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# Gastric Perforation Due to Intercostal Drainage: Is it a Clue to Missed Diaphragmatic Hernia?

Abhishek Kushwaha<sup>1\*</sup>, