Case Report

Attention Deficit Hyperactivity Disorder: Case Report and Literature Review on Vaginal Button Battery Insertion

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ABSTRACT

Background and Objectives: This study assesses the vaginal button battery insertion in a child with attention deficit hyperactivity disorder (ADHD).

Methods: For the literature review, online databases, such as Google Scholar and PubMed were searched with the following keywords: "Vaginal battery" OR "vaginal button battery" OR "vaginal battery insertion" AND "girl." The search process considered articles in English with no publication year limitation. The included studies were published from 2005 until 2023.

Case Presentation: We presented an eight-year-old, second-grade elementary school girl with ADHD and a history of methylphenidate consumption, referred to the general educational hospital in north Iran with the chief complaint of inserting a vaginal foreign body (VFB). On the night of the event. The child removed a small disc battery of her toys and inserted it into her vagina. Then, she told this to her parents and was referred to the hospital. The psychiatrist's assessment showed no psychiatric disorder, except for ADHD. The patient's abdomen was soft in physical examination and had a rebound tenderness complaint. Also, the entrance of the vagina was erythematosus, and vaginal discharge was seen. The primary assessment by pelvic radiography indicated a round button buttery in the upper segment of the rectum. In the surgery room, a gynecologist gently removed the button battery from the wall by rectal examination and milking from the upper under general anesthesia. The patient was febrile in the follow-up for 48 h and discharged with good general health without fever and severe psychiatric symptoms. In the review section of this study, case reports conducted regarding the insertion of battery in the vagina as a VFB in girls were searched and reported. Overall, 15 case reports were included in the literature review.

Conclusions: Interdisciplinary cooperation among pediatric clinicians and gynecology specialists in dealing with cases of VFB associated with a wide range of emotional and behavioral disorders, such as ADHD should be considered.

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Introduction

Attention-deficit/hyperactivity disorder (ADHD) is childhood's most common neurobehavioral disorder and the most prevalent chronic health problem affecting school-aged children [1]. According to published literature, the prevalence of ADHD varies significantly due to considerable changes in its diagnostic criteria over time but is reported in 3% to 5% of school-age children [2]. The main symptoms of ADHD are characterized by inattention, hyperactivity, and impulsivity [3]. Children with ADHD may experience significant functional disabilities, such as school difficulties, inability to have appropriate interpersonal relationships with family and peers, low self-esteem, and academic underachievement [1]. Studies revealed that ADHD is frequently comorbid with psychiatric disorders [4, 5] and showed a significant relationship between psychiatric disorders and genitourinary insertion of foreign bodies [6].

Vaginal foreign body (VFB) is an uncommon cause of referral to pediatric and gynecology clinics, usually occurring in ages 3-9 years [7-9]. VFB can present with diverse symptoms, such as vaginal bleeding, severe inflammation, sub-abdominal and suprapubic pain, frequency, burning sensation and dysuria. Among these symptoms, vaginal bleeding is the most reliable symptom of VFB in children [10]. The occurrence of VBF, such as battery insertion in pre-pubertal girls, is responsible for approximately 4% to 10% of the outpatient visits in pediatric and gynecologic wards [11-13]. Based on the published case reports, although the most commonly inserted VFB in children is small pieces of toilet paper [9, 13-15], other objects, including small nuts, safety pins, hair pins, buttons, crayons, pencils, and disc button lithium battery [7, 9, 10, 14]. Various factors, such as developmental delays, chronic mental or physical disabilities and parents with drug abuse are associated with a higher risk of VFB insertion among children [8].

Although in rare cases, the possibility of an intravaginal foreign body is doubted in pre-pubertal girls by physicians in the emergency wards [7, 16], the availability of electronic instruments requiring batteries in daily life has rapidly increased during the last decade [8]. VFB may be inserted by the child herself during playing due to curiosity of exploring the nature of the body or due to ignorance, sexual stimulation, sexual abuse, psychiatric disorders, and sometimes self-harm [8, 11, 14]. Long-term remaining of foreign bodies in the vagina may lead to severe tissue damage due to the building of sodium hydroxide as a result of the electronic discharge of batteries [8] and also significant morbidities, such as systemic infection and secondary problems, such as perforation, traumatic ulceration of vaginal walls, fistula creation, fibrosis, vaginal stenosis even complete obstruction of the vagina [12, 13]. Accordingly, this study provides a case presentation on vaginal button battery insertion with comorbid ADHD.

Case Presentation

An eight-year-old, second-grade elementary school girl was referred to the general educational hospital in the north with the chief complaint of inserting a VFB. On the night of the event, the child removed a small disc battery of her toys and inserted it into her vagina. Then, she told this action to her parents and was referred to the hospital. The patient was admitted to the gynecology ward, and because of her history of ADHD, psychiatric counseling was considered for her. In the psychiatrist's assessment, she confirmed that the child had no psychiatric disorders, had normal intelligence, and could communicate with them. According to the obtained history from the patient's mother, the child was referred to a psychiatrist due to hyperactivity and considerable negligence in the first grade elementary and was treated with Ritalin due to ADHD. She did not take any other medications. Also, the mother mentioned the considerable behavioral changes in her child when she was four years old, but no drug was prescribed for her at that time. In addition, the child's mother reveals a history of past genital touch in the child.

The patient's abdomen was soft in physical examination and had a rebound tenderness complaint. Also, the entrance of the vagina was erythematosus, and vaginal discharge was seen. Due to the child's virginity, no internal examination was performed by a physician. The urine culture and colony count results showed no growth after 48 h. The electrolyte analysis was in a normal range. The range of sodium and potassium was 143 and 4.1 mEq/L, respectively. In urine analysis, 12-14 white blood cells were seen, and other items were normal. The results of the complete blood count test showed a high level of white blood cells (11.3×10^3 g/dL) and a low level of mean corpuscular volume (74.9 fL) and mean corpuscular hemoglobin (25.1 pg). Pelvic radiography was conducted to specify the location of the button battery (Figures 1 and 2).

After general anesthesia, the patient underwent dorsal lithotomy. The rectal examination was first followed after Prep Drep and the battery was touched in the up-

per segment of the rectum. Initially, 30 mL of fluid was injected but was ineffective, and 10 mL of the lubricant was reinjected. Then, the battery was gently removed from the wall by rectal examination and milking from the upper.

In the recovery room, the patient was sleepy and febrile with an unknown source of infection and did not communicate visually or verbally. Due to continuous fever, infectious counseling was requested. The pediatric contagious specialist controlled the patient's fever by prescribing ceftriaxone 1 g intramuscular twice daily and clindamycin 300 mg intravenously every 8 h Ter die sumendum. Also, acetaminophen 300 mg was prescribed intravenous on the condition that the patient's body temperature was higher than 38 °C. Laboratory tests, such as complete blood cell, C reactive protein, erythrocyte sedimentation rate, urinalysis, ulcerative colitis, and chest x-ray were requested for the patient and the vital signs were checked regularly. Conservative treatment continued for up to 72 h, and the child was transferred to the pediatric ward of another hospital. The child was febrile (38-39 °C) over residency in the hospital. The patient was admitted to another hospital's infectious service under the treatment of Meropenem antibiotic therapy for 48 h. She was discharged with good general health without fever and recommended outpatient referral to a psychiatric clinic to manage ADHD.

Literature review

The comprehensive literature search was conducted in Google Scholar and PubMed with the following keywords: "Vaginal battery" OR "vaginal button battery" OR "vaginal battery insertion" AND "girl."

Case reports conducted regarding the insertion of vaginal battery as a VFB in girls were searched and reported in Table 1. The inclusion criteria were case report studies that uniquely reported the battery as a VFB in the child girls, and other cases reported that VFB were objects except for batteries, such as toilet paper, pen, or other objects were excluded from the literature review section of this study. In addition, English articles with no publication year limitation were considered in this section. The included studies were published from 2005 until 2023.

Discussion

In this case report, an 8-year-old child was introduced who, out of curiosity and due to ADHD, tried to insert a battery in her vagina. Because the child immediately informed her parents, her assessment had no diagnostic challenge. The main challenge was the therapeutic issues and possible chemical damage to the vagina and its complications. This issue in our study case may be attributed to the reality that the child with ADHD may experience the external and internal world in highly idiosyncratic, distorted ways and attempt to adapt to those perceptions. In cases of vaginal battery insertion due to the alkaline type of batteries, the physician needs to roll out the possibility of vaginal burns, perforation, and fistula after suspected vaginal battery insertion [17].

