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## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

## Handlebar hernia - A rare complication from blunt trauma

Hang-Fai So<sup>a,\*</sup>, Hajir Nabi<sup>b</sup><sup>a</sup> University of Queensland, Department of Colorectal Surgery, Logan Hospital, Brisbane, Australia<sup>b</sup> Department of Colorectal surgery, Logan Hospital, Brisbane, Australia

## ARTICLE INFO

## Article history:

Received 6 January 2018

Received in revised form 12 February 2018

Accepted 10 June 2018

Available online 19 June 2018

## Keywords:

Handlebar hernia

Traumatic abdominal hernia

## ABSTRACT

**INTRODUCTION:** Handlebar hernias are rare; they result from blunt force impacting the abdomen. This focal blunt trauma causes a tear of the underlying abdominal muscle and fascia without necessarily disrupting the skin. The site of the hernia is usually remote from the site of trauma so clinicians may be falsely reassured if they locally explore the site of bruising. The physical examination of such patient may not obviously suggest such an injury and the diagnosis can be easily missed.

**CASE PRESENTATION:** A fit and well 10-year-old boy presented to the emergency department with left sided abdominal pain following a pushbike accident. He fell from his bicycle resulting in an impact of the handlebar to the left side of his abdomen. No obvious hernia was found on physical examination but there was a circular-shaped bruise in the left lower quadrant. An abdominal CT scan was then performed and the unusual diagnosis of a handlebar hernia was made. A prompt laparoscopic herniorrhaphy was performed and his post-operative recovery was uneventful.

**DISCUSSION:** A high level of suspicion is required to diagnose handlebar hernias. Even relatively low-speed trauma can result in this insidious injury. Laparoscopic repair has been demonstrated to be successful in this case.

**CONCLUSION:** Despite being a rare entity, handlebar hernias should be suspected when significant blunt force is applied to the abdominal wall from a handle bar injury. They may not be obvious on physical examination and therefore further imaging is often important. Management involves prompt surgical repair to prevent complications.

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## 1. Introduction

Traumatic abdominal wall hernias result from the disruption of the abdominal musculature and fascia secondary to blunt or sharp trauma. Handlebar hernias result from direct blunt trauma by a handlebar-like object [1]. The first handlebar hernia was described by Landry et.al in 1956 [2]. Data on these hernias is limited with several case reports and few case series having been published. A medline/pubmed search revealed 38 cases reported in the literature. Past reports have indicated that the presence of the “handlebar sign” is associated with increased risk of internal injury. Physical examination may be falsely reassuring and occult hernias may only be detected by abdominal computerised tomography (CT) or ultrasound (US) scans [3]. Management involves urgent surgical repair to avoid complications from incarceration or strangulation. We report a case of a handlebar hernia in a 10-year-old boy following a bicycle accident who subsequently went on to have a

laparoscopic exploration and repair of his hernia. This case has been reported in line with the SCARE criteria [4].

## 2. Case presentation

A fit and well 10-year-old boy presented to the emergency department following a bicycle accident. He sustained a fall from a height of 1 m with the bicycle handlebar impacting on the left side of his abdomen. He was complaining of abdominal pain on arrival, mainly on the left side.

On examination, he was stable with no other detectable injuries. Abdominal inspection showed a circular bruise in his left lumbar region- the “handlebar sign” (Fig. 1). Abdominal tenderness was noted in the left lumbar region, but there was no guarding and no rebound tenderness. No hernia was appreciable on examination. He had normal bowel sounds on auscultation and the rest of the examination was unremarkable. A FAST (Focussed Assessment with Sonography for Trauma) was performed as an adjunct and it was negative.

Given the presence of the handlebar sign and abdominal tenderness, there was a reasonable suspicion for intra-abdominal injury. An abdominal CT scan was performed and this revealed a left abdominal wall hernia containing a loop of sigmoid colon (Fig. 2).

