

Percutaneous internal suturing procedure for a posttraumatic abdominal wall “handlebar hernia”

Maria Popescu, Gabriel Dragan

Department of Pediatric Surgery, “Victor Gomoiu” Clinical Hospital for Children, Bucharest, Romania

ABSTRACT

Posttraumatic abdominal wall hernias are extremely rare and are the result of the wall impact with an object that does not break the skin but has enough energy to disrupt the underlying muscular and fascia layers. One of the most frequent mechanisms for the pediatric population is the handle bar traumatic injury. We present the case of a 13-year-old male patient that was diagnosed with posttraumatic handlebar hernia in the right lower quadrant after performing a CT scan examination. The chosen surgical procedure was to repair the abdominal defect using an adaptation of the PIRS (percutaneous internal ring suturing) suturing technique assisted laparoscopically. The follow up of the case was uneventful.

Keywords: traumatic abdominal wall hernia, handlebar, laparoscopy, CT scan

Abbreviations

TAWH – traumatic abdominal wall hernia

HH – handlebar hernia

PIRS – percutaneous internal ring suturing

INTRODUCTION

Traumatic abdominal wall hernias (TAWH) are exceedingly rare in the pediatric population. The mechanism of injury consists in the low-velocity impact of the abdominal wall against an object which is too blunt to penetrate the skin (due to its elasticity) but strong enough to disrupt the muscular fibers and fascia layer. The handlebar hernia (HH) is the most common cause for this traumatic injury. Other causes of TAWH are related to damage from axe holders, other types of handlebars (motorcycle, plough, wheelbarrow), animal goring (bulls) or rare deceleration injuries (1). The incidence of TAWH in the pediatric population is around 1% with a reported 85% of the cases owing to HH (2).

All reported cases of HH have been treated surgically except one, performing approximation of the defect with or without mesh (3). Laparoscopy was mostly used as a diagnostic procedure for those with suspected concurrent intraabdominal injury or for

those cases with nonspecific or negative CT scan findings (4).

We report the case of a 13-year-old boy who presented with a HH and was repaired using laparoscopically assisted percutaneous internal suturing procedure. We received the informed consent of the parents to publish the data, the clinical and imaging findings of the patient.

CASE REPORT

Presenting concerns

We present the case of a 13-year-old boy who was admitted to our surgical department 24 hours after a bicycle crash that had as a result the hitting of the right lower quadrant of the abdomen with the rubber-coated handlebar. He complained about abdominal pain and presence of a lump at the site of the traumatic injury.

Corresponding author:

Maria Popescu

E-mail: popescumariadelia@gmail.com

Article History:

Received: 26 March 2021

Accepted: 29 March 2021

Clinical findings

The examination confirmed the presence of a painful 10 x 6 -cm reducible tender subcutaneous mass in the right lower abdomen with overlying skin intact but bruised (Fig. 1). The hernia was visible in both standing and supine position, had a positive cough impulse and a 7 cm fascial defect palpable at the site. He had no other abnormal physical findings or complaints.



FIGURE 1. Abdominal wall hematoma and bulge of the TAWH

Diagnostic focus and assessment

Laboratory data showed no abnormalities. Computer tomography imaging confirmed the diagnosis of TAWH showing the disruption of internal and external oblique muscles, transverse abdominal muscles, peritoneum and herniation of the bowels (colon) through the defect into the subcutaneous space, with no other intraabdominal injury (Figures 2 and 3).

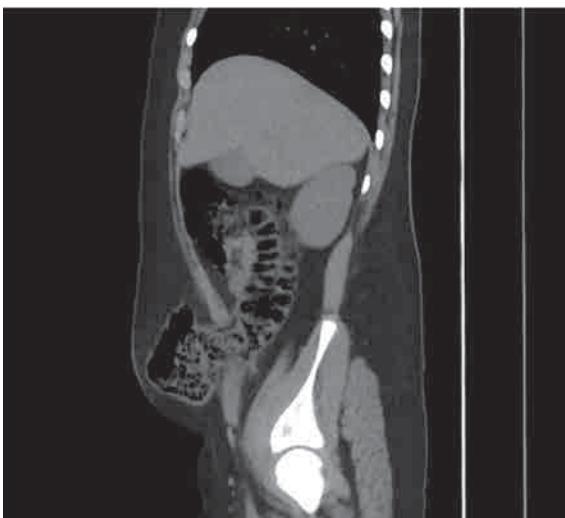


FIGURE 2. Abdominal wall hernia CT scan (transversal view)