In this case report, the entrance of the child girl's vagina was erythematosus, and vaginal discharge was seen. Chronic vaginal discharge in children is a significant concern among pediatricians, urologists, and gynecologists [13, 18]. Persistent or recurrent foul-smelling vaginal discharge in a girl may have occurred as a result of several causes, such as primary vaginitis or vulvovaginitis, vulvar skin disease (lichen sclerosis), endocrine abnormalities, vaginal neoplasm, the possibility of undisclosed sexual abuse and also VFB [13, 18, 19].

The symptoms of VFB are often similar to cases of vaginitis and respond temporarily to antibiotics; therefore, foreign bodies are usually treated first medically [14, 20]. Overall, gynecological problems exclusively in pediatric age groups require different management [13], and early identification and timely appropriate management are key issues to achieve better clinical outcomes in these cases and reduce the complications in the children [8]. To distinguish between trauma, carcinoma, and VFB, the patient or her parents should be asked about the recent injuries and a previous history of VFBs [21]. Based on the results of a study, up to 40% of foreign body insertions remain unwitnessed [22]. However, most of these VFB insertions are likely accidental [8].

In some cases, the presence of VFB may indicate sexual abuse. Due to the children being unable to provide a history of an inserted VFB and sexual abuse, the possibility of sexual abuse should be noted and explored in the referred children with complaints of VFB [10]. The child should also be assessed psychologically due to the possibility of emotional and behavioral problems [13, 21]. Our study considered her consultation-liaison psychiatry evaluation to evaluate the case's psychological status.

In our case, pelvic radiography was performed to diagnose the VFB in the child, and then the VFB was removed under sonography. Therapeutic management

Table 1. Case reports regarding the vaginal button battery among girls

1st Author, Year, Reference	Age (y)	Symptoms	Duration of Remaining VFB in the Vagina	Imaging	Battery Type	Battery Induced Damage	Management
Yanoh et al. 2005 [24]	12	Fever, lower abdominal pain	72 h	Radiography, vaginography, concomitant barium enema	Cylindrical battery	Severe vaginal ulceration	Battery removal, vaginal irrigation, necrotic debridement, systemic antibiotics
Huppert et al. 2009 [25]	13	Abdominal pain, vaginal discharge, and bleeding	42 h	Cystoscopy vaginoscopy, sigmoidoscopy	Cylindrical battery	Necrotic vaginal burns, necrotic lesions	Battery removal, topical estrogen, topical antibiotic, and an oral nonsteroidal anti-inflammatory
Dubuc et al. 2014 [26]	3	Abdominal pain, fever, dysuria, vaginal discharge	2 days	Abdominal ultrasound, vaginoscopy	Disc battery	Severe vaginal mucosa burns	Battery removal, broad-spectrum antibiotic, conjugated estrogens
Fard et al. 2014 [18]	13	Abnormal vaginal bleeding	One week	Vaginoscopy, pelvic and urinary system sonography, pelvic x-ray, cystoscopy	Disc battery	Necrotic tissue and severe vaginal burn	Battery removal, vaginal irrigation
Semaan et al. 2015 [12]	5	Vaginal discharge, pelvic pain	48 h	Vaginoscopy, cystoscopy, proctoscopy	Disc battery	Vaginal burn	Battery removal, topical estrogen, systemic antibiotics
Griffin et al. 2015 [17]	8	Vaginal bleeding, urinary retention, and dysuria	12 h	Radiography, sigmoidoscopy	Disc battery	Vaginal burn	Battery removal, oral pain killer, oral antiemetic, topical estrogen, topical antibiotics, systemic antibiotics
Khan et al. 2016 [7]	2.5	Blackish discharge	8 h	Vaginoscopy, plain abdominopelvic x-ray	Disc battery	Superficial ulcer on the anterior and a deep, circular ulcer on the posterior vagina wall	Battery removal, vaginal irrigation, topical antibiotic
Dwiggins et al. 2017 [27]	3	Lower abdominal pain, brown discharge	2 h	Abdominal x-ray, vaginoscopy, cystoscopy	Cylindrical battery	Vaginal burn	Battery removal, estrogen cream and/or antibiotics
Nakib et al. 2017 [14]	13	Foul-smelling dark brownish and malodorous vaginal discharge	6 years	Computed tomography scan, plain abdominopelvic x-ray, colposcopy	Disc battery	Vaginal stenosis	Vaginal dilatation and surgical removal of the battery, which was embedded in the vaginal fundal wall, vaginal washing
Herle et al. 2017 [28]	5	Blood stained vaginal discharge	20 days	Ultrasound and computed tomography scan, diagnostic laparoscopy	Disc battery	Vaginal burn	Battery removal
Massa et al. 2018 [29]	7	Lower abdominal pain, dysuria, and brownish vaginal discharge	6 days	Vaginoscopy, abdominal radiography, pelvic ultrasound	Alkaline disc battery	Vaginal burn, macroscopic lesions	Battery removal, systematic and oral antibiotics
Chidambaram et al. 2020 [30]	2	Greenish foul-smelling discharge	2 weeks	Trans-abdominal ultrasound, vaginoscopy	Disc battery	-	Battery removal

