

**ORIGINAL RESEARCH**

# Assessment of cases of traumatic diaphragmatic hernia

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**ABSTRACT**

**Background:** A traumatic diaphragmatic hernia (TDH) is a type of hernia that occurs as a result of a traumatic injury to the diaphragm. The present study was conducted to assess cases of traumatic diaphragmatic hernia (TDH).

**Materials & Methods:** 75 cases of traumatic diaphragmatic hernia (TDH) of both genders were selected and the injury severity score (ISS), admission, mechanism of trauma, side, intestines hernia, surgical procedure and length of the hospital stay (LOS) etc. was recorded.

**Results:** Out of 75 patients, males were 40 and females were 35. In acute and chronic form, side involved was left in 28 and 17 and right in 20 and 10. Admission was emergency in 34 and 22 and outpatient in 14 and 5 respectively. Mechanism of trauma was blunt in 35 and 21 and penetrating in 13 and 6. Intestines hernia was present in 10 and 19 and absent in 38 and 8 respectively. Surgical approaches were thoraco-abdominal in 8 and 4 and thoracotomy in 21 and 15 and laparotomy in 19 and 8 respectively. The difference was significant ( $P < 0.05$ ). The mean LOS (days) was 42.6 and 13.2, length of the rupture was 9.6cm and 5.8cm and ISS was 25.1 and 10.7 in acute and chronic respectively. The difference was significant ( $P < 0.05$ ).

**Conclusion:** Chronic TDH is more likely to occur from milder trauma. To prevent a delayed diagnosis of TDH, individuals with peripheral injuries must undergo a thoraco-abdominal computed tomography scan.

**Key words:** traumatic diaphragmatic hernia, thoraco-abdominal, penetrating

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**Introduction**

A traumatic diaphragmatic hernia (TDH) is a type of hernia that occurs as a result of a traumatic injury to the diaphragm, which is the muscle separating the chest cavity from the abdominal cavity.<sup>1</sup> In this condition, there is a defect or tear in the diaphragm, allowing abdominal organs to herniate or protrude into the chest cavity.<sup>2</sup> TDH can be caused by various types of trauma, such as blunt trauma which is the most common cause of traumatic diaphragmatic hernia and can result from motor vehicle accidents, falls from heights, or direct blows to the abdomen or chest. Penetrating trauma is stab wounds or gunshot wounds to the abdomen or chest can lead to diaphragmatic injury and subsequent herniation.<sup>3</sup>

The diaphragm can be injured in a traumatic event due to a sudden increase in intra-abdominal pressure, which may occur during accidents or injuries.<sup>4</sup> When the diaphragm is torn or weakened, it creates an opening through which abdominal organs, such as the stomach, small intestine, or spleen, can move into the chest cavity.<sup>5</sup> This herniation can lead to serious complications, as the displaced organs can compress

the lungs, heart, or other nearby structures. Symptoms of traumatic diaphragmatic hernia may not be immediately apparent and can be masked by more severe injuries sustained during the traumatic event.<sup>6</sup> However, some common signs and symptoms include difficulty breathing, chest pain or discomfort, abdominal pain or tenderness, bowel obstruction or gastrointestinal symptoms (if organs are trapped in the hernia).<sup>7</sup> The present study was conducted to assess cases of traumatic diaphragmatic hernia (TDH).

**Materials & Methods**

The present study consisted of 75 cases of traumatic diaphragmatic hernia (TDH) of both genders. All gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. The abbreviated injury scale (AIS) was used to assess the severity of injuries in different parts of the human body, and the injury severity score (ISS) was calculated based on the AIS. Parameters such as admission, mechanism of trauma, side, intestines hernia, surgical procedure and length of the hospital

