

Pediatric Perineal Impalement Injuries

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Pediatric perineal impalement injuries are relatively uncommon. There may be difficulty in recognizing or properly treating such injuries, because their severity may not be reflected accurately by the external appearance of the perineum. The authors describe 3 case reports of patients with perineal impalement injuries and their management. The authors emphasize how a thorough workup can prevent

missed injuries, leading to timely surgical repair and good outcomes.

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PEDIATRIC IMPALEMENT INJURIES are relatively uncommon and are often attributed to accidental falls or sexual abuse. Because of the rarity of these injuries and the risk of overlooking external signs, physicians may have difficulty recognizing or appropriately treating pediatric impalement injuries. Lesions in the pediatric perineum may appear innocuous, but can be potentially life threatening and surgically challenging. The extent of injury is dependent on the size, force, and direction of the impaling object. We report 3 cases of pediatric impalement injuries treated at Rainbow Babies & Children's Hospital's Pediatric Trauma Center; in each case, the superficial appearance of the wounds did not reflect the magnitude or seriousness of the injury. The cases highlight the need for an aggressive workup examination under anesthesia to minimize a potential delay in diagnosis and proper treatment. Recommendations for a thorough evaluation include sigmoidoscopy, cystoscopy or urography (especially in the presence of hematuria), and vaginoscopy in girls. Therapeutic and diagnostic approaches are detailed for the primary types of pediatric impalement injuries.

CASE REPORTS

Case 1

A 9-year-old white boy tried to jump off a couch over a billiard cue stick and landed on it. The patient reported having a bloody bowel

movement after the incident and was taken to a community hospital by his parents. Workup findings at that hospital showed only a 2-cm perineal laceration, a normal white cell count, and no hematuria on urinalysis, as well as normal abdominal and chest films. His vital signs were within normal limits. He was discharged home and returned 8 hours later with fever and diffuse abdominal pain. The patient was transferred to our emergency department for a pediatric surgery evaluation.

The patient had a distended abdomen with diffuse tenderness and absent bowel sounds and was guaiac positive by rectal examination. The patient was taken to the operating room 10 hours after the initial injury for examination under anesthesia.

A cystourethrogram finding was negative, and rigid sigmoidoscopy found a rectal perforation at 7 cm proximal to the anus. Exploratory laparotomy showed that the rectum had been perforated at an intraperitoneal location 3 cm above the peritoneal reflection with significant fecal soiling and advanced peritonitis. A layered closure of the defect was performed with a proximal diverting colostomy.

Postoperatively, the patient was treated with a 5-day course of ampicillin, gentamicin, and clindamycin. The patient was discharged home on postoperative day 7 tolerating a regular diet. He underwent a colostomy takedown 6 weeks later, and is doing well 1 year post injury.

Case 2

A 4-year-old white girl reportedly stuck a bathroom plunger in the bottom of a bathtub and then jumped on it. She initially had a large amount of perineal bleeding. In our emergency department, her vital signs were within normal limits. Dried blood was noted on her perineum near the vaginal introitus. Blood-tinged mucous was draining from her vagina. A posterior vulvar tear was noted during the initial examination, which was made difficult because of a lack of cooperation from the young child. The abdomen was soft and nontender. She was taken to the operating room for examination under general anesthesia.

Vaginoscopy findings showed a 2-cm laceration through the posterior vaginal wall into the rectal lumen involving the perineal body and the sphincter muscles. Cystoscopy findings were normal, and rigid sigmoidoscopy findings were unremarkable except for the rectovaginal laceration. The wound was repaired in layers. Postoperative treatment included a course of ampicillin, gentamicin, and clindamycin. She took nothing by mouth with peripheral parenteral nutrition for 7 days postoperatively. The patient was advanced to a regular diet on postoperative day 8.

Given the suspicious nature of the injury, a social services consult was initiated. Because of the inconsistent history of mechanism of injury provided by caregivers, as well as a past history of social issues, she was placed in foster care at discharge on postoperative day 11. She was continent and doing well at follow-up 15 months postinjury.

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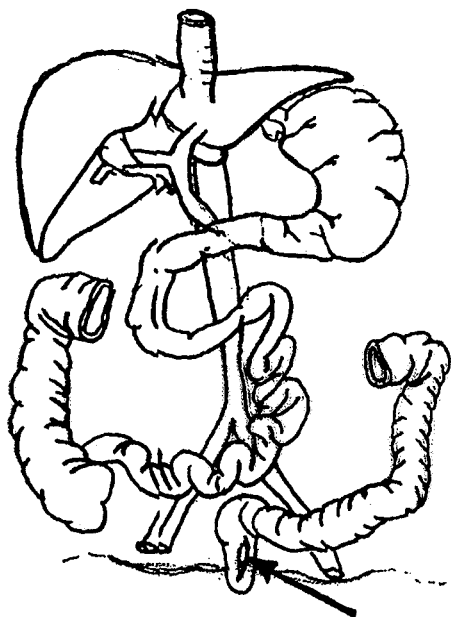


Fig 1. Rectal perforation extending above the peritoneal reflection secondary to impalement by a biliard cue stick.