1st Author, Year, Reference	Age (y)	Symptoms	Duration of Remaining VFB in the Vagina	Imaging	Battery Type	Battery Induced Damage	Management
Al-Oufi et al. 2021 [9]	5	Recurrent yellowish ill-smelling vaginal discharge	18-months	Pelvic radiograph, vaginoscopy	Disc battery	Vaginal burn	Battery removal, vaginal irrigation, systemic antibiotics
Guanà et al. 2022 [31]	11	Cramping abdominal pain, mucopurulent vaginal discharge	3 weeks	Abdominal ultrasound, vaginoscopy	Disc battery	Severe vaginal stenosis	Vaginal stenosis dilation and battery removal, antibiotics therapy, topical estrogen
Bapir et al. 2023 [32]	2	Lower abdominal pain, vaginal pain, and brownish-black vaginal discharge	7 h	Pelvic x-ray, vaginoscopy	Alkaline battery	-	Battery removal, oral and topical antibiotics

VFB: Viginal foreign body.

was considered according to the place of foreign bodies in the vagina. A low-situated VFB near the introitus can be visualized by separating the labia gently and can be removed easily by small Allis forceps under direct visualization [16, 20]. Initial efforts for removing the VFB in these cases included vaginal irrigation with normal saline; in return, a distally placed foreign body in the vagina may need an examination under anesthesia and removal by a vaginoscope. After removal, the vagina should be irrigated with a povidone-iodine solution [11].

Along with examination, various imaging techniques, such as pelvic ultrasonography, pelvic radiography, vaginoscopy, and magnetic resonance imaging may help explore the internal foreign bodies in vaginal and cervical canals [10, 11]. In pediatric patients, transabdominal ultrasound is preferred over transvaginal ultrasound due to the lack of radiation, increased availability and decreased invasiveness [23]. A literature review showed that pelvic ultrasound might fail to visualize non-metallic or metallic VFBs [14], so in this condition, magnetic resonance imaging is considered the best technique for evaluating VFBs in children [10].

The results indicated that vaginal examination using the knee-chest position is the first appropriate step which often successfully discloses the presence of the foreign body and leads to the removal of approximately one-third of the cases [14]. In our patients, the lithotomy position was performed for the first examination.