stay (LOS) etc. was recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

**Results**

**Table I: Distribution of patients**

Total- 75		
Gender	Male	Female
Number	40	35

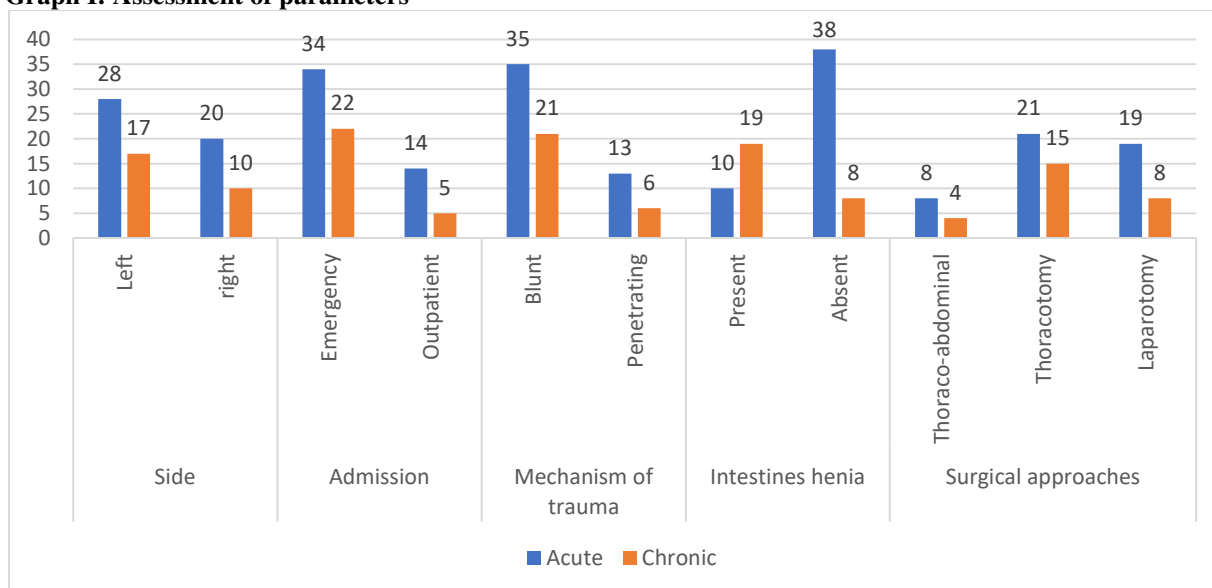
Table I shows that out of 75 patients, males were 40 and females were 35.

**Table II: Assessment of parameters**

Parameters	variables	Acute	Chronic	P value
Side	Left	28	17	0.08
	right	20	10	
Admission	Emergency	34	22	0.05
	Outpatient	14	5	
Mechanism of trauma	Blunt	35	21	0.05
	Penetrating	13	6	
Intestines henia	Present	10	19	0.03
	Absent	38	8	
Surgical approaches	Thoraco-abdominal	8	4	0.02
	Thoracotomy	21	15	
	Laparotomy	19	8	

Table II, graph I shows that in acute and chronic form, side involved was left in 28 and 17 and right in 20 and 10. Admission was emergency in 34 and 22 and outpatient in 14 and 5 respectively. Mechanism of trauma was blunt in 35 and 21 and penetrating in 13 and 6. Intestines henia was present in 10 and 19 and absent in 38 and 8 respectively. Surgical approaches was thoraco-abdominal in 8 and 4 and thoracotomy in 21 and 15 and laparotomy in 19 and 8 respectively. The difference was significant (P< 0.05).

**Graph I: Assessment of parameters**



**Table III Outcome**

Variables	Acute	Chronic	P value
LOS (days)	42.6	13.2	0.01
Length of the rupture (cm)	9.6	5.8	0.02
ISS	25.1	10.7	0.04

Table III shows that mean LOS (days) was 42.6 and 13.2, length of the rupture was 9.6cm and 5.8cm and ISS was 25.1 and 10.7 in acute and chronic respectively. The difference was significant (P< 0.05).

## Discussion

Diagnosis of TDH can be challenging, as it may not be evident during initial evaluations for trauma.<sup>8</sup> It can go unnoticed and undiagnosed for an extended period, leading to delayed treatment.<sup>9</sup> Imaging studies such as chest X-rays, CT scans, or ultrasound can help identify the diaphragmatic defect and the herniated organs. Treatment of traumatic diaphragmatic hernia typically involves surgical repair.<sup>10</sup> Surgery aims to close the tear in the diaphragm and reposition the herniated organs back into the abdominal cavity. In some cases, the surgical approach may be minimally invasive, while more extensive procedures may be required for complex cases.<sup>11,12</sup> The present study was conducted to assess cases of traumatic diaphragmatic hernia (TDH).

We found that out of 75 patients, males were 40 and females were 35. In acute and chronic form, side involved was left in 28 and 17 and right in 20 and 10. Admission was emergency in 34 and 22 and outpatient in 14 and 5 respectively. Gu P et al<sup>13</sup> conducted a study in which fifty acute and 19 chronic TDH patients were diagnosed. Chronic TDH patients had a significantly lower Injury Severity Score than acute TDH patients ( $10.26 \pm 2.68$  vs.  $26.92 \pm 4.79$ ,  $P < 0.001$ ). The most common surgical approach for acute and chronic TDH was thoracotomy and laparotomy, respectively. The length of the diaphragmatic rupture was significantly shorter in chronic TDH patients than acute TDH patients ( $6.00 \pm 1.94$  cm vs.  $10.71 \pm 3.30$  cm,  $P < 0.001$ ). The mean length of hospital stay was significantly longer for acute TDH patients than chronic TDH patients ( $41.18 \pm 31.02$  days vs.  $16.65 \pm 9.61$  days,  $P = 0.002$ ).