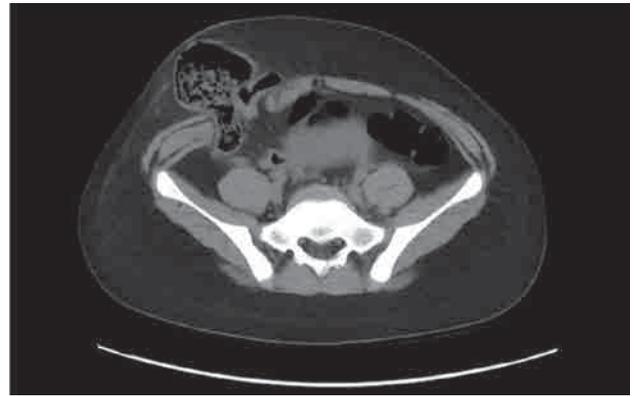


FIGURE 3. Abdominal wall hernia CT scan (lateral view)

Therapeutic focus and assessment

We performed 48 hours delayed laparoscopic procedure that showed that all the layers of the abdominal wall and peritoneum were disrupted, colon and omentum with adhesions to the subcutaneous tissue that were easily released (Figure 4). There was no intraabdominal organ injury. We performed an internal percutaneous suturing procedure, similar to the PIRS hernia repair, that allowed us to approximate the two rims of the defect, one layer, by using four 2-0 silk non absorbable braided sutures (Figures 5 and 6). We inserted a drainage into the preaponeurotic space that was removed two days after surgery.

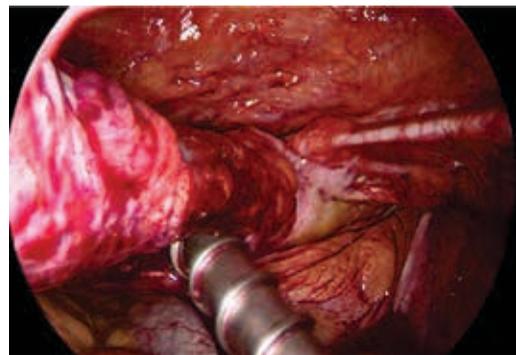


FIGURE 4. Laparoscopic view of the two rims of the defect

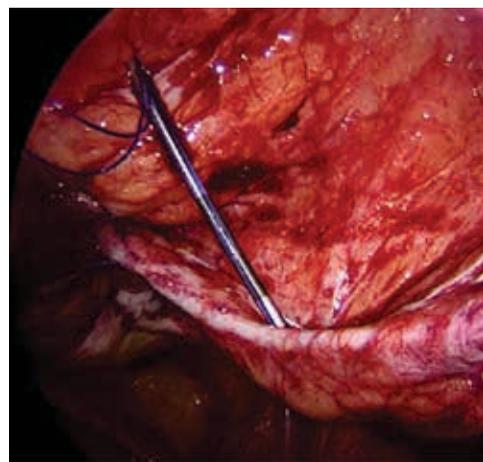


FIGURE 5. Adapted PIRS procedure for suturing the hernia defect

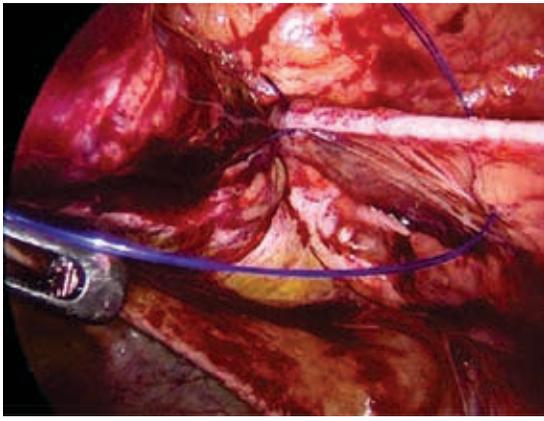


FIGURE 6. Intraabdominal loop of the extracorporeal knot used to approximate the two rims of the defect

Follow-up and monitoring

The postoperative course was uneventful and the patient was discharged four days after surgery. Follow up after 4 weeks and 6 months revealed no recurrence (Figure 7).



FIGURE 7. Postoperative aspect one week after surgery

DISCUSSION

TAWH are a rare pathology in the pediatric population and the available literature is based on case reports and statistics from few trauma centers that have small case series of this traumatic injury (2). When managing an abdominal trauma, it is very important to make a complete clinical exam and to carefully assess the main region affected. The localization of the hernia for our patient, the right lower quadrant, is one of the most frequent in case of TAWH secondary to handlebar trauma. This occurs mostly in the lower abdomen, lateral to the rectus sheath, disrupting the oblique and transversus muscles and protruding in the iliac fossa region. The right lower quadrant is the most common location but we can also find a TAWH in the left lower quadrant or even in posterolateral locations (2). Few cases associate concomitant diaphragmatic hernia or involve more than one region, that suggest an increased intraabdominal pressure as

the pathogenesis for the TAWH (5).