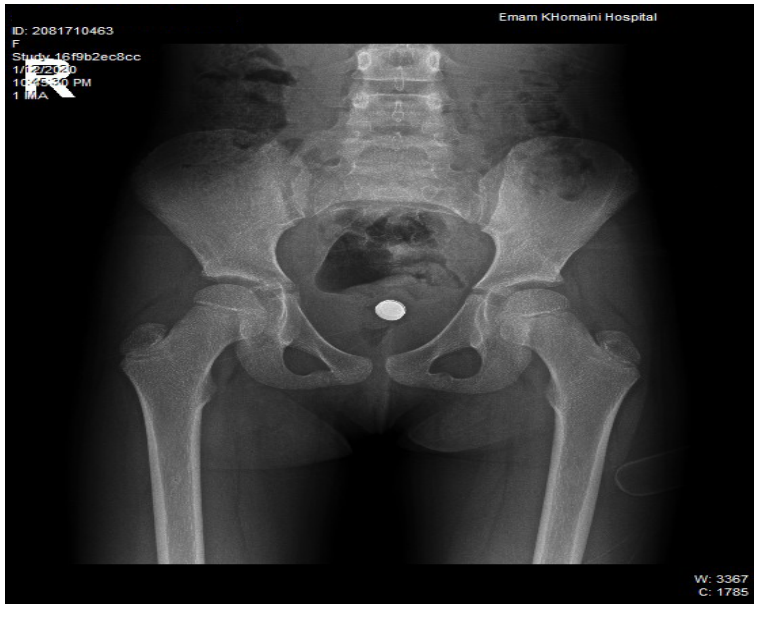

Figure 1. Location of button battery based on pelvic radiography

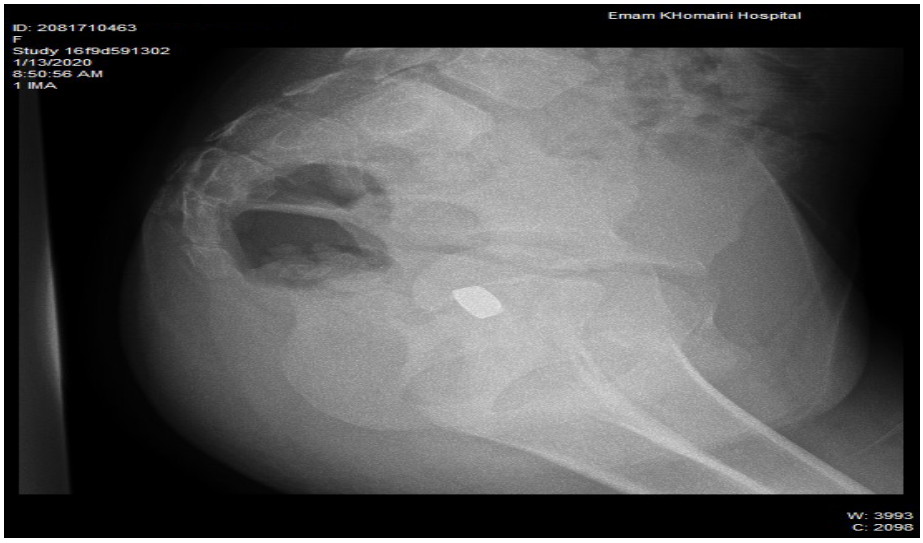

Figure 2. Location of button battery based on pelvic radiography

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Also, obtaining informed consent before performing a pelvic exam on children's parents is essential. Assessment for VFB requires questions about issues that may be sensitive to the patient and the personal aspect of a genital exam regarding the patient's privacy should be noted [20]. In our case, written consent was obtained from the child's father before the child's examination. For pharmacological management of similar cases, the consumption of topical estrogen treatment after battery removal and long-term follow-up is suggested to ensure complete vaginal healing without any fistula and record the complications of vaginal stenosis [12, 14].

Psychosomatic psychiatrists play a vital role in children's psychological well-being and in managing these emergency circumstances. Providing emotional and psychological support by considering counseling sessions and informing families regarding their child's condition are examples of healthcare providers' most important activities, especially psychiatrists and emergency ward nurses. Also, presenting education for parents about keeping their children safe by putting all small objects out of reach and about the way of preventing the reoccurrence of these events, especially in children who had multiple episodes of foreign body ingestions, are essential pieces of advice that psychiatrists should consider in the general hospitals [8].

Conclusion

The results of this study highlighted the critical effect of interdisciplinary cooperation among gynecology specialists, pediatric clinicians, psychosomatic psychiatrists, midwives, and nurses in dealing with cases of VFB associated with a wide range of emotional and behavioral disorders, such as ADHD. Meanwhile, in ADHD children, mothers need assistance raising the child, alleviating the child's disease's effects, helping stabilize family interactions, and managing their stress and grief reactions. Hence, in ADHD cases, parents should be educated regarding home safety measures and advised to provide appropriate toys for children to minimize accidental insertions.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles are considered in this article.

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Authors contributions

Conceptualization and psychiatric evaluation: Forouzan Elyasi; Case management: Imaneh Ahmadi; Direction of the case: Seyed Khosro Ghasempouri; Writing the original draft: Marzieh Azizi and Hamed Milani; Review & editing: Hamed Milani, Leila Monjazeb Marvdashti and Marzieh Azizi; Final approval: All authors.

Conflicts of interest

The authors declared no conflict of interest.

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