Case 3

A 14-year-old African-American girl was pushed into a plate glass table top. She was impaled by a 20-cm piece of broken glass in her left perirectal region. She sustained significant bleeding at the scene and received a 500-mL bolus of normal saline en route to our trauma center. On arrival, vital signs included a temperature of 35.8°C, heart rate of 142 beats per minute, respiratory rate of 48 per minute, and blood pressure of 78/35 mm Hg. Peripheral pulses were present and weak in all extremities, with the exception of the left lower extremity, where pulses were absent. Her abdomen was firm and distended. Active bleeding was noted from the vagina and a 5-cm left perirectal laceration. Initial laboratory findings showed a hemoglobin level of 4 g/dL. Fluid resuscitation continued with the patient receiving 2 additional liters of crystalloid solution, and transfusion was initiated with type O negative blood. She then was taken emergently to the operating room for exploratory laparotomy.

In the operating room it was discovered that the patient had sustained left external iliac artery and vein transection, left bladder laceration with transection of the left ureter, vaginal laceration, 2 small bowel enterotomies, and multiple lacerations of the transverse and sigmoid colon. Intraoperative consultations were obtained from the vascular and

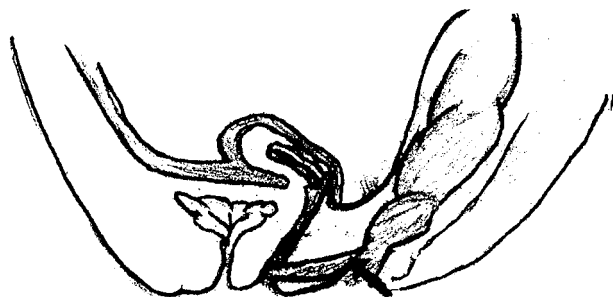


Fig 2. A 3-cm laceration through the posterior vagina, anterior rectum and perineal body secondary to reported impalement by a plunger.

urologic services. The patient underwent the following operations: repair of the left external iliac artery with saphenous vein interposition graft, repair of left external iliac vein with saphenous vein patch, 4 compartment fasciotomy of the left lower extremity, left urteroneocystostomy, repair of bladder and left ureter and vaginal lacerations, primary repair of the 2 small bowel enterotomies and through and through transverse colon laceration, Hartmann's pouch, and end colostomy. The perirectal wound was left open. The patient's operating time was approximately 14 hours. She required large volume crystalloid resuscitation along with 27 units of packed red blood cells. The estimated blood loss was 19.5 L.

Postoperatively, she was admitted to the pediatric intensive care unit (PICU) in stable condition on mechanical ventilation. She was treated with ampicillin, gentamicin, and clindamycin. She was maintained on nothing-by-mouth status, and total parenteral nutrition was initiated. Fasciotomy sites were closed under local anesthesia in the pediatric intensive care unit on postoperative day 4. She was extubated on postoperative day 7. Total parenteral nutrition gradually was weaned and discontinued because the patient was able to tolerate a regular diet by postoperative day 15. She was discharged home on hospital day 37. Five months later, the patient underwent elective colostomy takedown without complications and is doing well at 18 months postdischarge.

DISCUSSION

Pediatric perineal impalement injuries are rare but have potentially severe consequences. These injuries most often are caused by falls on offending objects, as occurred in our 3 case studies. Tool handles and stakes are common agents of injury. Because pediatric perineal impalement injuries also can result from sexual abuse, it is important to rule out child molestation.¹ Perineal injuries tend to be more common in boys than girls because of aggressive play; however, in our experience, girls predominated.

Children may be more predisposed to severe injuries

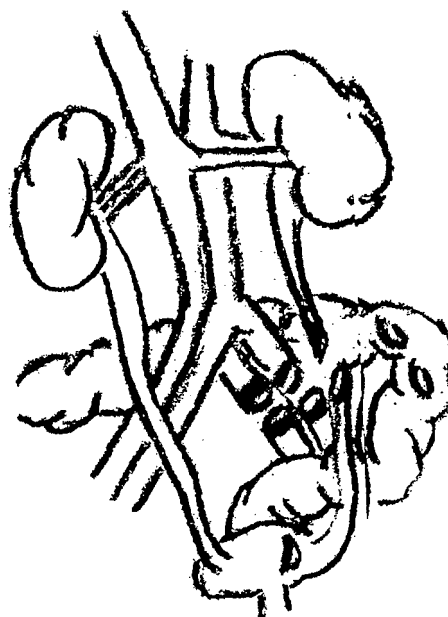


Fig 3. Multiple injuries incurred from perirectal impalement by a glass shard after falling on a glass tabletop.

