

Penetrating anorectal injuries in Jamaican children

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Abstract

Purpose To discuss the presentation, management and outcomes of penetrating anorectal injuries at the Bustamante Hospital for Children.

Methods A retrospective review over an 11-year period (January 2001–December 2011) was undertaken. The data analysed were extracted from patients' case notes which were pulled based on the hospital's admission database.

Results Over the study period a total of 14 children presented with penetrating anorectal injuries. The medical records for one child were missing. The mean age at presentation was 6 years. Impalement by a metal spike was the mechanism of injury in 12 children, with one case of sexual assault. Three of the children had associated urogenital injuries. Ten rectal injuries were extraperitoneal. Five of the 13 cases (38 %) were managed with a colostomy—average time to closure was 6 months. There was one case of perineal wound infection and dehiscence. There was no mortality.

Conclusion Selective fecal diversion in the form of a sigmoid loop colostomy is a safe and acceptable management option for children with penetrating anorectal injuries. The perineal wound itself can be closed primarily except in cases of delayed presentation.

Keywords Penetrating anorectal injuries · Trauma · Children · Jamaica

Introduction

Penetrating anorectal injuries in children are rare. Most series of over 10 years report fewer than 14 cases. Because of the inherent nature of these injuries it is important that social services and/or the relevant law enforcement authorities be involved from the time of admission so as to exclude possible sexual abuse. This report describes the experience gained in managing penetrating anorectal injuries at the Bustamante Hospital for Children over an 11-year period [January 2001–December 2011] and suggests recommendations on appropriate clinical and non-clinical management.

Methods

A manual check of written patient admission database was undertaken to identify patients admitted to the surgical unit with penetrating anorectal injuries. Of the 14 patients identified, the medical records of one child—a 9-year-old boy—could not be located. The medical records of the remaining 13 children were thus evaluated to identify patient demographics, cause of injury, endoscopic findings, surgical intervention, complications and their eventual outcomes.

Results

Of the 13 children evaluated, the majority were boys [10 boys and 3 girls]. The mean age at presentation was 6 years, ranging from 9 months to 9 years (Table 1).

Twelve of the 13 anorectal injuries resulted from impalement by metal objects, 4 of which resulted from use

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Table 1 Summary of patients- cases

Case	Age	Gender	Mechanism of injury	Mode of presentation	Proctoscopic findings	Surgical intervention
1	9 years	M	Impalement—metal spike (fell onto protruding metal spike at school)	Per rectal bleeding	5 cm jagged laceration from left gluteal region to anal verge and into rectum	Sigmoid loop colostomy (perineal wound not closed)
2	9 months	F	Sexual assault	Vaginal and rectal bleeding	Laceration of anal canal and perineal body, 4 cm laceration to posterior vagina	Primary repair of lacerations and perineal body
3	5 years	M	Impalement—bicycle pedal (child riding bicycle with broken pedal)	Perineal pain	3 cm laceration from anal margin to distal anus at 12 o'clock lithotomy	Primary repair of perineal laceration
4	10 years	M	Impalement—metal spike (Child jumping rooftops and fell astride metal spike)	Per rectal bleeding	Posterior anal canal laceration extending 1.5 cm from anal verge into anal canal	Primary repair of perineal laceration
5	18 months	M	Impalement- metal spike (child fell astride metal spike in bathroom)	Perineal pain	Jagged lacerations to anus involving anal margin at 3 and 7 o'clock lithotomy	(Perineal wound not closed)
6	6 years	M	Impalement—bicycle spike (child riding bicycle with defective wheels- protruding spikes)	Per rectal bleeding	2 cm posterior perineal wound extending into posterior anal canal	Primary repair of perineal laceration
7	9 years	F	Impalement—metal rod (child slipped in bath on metal rod- bath not fully installed)	Per rectal bleeding Perineal pain	2.5 cm laceration at 6 o'clock lithotomy extending into anus (2.5 cm)	Primary repair of perineal laceration
8	29 months	M	Impalement—metal spike (child fell astride metal rod while playing)	Per rectal bleeding Perineal pain	Full thickness anterior rectal wall laceration (5 cm)—0.5 cm above peritoneal reflection	Proximal loop sigmoid colostomy
9	3 years	F	Impalement- shower faucet (child slipped in bath and impaled herself on the shower faucet)	Per rectal bleeding (Frank hematuria on catheterization)	Lacerations to anterior and posterior rectal walls	Sigmoid loop colostomy Primary repair of perineal lacerations
10	8 years	M	Impalement—metal bar	Per rectal bleeding	Two anterior rectal lacerations	Primary repair of perineal lacerations Sigmoid loop colostomy
11	8 years	M	Impalement—broken bicycle (child riding bicycle that had a broken off seat)	Per rectal bleeding Perineal pain	Laceration at 6 o'clock extending into anal canal (3 cm)	Primary repair of perineal lacerations
12	9 years	M	Impalement—broken bicycle	Per rectal bleeding	Perianal laceration extending to anal verge, rectum intact	Primary repair of perineal laceration
13	6 years	M	Impalement—metal bar (child fell astride a metal bar at home)	Per rectal bleeding	Puncture wound to anterior rectal wall 3 cm above anal verge + mucopurulent drainage	Primary repair of bladder injury, cystostomy and repair of bladder injury Sigmoid loop colostomy

