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Laparoscopic-assisted management of traumatic abdominal wall hernias in children: case series and a review of the literature

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ABSTRACT

Background: Traumatic abdominal wall hernia (TAWH) is defined as herniation through a disrupted portion of musculature/fascia without skin penetration or history of prior hernia. In children, TAWH is a rare injury.
Objective: The objectives of this study were to report our experience with different management strategies of TAWH in children and to determine the utility of laparoscopy.
Design/method: A retrospective chart review of all children treated by pediatric surgery at our institution for TAWH in a 5 year interval was performed. Data were collected on mechanism of injury, initial patient presentation, surgical management, and outcomes.
Results: We present 5 cases of traumatic abdominal wall hernia; 3 were managed using laparoscopic assistance. One patient was managed nonoperatively. All patients recovered without complications and were asymptomatic on follow up.
Conclusion: Traumatic abdominal wall hernias require a high index of suspicion in the cases of blunt abdominal trauma. Laparoscopy is useful mainly as a diagnostic modality, both to evaluate the hernia and associated injuries to intraabdominal structures. Its use may facilitate repair through a smaller incision. Conservative management of TAWH may be appropriate in select cases where there is a low risk of bowel strangulation.

Blunt trauma is responsible for most childhood critical injuries, and approximately 5% of all pediatric emergency room admissions are owing to abdominal trauma, with a 15% mortality rate [1,2]. Blunt abdominal trauma (BAT) may result in GI tract perforation, disruption of solid organs and vascular structures, as well as intraabdominal inflammation. Despite the frequency of BAT, herniation of abdominal contents is actually rare because of the elastic nature of the abdominal wall [1].

Traumatic abdominal wall hernias (TAWH) occur when local blunt trauma to the abdominal wall has insufficient force to penetrate the skin but however is able to disrupt deeper tissue layers [1–5]. The combination of localized force and sudden increase in intraabdominal pressure causes a disruption of abdominal musculature and fascia. The increase in intraabdominal pressure with a combined deceleration force upon the abdominal musculature is responsible for the herniation of abdominal contents into the subcutaneous tissue [6,7]. The skin remains intact, however, because it is more elastic than the underlying muscle and fascial layers [3].

TAWH are rare in children. The majority of the literature on pediatric TAWH consist of case reports; this unfortunately limits the clinical significance with respect to treatment and outcomes. In this paper, we present one of the largest case series of TAWH in children so far, along with a review of the published literature on the subject.

1. Methods

A retrospective chart review of all children consulted and treated by the pediatric surgeons at the Maria Fareri Children's Hospital for TAWH between January 1, 2007 and June 1, 2013 was performed. Data were collected on mechanism of injury, initial patient presentation, surgical management, and patient outcomes. The study was approved by the IRB of New York Medical College (L-10,876).

A literature search was conducted using Pubmed and the search term “traumatic abdominal wall hernia” or “handlebar hernia” and “children”. The results were screened for relevance and the findings tabulated (Table 1).

1.1. Cases

(Table 2 and Figs. 1–3a and b).

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Table 1
Results of literature review.

Year of publication	Author	Ages (years)	Sex (M/F)	Number of cases	Mechanism	Diagnostic modality	Location of hernia	Associated injuries	Management	Post-operative outcome (as reported)
1956	Landry	14	M	1	MCC	Physical exam	LLQ	None	Open	No complications
1964	Roberts	9	M	1	Handlebar	Physical exam	LLQ	None	Open	No complications
1965	Manuola	9	F	1	Handlebar	Physical exam	LLQ	None	Open	No complications
1970	Pendl	8	F	1	Handlebar	Physical exam	RLQ	None	Open	No complications
1973	Hebert	7	M	1	Handlebar	Abdominal x-ray	LLQ	None	Open	No complications
1974	Atiemo	6	M	1	Gored by cow	Physical exam	LLQ	None	Open	No complications
1977	Hollwarth	R 4–9, M 6.5	3 M, 1 F	4	Handlebar	Physical exam	RLQ, RLQ, LUQ, symphysis pubis	None (4)	Open	No complications
1986	Dreyfuss	11	M	2	Handlebar	Abdominal X-ray (1), physical exam (2)	Rectus abdominis	None (1) mesenteric and right retroperitoneal hematoma, serosal tear of ascending colon (1)	Open	No complications
1988	Schneegans	8	M	1	Handlebar	Physical exam	RLQ	None	Open	No complications
1989	Bar-Maor	5	F	1	MVC	Physical exam	RUQ	None	Nonoperative	No complications
1990	Mitchiner	7	M	1	Handlebar	CT	LUQ	None	Open	No complications
1994	Damschen	5	M	5	Handlebar	CT (3), physical exam (2)	Not specified	None (5)	Open (3), nonoperative (2)	No complications
1994	Kubalak	R 6–9, M 8	2 M, 1 F	3	Gored by cow, handlebar (2)	Physical exam	RLQ	None (3)	Open	No complications
1997	Ciftci	2	F	1	MVC	Abdominal X-ray and barium enema	Epigastric	None	Open	No complications
1997	Iuchman	7	M	1	Handlebar	Physical examination	RLQ	None	Open	No complications
1998	Perez	11	M	1	Handlebar	Physical examination	LLQ	None	Open	No complications
1999	Kubota	9	M	1	Handlebar	CT	RLQ	None	Open	No complications
2002	Fraser	11	M	1	Handlebar	Ultrasound	RLQ	None	Open	No complications
2003	Mancel	7	M	1	Handlebar	Ultrasound	LLQ	None	Open with mesh	No complications
2004	Goliath	11	M	1	Handlebar	CT	RLQ	None	Open	No complications
2005	Chen	9	M	1	Handlebar	CT	RLQ	None	Open	No complications
2005	Iinuma	8	M	1	Handlebar	Abdominal X-ray, CT, and diagnositic laparoscopy	RLQ	None	Open	No complications
2007	Darani	2	M	1	MVC	CT	LLQ	Liver laceration, right retroperitoneal hematoma, ileal perforation	Open	No complications
2007	Haimovici	15	M	1	Handlebar	CT	Rectus abdominis	Multiple small bowel perforations and mesenteric tears	Open	No complications
2008	Litton	13	M	1	Handlebar	CT	RLQ	None	Nonoperative	No complications
2008	Narci	12	M	1	Handlebar	Abdominal X-ray, ultrasound, and CT	RLQ	None	Open	No complications
2009	Chew	16	M	1	MCC	CT	Rectus abdominis	Jejunal transection	Open	No complications
2009	Karaman	R 5–12	Not specified	3	Handlebar	Ultrasound and CT (numbers not specified)	Not specified	Intestinal perforation (3), splenic laceration (2)	Open	No complications
2009	Nguyen	6	M	1	Handlebar	Physical examination	LLQ	Evisceration of small bowel without injury	Open	No complications
2009	Valusek	11	M	1	MVC	CT	Lumbar, right lateral abdominal wall	Ileomesenteric and sigmoid devascularization	Open	No complications
2009	Van Bemmel	7	M	1	Handlebar	Physical examination	Rectus abdominis	None	Open	No complications
2011	Mitchell	14	M	1	Handlebar	Physical examination	RLQ	None	Open	No complications
2011	Rowell	14	M	1	Handlebar	CT	RUQ	Colonic mesenteric defect	Laparoscopic	No complications

(continued on next page)