CASE REPORT

OPEN ACCESS

An unusual case of handlebar injury

Utkarsh Fichadia, Usha Sethuraman

ABSTRACT

Introduction: Bicycling is a common recreational activity amongst American children. Bicycles are associated with more childhood injuries than any other consumer product except the automobile.

Case Report: We present a case of a 10-year-old girl sustaining significant morbidity secondary to penetrating handlebar injury and give a review of literature on common handlebar injuries.

Conclusion: We present a very unusual type of bicycle related injury but more importantly we hope to focus the attention to an often overlooked injury associated with bicycles, i.e., the handlebars.

Keywords: Handlebar injuries, Abdominal trauma, Trauma, Penetrating abdominal injuries

How to cite this article

Fichadia U, Sethuraman U. An unusual case of handlebar injury. Int J Case Rep Images 2014;5(6):423–426.

doi:10.5348/ijcri-201480-CR-10391

Utkarsh Fichadia¹, Usha Sethuraman²

Affiliations: ¹Fellow, Pediatric Emergency Medicine, Wayne State University, Children's Hospital of Michigan; ²Associate Professor, Wayne State University, Children's Hospital of Michigan.

Corresponding Author: Utkarsh Fichadia, Fellow, Pediatric Emergency Medicine, Wayne State University, Children's Hospital of Michigan; Email ID: utkfichadia@gmail.com

Received: 24 March 2014

Accepted: 14 April 2014

Published: 01 June 2014

INTRODUCTION

Bicycle handlebar injuries have been reported fairly regularly. Most of them have been related to blunt intra-abdominal injury. We present a case of penetrating injury caused by a bicycle handlebar followed by a review of literature.

CASE REPORT

A 10-year-old girl with no significant past medical history was brought to the emergency department after sustaining a penetrating handlebar injury to the lower abdomen. The girl was riding her bicycle when the handle of the bicycle turned perpendicular to the girl's body and she fell over the uncovered rusted handle, sustaining the penetrating injury. There was no associated head injury or loss of consciousness.

At the time of presentation the girl was alert, awake and in no distress. Vital signs were heart rate 108 bpm, respiratory rate 18 min, blood pressure 109/50 mmHg, oxygen saturation 98% on room air. Examination of head and neck was normal except for abrasions in her lower lips. There was no C-spine deformity or tenderness. Her cardiovascular examination was normal, and chest was clear to auscultation bilaterally. Her peripheral perfusion was adequate with a capillary refill less than two seconds. Examination of the abdomen revealed a handlebar impaled infraumbilically and appearing to come out through the vulva. There was no external bleeding visible.

Immediately after arrival an intravenous access was placed and she was fluid resuscitated. After the initial stabilization an abdominal radiograph done showed a penetrating injury with handlebars in the anterior soft tissues of the abdomen and pelvis (Figures 1 and 2). Surgical service was consulted to review the patient.

Vital signs of the patient remained stable throughout the emergency stay. The patient was taken to the operating room immediately where exploration showed only subcutaneous penetration without fascia penetration. The patient tolerated the procedure well and was discharged home forty-eight hours post surgery without any complications. Our case is unique in that there was

Figure 1: Oblique abdominal radiograph showing the penetrated handle.

Figure 2: Lateral abdominal radiograph showing path of the handlebar: Infraumbilical to pubis.

Table 1: Organs involved in different studies: Percentages

Authors	Spleen	Liver	Pancreas	Kidney	Bowel injury
Erez et al.	45	35	6	13	0
Acton et al.	20	10	10		
Clarnette	28	12.5	15.6	6	9.3
Nadler et al.	14				21

no intra-abdominal penetration but only subcutaneous tunneling had occurred.