Presented in bold type are those with intraperitoneal rectal injuries

of malfunctioning bicycles. Per rectal bleeding was the most common mode of presentation, noted in 11 children [85 %]. None of the children in this series presented with peritonitis.

In four children we proceeded to exploratory laparotomy after proctoscopy revealed tears/abrasions involving the anterior rectal wall which is highly suspicious for a bladder injury. Of these four children, one was a female patient

who was also noted to have gross hematuria on urethral catheterization. A bladder perforation was confirmed on laparotomy in one boy which was primarily repaired with the formation of a loop colostomy and suprapubic cystostomy. The latter was left in site for 10 days.

The girl presenting with gross hematuria [case 9] did not have a bladder injury confirmed on laparotomy or cystoscopy. However, she was noted to have lacerations involving her perineal body, anterior and posterior vaginal walls and distal urethra. She was managed with primary repair of her lacerations and fecal diversion. On examination under general anaesthesia 2 months later all her perineal wounds were fully healed. The other two children having anterior rectal wall injuries had intraperitoneal rectal involvement confirmed on laparotomy and were thus given a colostomy. The fifth child managed with a colostomy was so managed because of the extent of his perineal injuries [Case 1]. The average time to colostomy closure in the five children managed with fecal diversion was 6 months, ranging from 4 to 9 months.

Primary repair of perineal wounds, including vaginal lacerations (two girls) was routinely performed in all cases except in one child, it being unclear from the medical records why this decision was made at the time (Case 1). The wounds of one child with a delayed presentation was intentionally not closed primarily (Case 5). This was an 18-month-old boy with metal impalement whose anorectal lacerations were jagged, multiple, and 'old'—presenting to our surgical unit 10 days after his injury. His wounds were thus left to heal by secondary intention. His late presentation to our pediatric surgical centre was in part due to delays in transfer from his local hospital ambulance unavailability.

The one morbidity in this series occurred in a 9-month-old female who was sexually assaulted (Case #2). She had perineal body disruption with lacerations of both the vagina and rectum, which were closed primarily and was not offered a protective colostomy. She later developed a perineal wound infection with associated wound dehiscence which subsequently healed well with conservative management—twice daily sitz baths and intravenous antibiotics—without requiring a secondary colostomy.

There were no cases of mortality and all children retained normal fecal and urinary continence over the period of follow-up, averaging 72 months.

Discussion

Penetrating anorectal injuries in children are rare and thus remain relatively under-reported in the pediatric literature. They are more commonly noted in boys [1–6], which may be reflective of their more adventurous nature while at play.

All children presenting with these injuries should be suspected of being victims of sexual assault and be routinely referred to the social worker and/or relevant law enforcement authorities. Surgeons should be prepared to submit swabs, aspirates and washings from all cavities taken at the time of proctoscopy and vaginoscopy for culture and microscopy [7], semen analysis and DNA analysis. Detailed operative notes [7] and diagrams should be drawn in the event of court action.

The commonest cause of penetrating anorectal injuries in children include falls on pointed objects, sexual abuse, firearm injuries, road traffic accidents [1–9] and occasionally forceful enemas [7], swallowed foreign bodies [3] and use of rectal thermometers [10].

This series, however, suggest a strong link between penetrating anorectal injuries and malfunctioning bicycles. This association has not been previously noted in pediatric series of penetrating anorectal injuries, though the association with blunt perineal injuries, particularly in girls, has been well established [7, 11]. The mechanism of impalement from use of malfunctioning bicycles in this series included falls onto the pointed unprotected pedal or the pointed disconnected spoke of the bicycle wheel, and impalement by the metal bar that should normally be supporting the bicycle seat. The mechanism of injury of the other children is outlined in Table 1.

The initial management of all patients should involve examination under general anaesthesia with meticulous proctoscopy in order to distinguish from the onset localized perineal injuries from rectal injuries [2, 5, 6, 8]. This is important as rectal injuries particularly missed intraperitoneal rectal injuries can lead to frank peritonitis, sepsis and death [5]. In addition once a rectal injury has been confirmed surgical management in many instances differ from management of an isolated perineal injury (Fig. 1).

The integrity of the anal sphincter mechanism (ASM) should also be assessed at initial proctoscopy. The ASM is divided into the internal anal sphincter (IAS) and the external anal sphincter (EAS). The EAS is striated muscle partly under voluntary control and provides approximately 15 % of the resting anal sphincter tone. The other 85 % is provided by the smooth muscle of the IAS. The integrity of both is essential to maintain fecal continence—together with an intact sensory input from the rectum and anal canal [12, 13]. At proctoscopy if a full thickness muscular laceration/injury involving the proximal two-third of the anal canal is noted the integrity of the IAS is likely to have been breached, as well as the EAS depending on the depth of the laceration. If the laceration/injury involves the distal one-third of the anal canal and extends to the anal verge itself then the EAS is likely to have been compromised [14]. In addition, on inspection the IAS is notably of a paler pinkish colour, compared to the dark red colour of the EAS [15,

