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CLINICAL

Bicycle-Related Fatal Blunt Abdominal Trauma: A Case Report

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A B S T R A C T

Bicycle-related injuries often result in blunt trauma to the abdomen, posing serious health risks, particularly among children. We present the case of a 12-year-old boy who suffered abdominal blunt trauma from a bicycle handlebar during an accidental fall while playing. Despite initial outpatient management, the patient's condition deteriorated, leading to peritonitis and eventual demise. Autopsy findings underscore the importance of prompt diagnosis and intervention in such cases.

K E Y W O R D S

Bicycle handlebar injury, ring sign, blunt abdominal trauma.

Case Report:

Title:

Bicycle-Related Fatal Blunt Abdominal Trauma: A Case Report

Abstract:

Bicycle-related injuries often result in blunt trauma to the abdomen, posing serious health risks, particularly among children. We present the case of a 12-year-old boy who suffered abdominal blunt trauma from a bicycle handlebar during an accidental fall while playing. Despite initial outpatient management, the patient's condition deteriorated, leading to peritonitis and eventual demise. Autopsy findings underscore the importance of prompt diagnosis and intervention in such cases.

Keywords: Bicycle handlebar injury, ring sign, blunt abdominal trauma.

Introduction:

Children are vulnerable to a wide range of bicycle-related traumatic injuries. Bicycle accidents

account for 5-14% of blunt abdominal trauma in children [1]. The reported handlebar-related injuries include liver, splenic, renal, intestinal, and pancreatic injuries; traumatic abdominal wall hernia; abdominal wall rupture; abdominal aorta rupture; transection of the common bile duct; traumatic arterial occlusion; groin injuries and other site-specific injuries. In general, injuries to the spleen, liver, or kidneys are readily evident soon after the accident; however, injuries to the bowel and pancreas often present late and result in greater morbidity.[2] Bicycle-related injuries are a significant public health concern, with abdominal trauma being a frequent manifestation, especially among pediatric populations. Despite advancements in medical care, such injuries continue to pose challenges due to delayed diagnosis and potentially life-threatening complications.

Case Details:

A 12-year-old male, brought dead with a history of accidental fall from a bicycle was referred for Medicolegal postmortem examination. As per the details furnished at the time of the police inquest, after the alleged accidental fall, he was taken to a nearby general practitioner with complaints of pain in the abdomen. He was advised analgesic therapy in an outpatient setting. Later his condition deteriorated over 30 hours, and before he could reach any higher centre he succumbed to death.

The autopsy revealed dark red contused abrasions in the form of ring sign on the abdomen consistent with bicycle handlebar impact (Image no. 1). Apart from this another minor abrasion consistent with the history of fall was noted over both knees and right leg. Internal examination demonstrated the presence of 500 cc of yellowish-green foul-smelling fecal matter mixed with thin fluid (Image no. 2) with a collapsed small intestine. On further exploration, a single full-thickness traumatic small bowel perforation was noted in the Jejunum over the anti-mesenteric border (Image no. 3). At the end of the autopsy death was attributed to peritonitis secondary to small bowel perforation following blunt abdominal trauma.

Discussion:

Cycling is the single major activity among children apart from playing, and it accounts for a significant number of injuries sustained by children on the road.[2] It is noteworthy that while bicycle-related injuries are prevalent across all age groups, children are particularly vulnerable due to their propensity for outdoor activities and lack of fully developed coordination skills.

Bicycle handlebar injuries range from minor soft tissue trauma to extensive visceral injuries leading to significant morbidity and even death. [2] Approximately 70% of patients injured in handlebar-related mechanisms are injured by a direct impact from the end of the handlebar like in the present case. In 16% of the child bicyclist, serious injuries resulted from handlebar impact, and the remaining 84% of serious injuries primarily involved bicycle-motor vehicle collisions [3]. Bicycle handlebar injuries have been reported to account for 14-20% of cases of gastrointestinal perforations among children with blunt abdominal injuries [1,4]. The small intestine is the most common site of perforation, and peritonism may not be evident initially because the content of the small bowel is of a neutral pH, low bacterial density, and low enzymatic activity [5]. Hollow-viscus injuries can be particularly challenging to detect because of delayed presentation, the infrequency of related external bruising, and the difficulties associated with detecting these injuries on imaging [1,5].

Bicycle accidents in which there is a history of trauma from the handlebars are particularly associated with severe abdominal injuries as the force of impact is applied via the small cross-sectional area of the end of the handlebars.[3, 6] A study of 813 children who presented to the hospital with bicycle-related injuries found that life-threatening intra-abdominal injuries occurred in 10 of 21 children who had sustained handlebar trauma.[6]

Abdominal ultrasonography can be a useful non-invasive investigation in these children. It may show free peritoneal fluid without concomitant solid organ injury in cases of gastrointestinal tract perforations. [7] However, ultrasound findings may be normal in the early period after the trauma and intra-abdominal injury cannot therefore be excluded in all cases. [7, 8] Frequently repeated clinical examination remains the most important tool for early diagnosis; and a period of observation for all children who have symptoms after such an injury, and review by a senior doctor before discharge should be a recommended practice as reported earlier.[5]

In the current case, as more details from the general practitioners are not available, we cannot comment on whether any investigation was warranted. However, looking at the case details, the presence of complaints of pain in the abdomen, external visible physical injury in the form of a typical ring sign, and the young age of the patient, we feel that admission and detailed investigations like focussed sonography or CT scan along with observation for significant duration should have been preferred clinical approach.

Overall bicycle-related injuries encompass a spectrum of trauma, ranging from minor abrasions to life-threatening internal organ damage. The current case highlights the need for clinicians to maintain a high index of suspicion for internal injuries in such cases as diagnosis can be challenging due to nonspecific or absent initial symptoms.

Conclusion:

Bicycle-related blunt abdominal trauma poses significant challenges in diagnosis and management, particularly in pediatric patients. Suspicion of visceral injury, early recognition of internal injuries and prompt intervention are paramount to prevent adverse outcomes. Efforts to enhance public awareness, implement safety measures, and improve medical response are essential in reducing the burden of bicycle-related injuries on society.

Recommendations:

There should be programs to raise awareness among healthcare providers, parents, and the general public about the risks of bicycle-related injuries. Effective advocacy for the use of protective gear and implementing safety measures to mitigate these risks and improvements in bicycle design, such as protective padding and handlebar modifications, to reduce the severity of injuries in the event of accidents should also be promoted.

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Conflict of Interest

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