We found that mechanism of trauma was blunt in 35 and 21 and penetrating in 13 and 6. Intestines hernia was present in 10 and 19 and absent in 38 and 8 respectively. Surgical approaches were thoraco-abdominal in 8 and 4 and thoracotomy in 21 and 15 and laparotomy in 19 and 8 respectively. Peer et al<sup>14</sup> in their study twenty-nine patients underwent surgery for traumatic diaphragmatic hernia. The cause of rupture was blunt trauma in 24(83%) patients and penetrating trauma in 5(17%) patients. In 21 (72%) patients the diagnosis was made within 24 hours and in 8(28%) patients the diagnosis was made after 24 hours. Thoracotomy was the most common surgical approach used in 20(69%) patients. Post operative morbidity was 24% and mortality was 13.8%. X-ray chest was very useful in the diagnosis of diaphragmatic ruptures. Right sided ruptures are difficult to diagnose. Diaphragmatic hernia repair can be done through a thoracotomy with acceptable results in patients without concomitant intra abdominal injuries.

We found that the mean LOS (days) was 42.6 and 13.2, length of the rupture was 9.6cm and 5.8cm and ISS was 25.1 and 10.7 in acute and chronic respectively. Filiz et al<sup>15</sup> in their study 13 patients

with traumatic diaphragmatic rupture or diaphragmatic hernia were treated. All patients were male and mean age was 23.1 years. Diaphragmatic rupture was left-sided in all patients. Six of these patients had blunt and the remaining 7 had penetrating trauma. Diagnosis of diaphragmatic rupture was established in less than 24 hours in 4 patients. In the remaining 9 patients, who developed intra-thoracic herniation of abdominal organs, diagnostic delay ranged from 12 to 48 months. The most frequent herniated organ was transverse colon. Non-absorbable sutures were used for closure of the defect. Complication rate was 30% and no death was observed. After blunt or penetrating trauma in upper abdomen and distal chest, a high index of suspicion is important to diagnose diaphragmatic rupture. Late presentations were associated with increased morbidity.

The limitation of the study is small sample size.

## Conclusion

Author found that chronic TDH is more likely to occur from milder trauma. To prevent a delayed diagnosis of TDH, individuals with peripheral injuries must undergo a thoraco-abdominal computed tomography scan.

## References

1. Ramos CT, Koplewitz BZ, Babyn PS, et al. What have we learned about traumatic diaphragmatic hernias in children? *J Pediatr Surg* 2000; 35: 601-604.
2. Murray JA, Demetriades D, Asensio JA, et al. Occult injuries to the diaphragm: prospective evaluation of laparoscopy in penetrating injuries to the left lower chest. *J Am Coll Surg* 1998; 187: 626-630.
3. Miller L, Bennett EV Jr, Root HD, et al. Management of penetrating and blunt diaphragmatic injury. *J Trauma*. 1984; 24: 403-409.
4. Matsevych OY. Blunt diaphragmatic rupture: four year's experience. *Hernia* 2008; 12: 73-78.
5. Wirbel RJ, Mutschler W. Blunt rupture of the right hemidiaphragm with complete dislocation of the right hepatic lobe: report of a case. *Surg Today* 1998; 28: 850-852.
6. Grillo IA, Jastaniah SA, Bayoumi AH, et al. Traumatic diaphragmatic hernia: an Asir region (Saudi Arabia) experience. *Indian J Chest Dis Allied Sci* 2000; 42: 9-14.
7. Friese RS, Coln CE, Gentilello LM. Laparoscopy is sufficient to exclude occult diaphragm injury after penetrating abdominal trauma. *J Trauma* 2005; 58: 789-792.
8. Cherry RA, Eachempati SR, Hydo LJ, et al. The role of laparoscopy in penetrating abdominal stab wounds. *Surg Laparosc Endosc Percutan Tech* 2005; 15: 14-17.
9. Matthews BD, Bui H, Harold KL, et al. Laparoscopic repair of traumatic diaphragmatic injuries. *Surg Endosc* 2003; 17: 254-258.
10. Baca B, Karahasanoğlu T, Sarıbeyoğlu K, et al. Late complication of diaphragmatic gunshot injury: appendix perforation due to colon incarceration. *Ulus Travma Acil Cerrahi Derg* 2007; 13: 70-73.
11. Murray JG, Caoili E, Gruden JF, et al. Acute rupture of the diaphragm due to blunt trauma: diagnostic

- sensitivity and specificity of CT. *AJR* 1996; 166: 1035-1039.
12. Guth AA, Pachter HL, Kim U. Pitfalls in the diagnosis of blunt diaphragmatic injury. *Am J Surg* 1995; 170: 5-9.
  13. Gu P, Lu Y, Li X, Lin X. Acute and chronic traumatic diaphragmatic hernia: 10 years' experience. *PLoS ONE* 2019;14(12): e0226364.
  14. Peer SM, Devaraddeppa PM, Buggi S. Traumatic diaphragmatic hernia-our experience. *International Journal of Surgery*. 2009 Jan 1;7(6):547-9.
  15. Filiza AI, Kurta Y, Sucullua I, Yucela E, Akina ML. Traumatic diaphragma rupture: an experience of 13 cases. *Eastern J Med*. 2008;13:25-9.