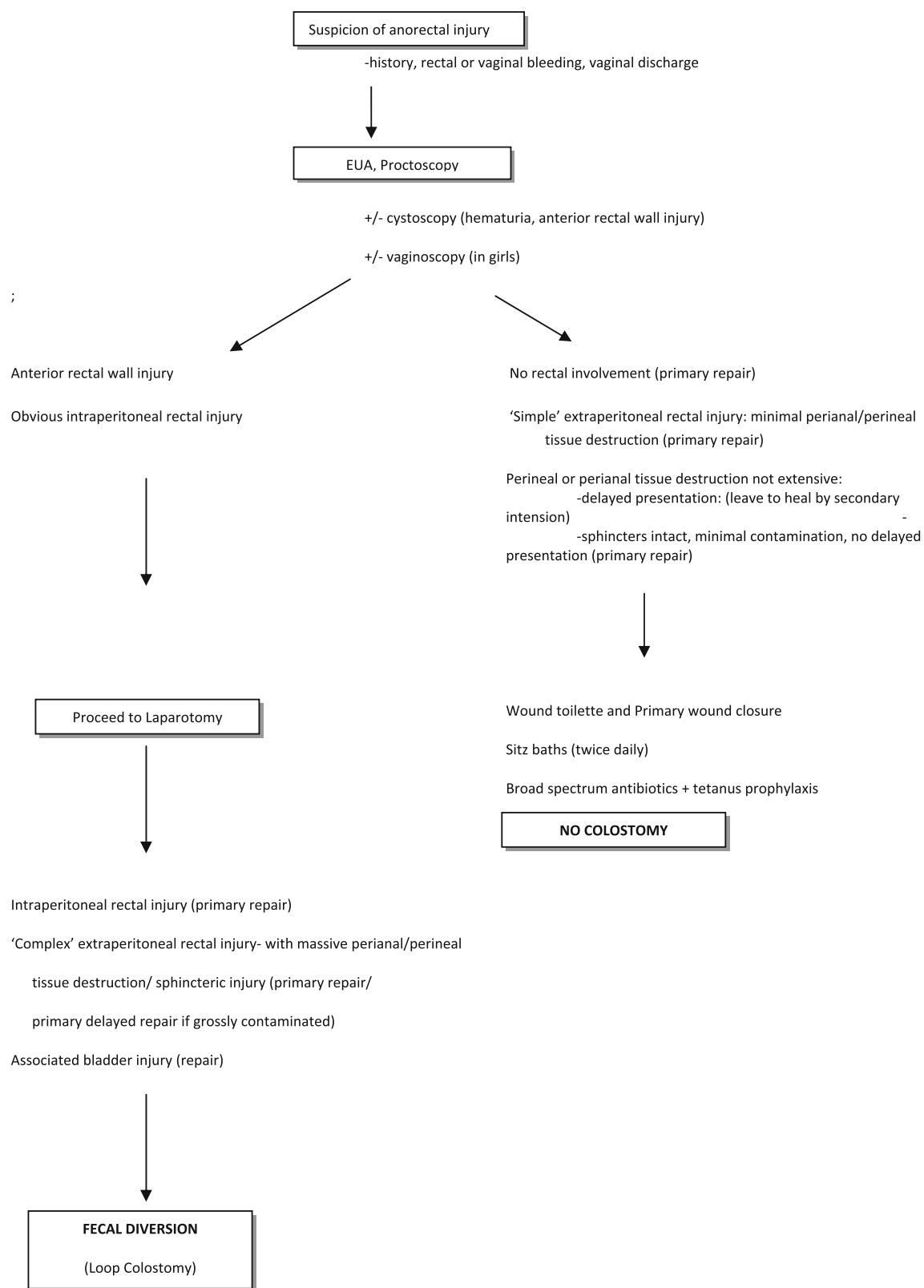


Fig. 1 Local Protocol for management of penetrating anorectal injuries in children

16]. Palpation will also guide assessment of the integrity of the ASM. On palpation one notes the presence of any muscular defects which would be indicative of ASM compromise [5]. A combination of visual inspection and palpation is recommended as ASM injuries may not be apparent on inspection alone if the anorectal mucosa is intact [16].

All patients with proctoscopic findings supportive of intraperitoneal extension or abdominal signs on presentation (significant tenderness, guarding or rebound) should undergo exploratory laparotomy. Laparoscopy may also play a role being both diagnostic and therapeutic. It can adequately exclude intraperitoneal extension, repair the perforation and guide colostomy formation if necessary [6].

In girls, additional vaginoscopy is advocated to exclude accompanying vaginal injuries [2, 4, 17]. Similarly, cystoscopy is warranted in both sexes in cases highly suspicious of urological injury, for example the child presenting with gross hematuria or having an anterior rectal wall injury [1, 2, 4, 17].

Radiological investigations may also be useful in the management of children with penetrating anorectal injuries in whom proctoscopy is negative but mild peritoneal signs are present. A plain abdominal X-ray or erect chest X-ray may identify free peritoneal air or water-soluble contrast enemas confirm the presence of an intraperitoneal rectal injury [1, 5, 9]. Use of barium contrast enemas is not advised as any leak of barium into the peritoneal cavity may lead to barium peritonitis, with associated marked fluid and electrolyte imbalances from third space losses which can be life-threatening [18, 19]. Computed tomography scanning (CT scan) of the abdomen and pelvis with triple (intravenous, oral and rectal) contrast has also been shown to reliably identify cases of rectal injuries that were missed on initial proctoscopy in children, possibly because of poor visualization at the time of the examination in an unprepared rectum [20].

After initial assessment, our approach in this series of patients was that of selective fecal diversion using a sigmoid loop colostomy where applicable (Fig. 1). Fecal diversion was performed in all children with intraperitoneal rectal injuries, bladder injuries or extraperitoneal rectal injuries with extensive perianal or perineal tissue destruction. The latter group is of particular interest because contamination in the presence of devitalized tissues can cause delayed healing and infective complications—including abscess formation necessitating a secondary colostomy [4, 7].

Loop colostomies—as opposed to divided colostomies—have traditionally been used in the management of penetrating anorectal injuries in adults because they can be constructed with ease and rapidity, and are easier to close [22, 23]. Most pediatric surgical series reflect this

preference for use of loop colostomies [6, 8, 9]. Though not fully diverting it offers adequate fecal diversion for the purpose of allowing healing of rectal and perineal injuries [6, 8, 22, 23]. In addition, many argue that a properly constructed loop colostomy may be fully diverting [22, 24].

