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Delayed retropneumoperitoneum following vaginal laceration in a 7-year-old girl

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We describe an unusual case of delayed retropneumoperitoneum caused by a deep vaginal laceration as a result trauma from a water jet in a fountain. A 7-year-old premenarcheal girl presented to the emergency department after experiencing an injury from a water jet at a fountain park. Initially, the patient's vital sign and perineum were within normal range. Because the patient's vital signs became unstable 12 hours after vaginal injury, we carried out abdomino-pelvic computed tomography resulting in retropneumoperitoneum. Arterial bleeding from vaginal lateral wall was founded and controlled by electrocoagulation. No damage to the rectum was laparoscopically confirmed. A diagnostic laparoscopy, not laparotomy, should be considered in cases of retropneumoperitoneum with an ambiguous cause first.

Keywords: Child; Laceration; Retropneumoperitoneum; Vagina

Introduction

Retropneumoperitoneum is mainly caused by gastrointestinal perforation, usually accompanied by pneumomediastinum or pneumoperitoneum, and requires surgical treatment [1-3]. However, cases without perforation have been known to occur, especially in women, because the female genital tract can become a passageway of air into the peritoneal cavity [4]. If the patient does not have a perforated bowel, the decision whether surgical treatment is required can be difficult, particularly in children. Lack of patient cooperation to permit an examination can cause problems in diagnosing abdominal pathology. We describe an unusual case of delayed retropneumoperitoneum caused by a deep vaginal laceration as a result trauma from a water jet in a fountain.

Case report

A 7-year-old premenarcheal girl presented to the emergency department after experiencing an injury from a water jet at a fountain park. While playing in the fountain in a dressed-down style, the patient felt a sharp pain around the anus and subsequently experienced a small amount of bleeding. Initially, the patient's vital sign was within normal range (heart rate 90 to 100 beats/min, blood pressure 110/73 mmHg, and oxygen saturation of 99% to 100%). On pelvic examination, the right side of the vaginal orifice appeared scratched, with blood loss and swelling. The vaginal introitus, including the hymen, appeared normal without trauma. Abdominal examination revealed a soft and non-distended abdomen with normal active bowel sounds. The patient was hemodynamically stable with a hemoglobin level of 12.3 g/dL on presentation. Although she did not have problems while urinating and walking, the patient was hospitalized

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Fig. 1. Abdomino-pelvic computed tomography showing extensive pneumoretroperitoneum around the rectum. (A) Transverse section and (B) coronal section. b, bladder; R, retropneumoperitoneum; r, rectum.

and placed under close observation due to perineal pain.

Following hospitalization, her guardians complained of blood clots in her bathing suit and underlying bed pads, and the patient was experiencing abdominal pain with mild rigidity and mild tenderness. Subsequently the patient's vital signs became unstable to mildly tachycardic at 110 to 115 beats/min and hypotensive at 90/50 mmHg, likely due to the acute hemorrhage. Further evaluation was carried out using abdomino-pelvic computed tomography. On abdomino-pelvic computed tomography, we observed air density in the perirectal space, hematoma filled to the presacral area, and hematoma and retropneumoperitoneum on the upper portion of the retroperitoneum (Fig. 1). Due to the persistence of bleeding and the possibility of rectal injury, we decided to proceed to the operating theatre for further examination of the patient under anesthesia.

The patient was placed in the dorsal lithotomy position under general anesthesia. On inspection, there was no apparent external genital trauma, including that to the hymen, perineum, and urethra. Blood clots were observed at the vaginal introitus. A small vaginal speculum was used to examine the vaginal cavity. Arterial bleeding was observed at the 9 o'clock, left lateral portion of the vagina. As direct repair of the vaginal caliber was not possible and size of injury was pin-point, electrocoagulation was used to control the bleeding. After the vaginal dressing was applied, the wound was packed gently with surgical gauze. Potential damage to the rectum was laparoscopically investigated by a pediatric surgeon. A small amount of serous fluid was visible on the cul-de-sac; however, no abnormalities were visible on the small and large bowel. When presented at Department of Emergency, she did not complaint any symptom to suspect abdominal injury. After admission, she reported vaginal bleeding, abdominal pain with tenderness, and tachycardia, progressively. So, we diagnosed this case as delayed retropneumoperitoneum.

The postoperative course was unremarkable, and the postoperative hemoglobin level was 10.9 g/dL; on postoperative day 5, the patient was discharged with a prescription for iron sulfate. The patient received follow-up in the gynecology clinic 1 week later. She reported no further vaginal bleeding, fever, or pain. No further follow-up was required.

Discussion

Pneumoperitoneum or retropneumoperitoneum is defined as the presence of intraperitoneal free air or retroperitoneal air as detected on radiographs, and it mainly occurs because of gastrointestinal perforation, requiring emergency surgery in

most patients [1,5]. In women, genital trauma is a possible cause of pneumoperitoneum or retropneumoperitoneum [5]. In the present case, because the patient complained of abdominal discomfort 12 hours after vaginal injury, a small amount of air may have penetrated through the vaginal laceration and gradually invaded into the retroperitoneum of the pelvic cavity. The patient underwent a diagnostic laparoscopy, not a laparotomy, to investigate the status of the gastrointestinal tract. There have been a paucity of reports of vaginal laceration due to high-pressure water jet in prepubertal children [6-8] and a case report about retropneumoperitoneum due to vaginal laceration [2], and in these cases, as in ours, the external genitalia were not affected. However, there have been no reports regarding the association between delayed retropneumoperitoneum and vaginal laceration.

Common causes of genital injury in girls include person versus foreign object, home accidents, and sexual assault [6]. Vaginal laceration resulting from water activities can occur without direct trauma [8]. In postmenarcheal girls, because the labia minora are not close anatomically, the vaginal introitus is wide relatively. However, in prepubertal girls, the labium are smaller and provides lesser protection to the internal structure of the genital tract than that in postmenarchal girls. The proposed cause of the vaginal injury and retropneumoperitoneum in this case was as follows: a stream from the fountain can rise to a height of 20 meters with a water pressure of 3 kg/cm^2. It is suspected that the injury was caused by the water striking the area of the perineum when the child bent down in the stream of fountain. The air likely entered the body through a pin-point laceration of the vaginal wall after vaginal injury and then gradually penetrated the extraperitoneal space of the pelvis [2]. The extraperitoneal space of the pelvis communicates with the retroperitoneal space, and it made delayed retropneumoperitoneum.

When physicians initially examine a pediatric patient who complains of discomfort on the perineal region, the patient's history must correlate with the physical findings to confirm nonsexual trauma. The physician should begin the examination of the external genitalia to assess for vulvar hematomas or lacerations. It is important to inspect the urethral meatus and observe for signs of hematuria that may be indicative of urethral injury. Examination of the perineal area in pediatric patients to assess for vaginal hematomas, ongoing bleeding, hymenal lacerations, or the presence of feces should be performed using the 'frog-leg' or 'knee-chest' position. This removes the need for speculum insertion. Examination under anesthesia may be necessary in some cases to complete the examination or if sutures are indicated [9].

In conclusion, the physicians must carefully examine the pediatric patient who complains of vaginal laceration, and a diagnostic laparoscopy should be considered in cases of retropneumoperitoneum with an ambiguous cause first.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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