An important factor that influences the surgical management is the dimensions of the hernia. In the case that we presented the dimensions of the defect measured intraoperative were 7/4 cm probably due to the larger dimension of a custom-made handlebar that caused the injury. According to the scientific literature TAWH can be classified into three major types according to the size of the defect and mechanism of injury: type I smaller defect (such as those from handlebar hernias), Type II the defect is larger (high energy trauma in motor vehicle crash or fall from a height) and type III with intraabdominal bowel herniation (deceleration injuries) (2,6).

Due to the rarity of this type of pathology the diagnosis can be challenging both of the abdominal wall hernia but also of the associated intraabdominal pathology. Even if our patient was stable and had no other major complaints, we performed a CT scan as soon as it was available in order to have a better assessment of the defect and to avoid other pathologic abdominal lesions. Concurrent intraabdominal injuries are usually associated when the impact is in the upper abdomen but a HH can associate a rate of 8% urologic, splenic, hepatic, pancreas, bowel or mesentery operative pathologic findings (2,4). The easy access to a CT scan in all trauma centers makes it the modality of choice to investigate first hand an abdominal wall trauma. Even if the CT scan detects most of TAWH, we notice the importance of the clinical factors that can dictate the operative intervention due to a worsening examination even with normal CT scan findings. We advocate for serial examinations and close clinical monitoring due to a high index of suspicion for intraabdominal concurrent associated injuries (2,5).

The timing of hernia repair and type of hernia repair should be decided for each case separately, depending on the hemodynamic stability of the patient, clinical evaluation and serial CT findings. Our patient was stable, and had a CT scan that revealed no other pathological findings, except the hernia defect, so we performed a scheduled laparoscopy 24 hours after he was admitted to our department, and 48 hours after the traumatic event. We advocate for an emergency laparotomy in case of hemodynamic instability associated to a high index of suspicious of intraabdominal concurrent injuries for the patients diagnosed with TAWH (24 hours from admission) to avoid further complications and to effectively repair the hernia. For hemodynamically stable patients or if the diagnosis is unclear, we consider the laparoscopic approach both as diagnostic method and also curative one (5,6).

We chose to use a variant of laparoscopically assisted PIRS repair for the hernia because the two rims

of the defect that were easily identified had a distance of 4 cm in-between and performing an extracorporeal knot allowed us a better security of the suturing. To prevent future complications such as bowel obstruction, incarceration or strangulation the primary tension free repair of the hernia with non-absorbable sutures is recommended after a close exploration of all the intraabdominal organs. Mesh repair is very rare in the pediatric population and apply only for those cases with large abdominal defects where a tension free repair is not feasible (1,5).

The non-operative approach of a TWH is described for one case in the literature and applied to a

Conflict of interest: none declared

Financial support: none declared

REFERENCES

1. Kubota A, Shono J, Yonekura T, Hoki M, Asano S, Hirooka S, Kosumi T, Kato M, Oyanagi H. Handlebar hernia: case report and review of pediatric cases. *Pediatr Surg Int.* 1999 Jul;15(5-6):411-2.
2. Hafezi N, Raymond JL, Mayo ED, Rouse TM, Billmire DF, Gray BW. Traumatic abdominal wall hernias in children: A case for early exploration. *J Pediatr Surg.* 2020 Jul 12:S0022-3468(20)30480-2.
3. Litton K, Izzidien AY, Hussien O, Vali A. Conservative management of a traumatic abdominal wall hernia after a bicycle handlebar injury (case report and literature review). *J Pediatr Surg.* 2008 Apr;43(4):e31-2.
4. Iinuma Y, Yamazaki Y, Hirose Y, Kinoshita H, Kumagai K, Tanaka T, Miyajima M, Nitta K, Naitoh S, Kobayashi K. A case of a traumatic abdominal wall hernia that could not be identified until exploratory laparoscopy was performed. *Pediatr Surg Int.* 2005 Jan;21(1):54-7.
5. Talutis SD, Muensterer OJ, Pandya S, McBride W, Stringel G. Laparoscopic-assisted management of traumatic abdominal wall hernias in children: case series and a review of the literature. *J Pediatr Surg.* 2015 Mar;50(3):456-61.
6. Chen HY, Sheu MH, Tseng LM. Bicycle-handlebar hernia: a rare traumatic abdominal wall hernia. *J Chin Med Assoc.* 2005 Jun;68(6):283-5.

small defect and stable patient with no suspicion of intraabdominal organ injury (3).

CONCLUSIONS

When treating a patient with a suspicion of TAWH, the management should be on a case-by-case basis depending on the anamnesis, clinical findings, CT scan examination and the surgical moment and type of hernia repair reflect the importance of the surgeon decision making.