Jones et al. [7] who utilized divided sigmoid colostomies in their series of children presenting with perineal injuries have advised of the importance of thoroughly irrigating the distal limb of the defunctioning stoma prior to repair of the perineum to minimize septic complications. However, this measure may be reflective of management of non-civilian missile injuries and its efficacy has not been substantiated with respect to affecting mortality or overall morbidity of civilian wounds [9, 22, 23].

A major advantage of selective fecal diversion is that many children will be saved from the stigma of having a colostomy, as well as being spared the possible complications of both colostomy formation and colostomy closure, while still having excellent outcomes.

Typically closure of colostomies is safely performed in 6 weeks following anorectal injuries without adverse consequences [1, 3, 8]. However many have used more liberal intervals of up to 3–8 months [4–6]. The average time to colostomy closure in our series was 6 months—ranging from 4 to 9 months, and this was achieved despite theatre time constraints and shortage of surgical and nursing personnel in our setting. However, we would ideally like to decrease this interval to within 2–3 months for all children in the future. This is particularly important because of the socioeconomic burden of delayed colostomy closure, especially in a developing country such as Jamaica. Here we are faced with issues such as colostomy bags not being affordable by the average family, a present lack of pediatric enterostomal therapists to assist children and their families, and the fact that many children with a colostomy are prevented from attending school either because of social embarrassment or lack of education by teachers and caregivers in the public school setting. These socioeconomic issues cannot be overlooked when managing children with penetrating anorectal injuries in developing countries.

In the late 1940s, Boyden was the first to question the long time to closure of colostomies (3–12 months) in adult patients [25]. This subsequently led to a series of animal studies showing that adequate healing of the bowel is usually evident at 7–11 days following trauma, as evidenced by optimal or increased collagen content [26, 27]. These findings were later substantiated by Renz [25], who demonstrated that 75 % of his 30 adult patients had radiological confirmation of healing of their rectal wounds at 10 days following injury. He was thus able to offer 50 % of his patients colostomy closure before discharge home (same admission colostomy closure) after a mean hospital stay of only 17.4 days. This correlated to their having

colostomy closure 9–19 days following rectal trauma. In the future consideration should thus probably be given to offering children with penetrating anorectal injuries, particularly in our setting, ‘same admission colostomy closure’.

Though the usefulness of routine contrast studies in trauma patients prior to closure of colostomies have been questioned because of the low yield, all children in this series having fecal diversion had a distal loopogram to ensure absence of severe stricturing prior to colostomy closure [28]. None of the children in this series was noted to have evidence of a stricture.

With respect to the perineal wound itself, primary wound closure was performed, in addition to twice daily sitz baths, broad spectrum antibiotics and tetanus prophylaxis. The exception to this rule were those presenting with old wounds (more than 8–12 h) in whom primary wound closure was not offered. In such cases the wound was left to heal by secondary intention. Another exception to the rule of primary closure of the perineal wound would be in cases where the ASM is involved (sphincteric injury), and the wound is grossly contaminated, with established sepsis. In such instances delayed primary repair of the sphincter is advocated, together with a defunctioning colostomy [7, 29].

The functional outcome of penetrating rectal injuries once appropriately managed is usually very good, with low morbidity and maintenance of fecal continence even in the presence of external sphincter disruption [4–6]. The most commonly encountered complication is wound infections and/or abscess formation [4–6]. Mortality in these children is usually limited to those with a missed intraperitoneal rectal injury or delayed presentation [5, 6, 30]. Intraperitoneal rectal injuries may be missed because of lack of meticulous proctoscopy, or failure to appreciate the injury at laparotomy, which may not always be obvious. Often the rectal injury may be masked by the presence of a localized bruise or clot on the rectal wall.

Though a relatively small series, we were able to demonstrate satisfactory outcome from our local protocol of selective fecal diversion in the management of penetrating anorectal injuries in children. All the children had return of normal fecal continence, after a mean follow up of 72.5 months, ranging from 19 months to 11 years. This approach was associated with no cases of mortality. There was only one case of morbidity—perineal wound infection with dehiscence, which occurred in a 9-month-old girl who was sexually assaulted (Case #2).

This review also identifies two issues relevant to managing penetrating anorectal injuries in a developing country: use of defective bicycles—a clear health hazard and the prolonged time to colostomy closure many children are subjected to.

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