DISCUSSION

Bicycling is a common childhood recreational activity. As many as 80% of children own a bicycle by the time they are in second grade [1]. According to the National SAFE KIDS campaign 2004, bicycles are associated with more childhood injuries than any other consumer product except the automobile. One of the most common causes of head injury in pediatric age group has been bicycle

related. As per the IIHS (Insurance Institute for Highway Safety) helmet use among bicyclist has been shown to reduce to rate head injury risk by 85%. According to the National Safe KIDS campaign every dollar spent on Helmets would save thirty dollars in healthcare costs and costs to society. Many states have now adopted legislation for helmet use for child bicyclist with follow-up studies showing reduction in head injury rates [2]. However, one of the common but often overlooked injuries among young bicyclist is that secondary to handlebars. An estimated 77% percent of non-motor vehicle involved bicycle related injuries could be from handlebars with a huge economic burden for treating the same [3]. We

will discuss the common patterns of handlebar injuries through a review of literature.

The most common mechanism of fall is a loss of balance followed by a forward fall. Majority of handlebar injuries are either due to a flip over handlebar or a result of direct impact. While the first mechanism leads to more facial and skeletal trauma, the latter leads to more abdominal trauma [4, 5].

Majority of children sustaining handlebar trauma are males [4–7]. The most common injury reported has been a blunt trauma to abdominal wall and pelvis. The small area of the handle bar even in presence of low velocity is a major contributing factor to serious intra-abdominal injuries [6]. In a study done by Parshotam et al. the odds for having a serious intra-abdominal injury was higher for patients with handle bar imprints (OR 21.8) [8]. A similar study done by Karaman et al. reported 45% of patients with serious abdominal injuries having a handle bar imprint [7]. Even though these imprints may give a clue towards a more severe intra-abdominal injury, majority of patients with serious abdominal injury do not have an imprint. Rare penetrating injuries have also been reported [9]. As with our case they have been associated with an uncovered handle bar ends. In 21 cases of handlebar injury reported by Acton et al. uncovered handlebar end was responsible for 47% of serious abdominal injuries [10].

Common intra-abdominal injuries reported after handle bar injury are spleen, liver, pancreas, intestines [4–7]. Splenic and liver injuries commonly present as laceration and hematoma. Most of these blunt injuries could be managed conservatively with close observation. Handlebars could responsible for as many as 62–75% traumatic pancreatitis in children [11, 12]. This can present a challenge during early stages, as initial serum amylase could be normal. Understanding the mechanism of trauma, maintaining a high level of suspicion, serial serum amylase level along with ultrasound or computed tomography might point to the diagnosis.

Though uncommon, abdominal wall hernia has been reported. It occurs when the force of the handle bar is not enough to disrupt skin but enough to disrupt the underlying tissue via a tangential shearing stress [13, 14]. It is usually diagnosed clinically but may require additional imaging for confirmation. This type of injury requires prompt diagnosis and often a surgical intervention to prevent tissue strangulation.

Another hidden danger of serious handlebar injury is a delayed presentation. A delayed presentation has been reported up to as late as 18 days following handlebar injury [15]. The common causes for the presentation have been pancreatic and small bowel injuries. Delayed pancreatic injury often presents with formation of pancreatic pseudocyst [15]. A close follow-up with a primary care provider is a must if early discharge is anticipated. The incidence of small bowel injury following blunt abdominal trauma has been reported to be around

5% [16]. Early diagnosis of a perforated small bowel could pose a challenge secondary to neutral pH and low bacterial content of the lumen [17]. Initial radiographs may be normal in up to 60% of cases [18]. Some clues to diagnosis are free fluid on ultrasound, increasing tachycardia and rising white count.

Though Winston et al. have done studies looking into mechanism of handlebar injuries and its economic burden, more studies are needed looking into possible solutions and their impact on preventing serious handlebar injuries and reducing the economic burden. A retractable handlebar design was suggested by Arbogast et al. [19]. Taking a cue from our patient's experience, some of the possible preventive strategies could be making bicycles with limited handle rotation, better protection of the handlebar ends and parental awareness regarding unsafe bicycles.

CONCLUSION

In conclusion bicycling, though a common childhood recreational activity, can lead to some serious injuries. Though most focus on injury prevention has been on children wearing helmets. Our case signifies another cause of morbidity associated with bicycle related injuries, i.e., the handlebars.