\* Corresponding author at: 14 Pattie Street, Sunnybank Hills, Brisbane, Queensland, 4109, Australia.

E-mail address: [hangfai.So@health.qld.gov.au](mailto:hangfai.So@health.qld.gov.au) (H.-F. So).

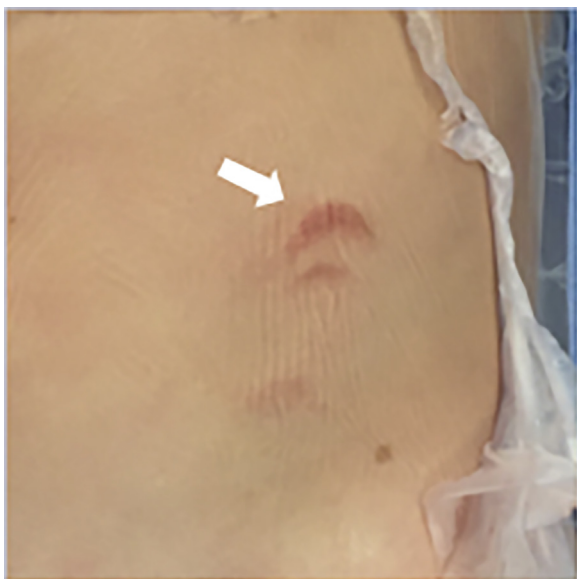


Fig. 1. Handlebar sign – bruising in the left lumbar region (white arrow).

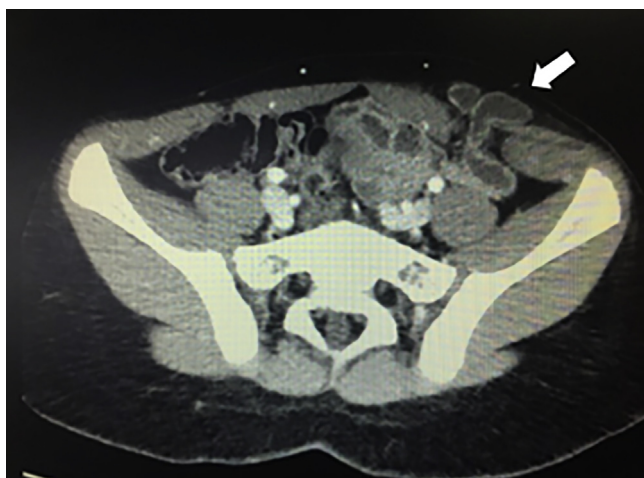


Fig. 2. CT-Abdomen showing abdominal wall hernia containing a loop of sigmoid colon (white arrow).

There was no other significant intra-abdominal pathology evident on CT.

The patient promptly proceeded to have a diagnostic laparoscopy, which confirmed the presence of a left sided abdominal wall hernia containing a loop of sigmoid colon and omentum (Fig. 3). The hernia defect was 3 cm more cephalad and 2 cm more medial than the site of the actual handlebar bruising. The herniated omentum and sigmoid colon were reduced laparoscopically.

The incarcerated sigmoid colon was assessed to be viable after a period of observation. No other intra-abdominal injuries were identified at laparoscopy. The hernia defect was closed laparoscopically using an Endoclose device™ with several 0 PDS interrupted sutures. His postoperative recovery was uneventful and was discharged on postoperative day 2. He was followed up in clinic 5 weeks later and was well with no clinically detectable recurrence.

### 3. Discussion

A traumatic abdominal wall hernia can occur when there is blunt or sharp trauma to the abdomen. Blunt trauma can produce shearing of the musculature, fascia and peritoneum, while the skin remains intact. Traumatic abdominal wall hernias are classified into three types [5]. Type I hernias involve small defect caused by lower energy impact by a localised object. Type II hernias are larger, resulting from higher energy impact such as motor vehicle accidents or fall from heights. While type III hernias involves bowel herniation generally attributed to deceleration injuries.

