interest.

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