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Traumatic Abdominal Wall Hernia: A Unique Causation

Abhijeet Dilip Kharche[1], Sriranjani Iyer[2]

[1]Junior Resident, Department of General Surgery, Rajiv Gandhi Medical College, Thane, Mumbai, Maharashtra, India

[2]Senior Resident, Department of General Surgery, Rajiv Gandhi Medical College, Thane, Mumbai, Maharashtra, India

[1]Corresponding Author Email: *abhijeetkharche1994[at]gmail.com*

Abstract: ***Acute blunt trauma abdomen is a known surgical emergency and its presentation has vast diversity; one of which is a traumatic abdominal wall hernia. These hernias are very unique in their own way of causation and presentation. The trauma could be from any blunt object with smaller area and high force; most common in a road traffic accident being a handle of bicycle or steering wheel of a car. Immediate presentation with traumatic site swelling and pain, confirmed with ultrasonogram and computed tomography scan without any complications; patients of TAWH can be subjected to immediate or late repair by open or laparoscopic method. Not repairing or unsupervised delay in repair can lead to obstruction or strangulation of bowel.***

Keywords: Trauma, Hernia, traumatic abdominal wall hernia (TAWH)

1. Introduction

Acute blunt trauma to abdomen is an surgical emergency and its presentation has vast diversity; one of which is development of unique traumatic abdominal wall hernia at site of injury. The trauma could be from any blunt object with smaller area and high force; most common in a road traffic accident being a handle of bicycle or steering wheel of a car.

In terms of causation, traumatic abdominal wall hernias (TAWHs) are an exceptionally rare kind of abdominal wall hernia. Blunt traumatic abdominal wall hernia is defined as a herniation through disrupted musculature and fascia, without skin penetration with no evidence of a prior hernial defect at the site of injury.[1]

After a blunt traumatic injury to abdomen patient can present immediately with a swelling reducible or irreducible at site of injury, sudden pain and occasionally vomiting. Patient typically gives history of development of swelling after trauma only. After initial clinical evaluation to rule out peritonitis, patient can be subjected to ultrasonogram abdomen and if needed computed tomography scan to rule out intra-abdominal pathology.

Once the diagnosis is confirmed to be TAWH without any complications patient can be posted for surgical repair. Also early repair gives advantage of local exploration for any intra-abdominal injuries.

We report a case of TAWH due to handlebar injury following a road traffic accident of bicycle.

2. Case Report

A 40 year male patient came to our surgical opd with chief complaints of swelling in right side of abdomen post bicycle handle injury during an accident 4 days back. Patient initially had severe pain in abdomen post fall and noticed a swelling in right lumbar region at the end of the day; and the pain gradually decreased on next day. The swelling was reducible and increased on coughing. There were no external injuries; no temperature and color changes over swelling. Patient did not have any alterations in bladder bowel habits or vomiting.

There was no history of hernia at same site before trauma. Patient had history of exploratory laparotomy at the age of 8 years; indication for same could not be found. There was no history of heavy weight lifting or chronic constipation.

On examination right lumbar reducible swelling (figure 1) with positive cough impulse was found with no evidence of inflammation in surrounding region, no evidence of strangulation or obstruction found. Rest of the abdomen was soft and non tender. Patient was taking oral full diet with normal bladder and bowel habits. So a probable diagnosis of left lumbar traumatic abdominal wall hernia was made with no intra abdominal injury.

Plain erect roentogenogram of abdomen was normal. A ultrasound scan abdomen was performed suggestive of 4cm×4cm defect in anterior abdominal wall on right side with herniation of small bowel loops through it ; with peritoneal breach and no evidence of solid organ injury or any intra peritoneal collections were found.

After primary blood investigations patient's hemoglobin was 12g/dl, total leukocyte count 11,000/mm^3, platelet count of 230×103/mm^3; patient was posted for local exploration with hernia repair under spinal Anesthesia. A transverse incision (figure 2a) was taken over hernia after reduction of contents inside; there was evidence of omentum and a loop of small bowel just under subcutaneous plane with defect in external oblique aponeurosis, muscles and peritoneum (figure 2b). No evidence of local bowel injury/hemoperitoneum was found. After satisfactory exploration peritoneum was sutured with absorbable synthetic polygalactin sutures (figure 3a) and rest of defect sutured in layers with nonabsorbable synthetic polypropylene sutures (figure 3b, c) without a synthetic

mesh. Patient was stable post operatively and was discharged in healthy condition.

On follow up after 8 days surgical site was healthy (figure 4) without any contamination and sutures were removed. On later follow up after 6 months no recurrence was found.

(a) (b)

Figure 1: Photograph showing traumatic abdominal wall hernia ; a- after reduction of contents, b- on cough impulse

(a) (b)

Figure 2: a) photograph of transverse incision over swelling with defect seen involving peritoneum, muscles and External oblique aponeurosis; **b** - evidence of omentum and loop of small bowel as content.

(a) (b) (c)

Figure 3: a) peritoneum sutured with absorbable synthetic polygalactin sutures, **b and c -** muscles and External oblique aponeurosis sutured with nonabsorbable synthetic polypropylene sutures.

(a) (b)

Figure 4: a) immediate post operative suture site, **b)** suture site on post operative day 8.