Author Contributions

Utkarsh Fichadia – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Usha Sethuraman – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

Copyright

© 2014 Utkarsh Fichadia et al. This article is distributed under the terms of Creative Commons Attribution License which permits unrestricted use, distribution and reproduction in any medium provided the original author(s) and original publisher are properly credited. Please see the copyright policy on the journal website for more information.

REFERENCES

1. Waller JA. Bicycle ownership, use, and injury patterns among elementary school children. *Pediatrics* 1971;47(6):1042–50.
2. Macpherson A, Spinks A. Bicycle helmet legislation for the uptake of helmet use and prevention of head injuries. *Cochrane Database Syst Rev* 2008;16(3):CD005401.
3. Winston FK, Weiss HB, Nance ML, et al. Estimates of the incidence and costs associated with handlebar-related injuries in children. *Arch Pediatr Adolesc Med* 2002;156(9):922–8.
4. Nadler EP, Potoka DA, Shultz BL, Morrison KE, Ford HR, Gaines BA. The high morbidity associated with handlebar injuries in children. *J Trauma* 2005;58(6):1171–4.
5. Winston FK, Shaw KN, Kreshak AA, Schwarz DF, Gallagher PR, Cnaan A. Hidden spears: Handlebars as injury hazards to children. *Pediatrics* 1998;102(3 Pt 1):596–601.
6. Clarnette TD, Beasley SW. Handlebar injuries in children: Patterns and prevention. *Aust N Z J Surg* 1997;67(6):338–9.
7. Karaman I, Karaman A, Aslan MK, Erdogan D, Cavusoglu YH, Tütün O. A hidden danger of childhood trauma: Bicycle handlebar injuries. *Surg Today* 2009;39(7):572–4.
8. Gera PK, Barker AP, Gollow I, Orford J, Wicks S, Whan L. Bicycle handlebar injuries in Western Australia: From imprints to abdominal wall hernias. *Med J Aust* 2008;189(5):295.
9. Krishnan SG, Rathjen KE. Open iliac wing fracture caused by penetrating injury from a bicycle handlebar. *J Orthop Trauma* 2002;16(4):277–9.
10. Acton CH, Thomas S, Clark R, Pitt WR, Nixon JW, Leditschke JF. Bicycle incidents in children—abdominal trauma and handlebars. *Med J Aust* 1994;160(6):344–6.
11. Graham CA, O’Toole SJ, Watson AJ, Munro FD, Haddock G. Pancreatic trauma in Scottish children. *J R Coll Surg Edinb* 2000;45(4):223–6.
12. Takishima T, Sugimoto K, Asari Y, et al. Characteristics of pancreatic injury in children: A comparison with such injury in adults. *J Pediatr Surg* 1996;31(7):896–900.
13. Goliath J, Mittal V, McDonough J. Traumatic handlebar hernia: A rare abdominal wall hernia. *J Pediatr Surg* 2004;39(10):e20–2.
14. van Bommel AJ, van Marle AG, Schlejen PM, Schmitz RF. Handlebar hernia: A case report and literature review on traumatic abdominal wall hernia in children. *Hernia* 2011;15(4):439–2.
15. Lam JP, Eunson GJ, Munro FD, Orr JD. Delayed presentation of handlebar injuries in children. *BMJ* 2001;322(7297):1288–9.
16. Bensard DD, Beaver BL, Besner GE, Cooney DR. Small bowel injury in children after blunt abdominal trauma: Is diagnostic delay important? *J Trauma* 1996;41(3):476–83.
17. Pikoulis E, Delis S, Psalidas N, et al. Presentation of blunt small intestinal and mesenteric injuries. *Ann R Coll Surg Engl* 2000;82(2):103–6.
18. Brown RA, Bass DH, Rode H, Millar AJ, Cywes S. Gastrointestinal tract perforation in children due to blunt abdominal trauma. *Br J Surg* 1992;79(6):522–4.
19. Arbogast KB, Cohen J, Otoy L, Winston FK. Protecting the child’s abdomen: A retractable bicycle handlebar. *Accid Anal Prev* 2001;33(6):753–7.

Access full text article on
other devices

Access PDF of article on
other devices