Most handlebar hernias occur in children aged 4–14 years [6]. This probably reflects the thinner and weaker abdominal wall of children compared to adults. For adults, the site of hernia occurs at anatomical weak points, usually in the inguinal region or in the lower abdomen lateral to the rectus muscle. In children, the location can be more varied, most occurring in the lower abdomen, but there are two cases reported in the upper abdomen also [7,8].

The diagnosis of handlebar hernias can be made clinically. Signs such as bruising and the imprint of a handlebar on the abdominal skin (handlebar sign) as well as a tender mass and/or cough impulse are usually sufficient to make a clinical diagnosis. In severe cases, where intra-abdominal organ injury has occurred, peritonitic signs will be apparent. However, in absence of some of these examination findings, a high level of suspicion is required to make a diagnosis. Onset of symptoms can also be late; there are case reports of patient presenting 48 h to 5 months post injury [9]. Abdominal US is appropriate for identifying handlebar hernias; but increasingly, CT is being used to diagnose hernia and exclude other intra-abdominal injuries in these traumatic clinical settings [10,11].

The management of handlebar hernias is prompt surgical herniorrhaphy to prevent complications from incarceration or strangulation. For small defect, repair can be achieved with primary closure of the torn layers with non-absorbable sutures. Larger defects may require the use of prosthetic mesh, however, this may not always be possible in the setting of intra-abdominal contamination secondary to bowel injury. In terms of timing of surgery, immediate exploration and repair is preferred given there is always risk of intra-abdominal injuries in these settings. However, if the probability of intra-abdominal injuries is low, and that there are no immediate signs of incarceration or strangulation, surgical repair can be delayed [12]. There is also a case report of such a hernia being managed conservatively [13]. In terms of surgical approach, both laparoscopic and open surgery has been reported to be appropriate

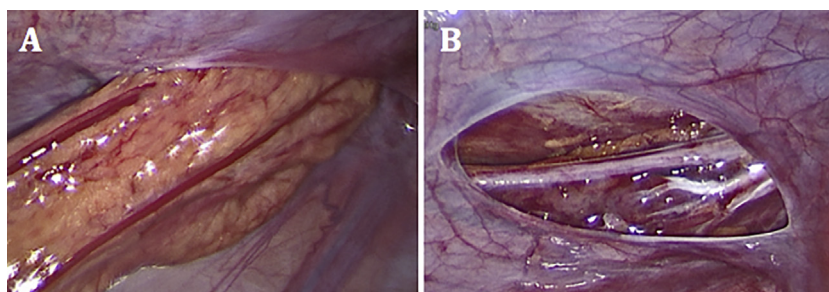


Fig. 3. Laparoscopic view of the handlebar hernia containing omentum and sigmoid colon prior to reduction (A) and post-reduction (B).

[14]. Our case demonstrates the advantages of a minimally invasive approach with early hospital discharge and minimal morbidity.

#### 4. Conclusion

Handlebar hernias are rare. In the right clinical context, a high level of suspicion is required to diagnose this insidious injury. As demonstrated by this case, handlebar hernias can occur even with relatively low-speed trauma, such as a fall from a bicycle. Management involves prompt surgical repair to prevent complications. A laparoscopic approach has been demonstrated to be successful in this case.

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Parental consent has been obtained for the preparation and publication of this case report.

#### Conflicts of interest

I declare there are no conflict of interest in preparing this manuscript.

#### Funding sources

I declare there are no sponsors or funding received for preparing this manuscript.

#### Ethical approval

Case report is exempt from ethical approval from our institution. All patient identifiers are removed from the manuscript.

#### Consent

Consent has been obtained from patient's parent. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request. All identifying details have been omitted from manuscript.

#### Author contribution

All authors contributed to data collection, analysis and writing the paper.

#### Registration of research studies

researchregistry3471.

#### Guarantor

Hajir Nabi.

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