3. Discussion

First documented report of TAWH was given by Shelby.[2] Handlebar hernia is an example of traumatic abdominal hernia of anterior abdominal wall due to handlebar injury which was described by Dimyan et al. in 1980.[3]

Mcawhorter gave the diagnostic criterion for TAWH as - 1. Immediate descent of hernia following trauma, 2.severe pain in region of injury, 3.certain degree of prostration, 4. symptoms severe enough that patient seek medical advice within 24hours of incidence, 5. No history of hernia at same site before trauma, 6. Evidence of adequate trauma to cause the hernia.[4, 5]

Clain in his paper added to above criteria that no penetration of skin should be present[6] and Malangoni added that there should be no evidence of peritoneal sac at time of surgery.[7]

TAWH can be divided into low and high energy injuries. Low energy injuries are due to impact of a small blunt object. Motor vehicle accidents or automobile versus pedestrian accidents leads to High energy injuries.[8]

Abdominal trauma can lead to a wide range of hernias in the abdominal wall, ranging from minor defects caused by direct injury to more extensive defects caused by compressive injury to the abdomen.[9]

The pathophysiology of TAWH includes the impact of a blunt force to the abdominal area large enough to prevent skin penetration; the tangential forces leads to a pressure-induced disruption of the abdominal wall muscles and fascia, allowing abdominal contents to pass through the defect subcutaneously. A combined effect of a sudden increase in intra-abdominal pressure and severe abdominal shearing force is mechanism given in reports.[10, 11]

Due to the elasticity of skin than other layers of abdominal wall, even though the underlying musculature and fascia are

disrupted, the skin is left intact which gives rise to TAWH.[8,12]

In particular, the forces directed tangentially to the abdominal wall can easily produce shearing stresses to the underlying muscles, fascia, and peritoneum.[11]

When force is applied over the obliques and transversus abdominis muscle, the defect is along the direction of muscle fibers but when force is applied directly to rectus abdominis muscle, disruption is perpendicular to muscle fibers.[13, 14]

Congenital, mechanical, and degenerative factors are the attributable etiological factors for TAWH. Blunt traumatic hernias are rare enough to preclude identification of specific anatomic patterns.

Most common clinical finding is a tender subcutaneous swelling in the abdominal wall with bruising and ecchymosis of the skin. On physical examination, a reducible hernia or swelling with underlying defect may be detected.[15]

Traumatic abdominal wall hernias in the supraumbilical regions are uncommon, because of the strength of the posterior rectus sheath, but they are frequently associated with intraabdominal injuries.[16]

CECT and USG of the abdomen are the investigations of choice.[11, 17]

Some writers recommend early repair after a TAWH to assess the related intra-abdominal injuries and to reduce hospitalization and disability time. Early repair is seen to be easier from a technical standpoint. The results of simple debridement and layered closure of disturbed musculofacial layers are usually excellent. To avoid complications such as incarceration or strangulation, as well as the associated morbidity, prompt surgery is essential.[15]

Because of the documented evidence of accompanying intra-abdominal injuries requiring repair (varying from 33% to 100%) and the risk of bowel incarceration (reported as 25%), prompt surgical exploration was previously recommended for patients presenting with a TAWH.[18]

But if on investigations no evidence of intra abdominal injuries is found and patients general condition is fair late repairs and some conservative approaches can also be implemented.
The repair can be open or laparoscopic depending on availability of resources with or without a synthetic mesh for reinforcement.

In patients with serious injuries and local skin infection, late repair has been indicated. In individuals who appear late with a significant defect, artificial grafts may be required.[19, 20]

Late diagnosis of TAWH may be due to adjacent hematoma or wound infections.

For adequate enforcement of the herniated contents and defect, the incision should be made directly over the traumatic swelling. Repairing smaller defects with clear borders is simple. More apparent disruptions, on the other hand, necessitate a combination of circumstances, including the patient's overall state, related intra-abdominal injuries, the defect's size and location, and available surgical expertise. Nonabsorbable sutures with or without mesh can be used to close the traumatic defect, according to most case reports. Because of the significant risk of mesh infection, mesh repair is not recommended in contaminated wall defects. TAWHs are infrequent, and whether such patients require an immediate laparotomy is debatable.

Holzheimer reported a case of TAWH that was finally diagnosed 14 years after trauma.[21]

The fact that, in the absence of internal organ damage and depending on the extent of the hernia, it can be successfully handled conservatively is a distinctive aspect of TAWH in pediatric patients (nonoperative management).[12, 22, 23]

Vargo et al reported a case in which they successfully utilized laparoscopy to repair a left flank hernia identified in a patient 1 month after initial blunt abdominal trauma.[24]
Laparoscopic abdominal surgeries have several advantages, including a shorter hospital stay, less pain medication, and a faster return to regular activity. Exploratory laparoscopy is increasingly being used to detect and treat intraabdominal injuries in carefully selected, hemodynamically stable blunt and penetrating trauma patients.

As natural orifices are present in lower abdomen (inguinal canal) , the typical weakening of the abdominal wall around this location, and increased intra-abdominal pressure following injuries, TAWH has primarily been documented in the lower abdomen rather than the upper abdomen. Herniation can also occur in the superior and inferior lumbar triangles.

Considering the late presentation in our case and no evidence of intra abdominal injury we chose to do immediate open layered primary repair without mesh reinforcement.

4. Conclusion

After prompt diagnosis of TAWH early repair is advisable to prevent any complications like incarceration or strangulation by open or laparoscopic method according to availability of resources and use of artificial mesh for reinforcement should be done carefully keeping mind of the risk of mesh infection.

5. Declaration

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Author Profile

Dr Abhijeet Dilip Kharche, Junior resident, Department of General Surgery, Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital, Thane, Maharashtra, India

Dr Sriranjani Iyer, Senior Resident, Department of General Surgery, Rajiv Gandhi Medical College and Chhatrapati Shivaji Maharaj Hospital, Thane, Mumbai, Maharashtra, India