caused by perineal impalement than adults. In girls, the rectovaginal septum is very thin, and the urogenital diaphragm is more superficial. Structures such as the bladder, uterus, and rectum lie low in the pelvis of the child. In adults these structures are intraperitoneal rather than intrapelvic, making children more prone to injury.²

Some general principles of impalement injury management also are applicable to the treatment of children with these injuries. If the object remains in place, it should not be removed until the patient is in the operating room. Minimal manipulation should be used to maintain tamponade of any vascular structures. Preoperative planning should be based on the course and nature of the impaling object.³ Identifying the suspected pattern of injury assists in determining ideal operative positioning and anticipating the need for involvement of other surgical disciplines. Meticulous wound care, irrigation and debridement of the wound tract, and antibiotic therapy all are important.

Evaluation of perineal impalement injuries in children needs to be thorough even in the presence of minimal or no symptoms. A lack of external findings does not preclude serious rectal perforation.¹ It has been recommended that the workup include proctosigmoidoscopy to rule out bowel perforation, vaginoscopy in girls, and cystoscopy or urography to identify urinary tract injury, especially if hematuria is present.^{1,4}

Standard principles in the treatment of severe perineal and anorectal injuries in children include fecal diversion, wound drainage, and broad-spectrum antibiotics.⁴ Some investigators have suggested that the degree of contamination and site of perforation, rather than the age of the wound, determine the need for colostomy.⁵ Reestablishment of colonic continuity in patients who sustained sphincter injuries should be completed after manometric confirmation of anal sphincter sufficiency and complete healing.⁴

Perineal impalement injuries in children are classified as transanal or perineal and further subdivided as extraperitoneal or intraperitoneal. This classification method is used to predict potential injuries and develop treatment guidelines.¹

Transanal Extraperitoneal

Transanal extraperitoneal wounds usually are directed posteriorly, are caused by sharp objects, and may be difficult to detect. They often lead to retrorectal, retroperitoneal, and vascular injuries. Antibiotics and drainage are indicated. Colostomy may be indicated if massive tissue destruction or inflammation are present.

Transanal Intraperitoneal

Transanal intraperitoneal wounds are more common and often are seen in young boys. They can be caused by

blunt or sharp objects and potentially may be complicated by evisceration. They may lead to injuries of the anterior rectum, bladder, urethra, bowel, and solid organs. Treatment involves rectal repair, colonic and peritoneal lavage, antibiotics, and often colostomy.

Perineal Extraperitoneal

Perineal extraperitoneal wounds are associated with injuries of the anal sphincter, vagina, and urethra. They are treated by repair of injured structures, debridement, antibiotics, and rectorectal drainage. Colostomy rarely is indicated, unless massive tissue destruction is present or extensive repair is required.

Perineal Intraperitoneal

Perineal intraperitoneal injuries are uncommon and usually caused by sharp objects. Their injury pattern and method of treatment is similar to that of transanal intraperitoneal wounds. Patients with intraperitoneal or transanal injury with colorectal perforation, advanced peritonitis, significant tissue damage, and difficult repair may benefit from a diverting colostomy.

Some surgeons have reported good outcomes with primary repair without colostomy in early and clean cases of intraperitoneal colorectal perforations. Massive complicated extraperitoneal injuries with or without anorectal perforation may heal better and be easier to treat with diversion of the fecal stream.

Prognosis of pediatric perineal trauma generally is good. Even patients with severe anorectal damage may have positive outcomes. It appears that the pediatric population has a more favorable prognosis than the adult population with respect to these injuries.⁵ In our patients with perineal injuries, aggressive workup with examination under anesthesia, proctosigmoidoscopy, cystoscopy, or urography and vaginoscopy in girls led to appropriate diagnosis and successful surgical management. All patients had good outcomes and are doing well at 12 to 18 months postinjury. Multidisciplinary management was especially useful with multiple severe injuries as illustrated by our third case.

REFERENCES

1. Jona JZ: Accidental anorectal impalement in children. *Pediatr Emerg Care* 13:40-43, 1997
2. Dudgeon DL, Paidas CN: Trauma to the vulva and vagina, in Carpenter SE, Rock JA (eds): *Pediatric and Adolescent Gynecology*. New York, NY, Raven Press, 1992, pp 117-121
3. Kelly IP, Attwood SE, Quinlan W, et al: The management of impalement injury. *Injury* 26:191-193, 1995
4. Beiler HA, Zachariou Z, Daum R: Impalement and anorectal injuries in childhood: A retrospective study of 12 cases. *J Pediatr Surg* 33:1287-1291, 1998
5. Rainberg O, Yazbeck S: Major perineal trauma in children. *J Pediatr Surg* 24:982-984, 1989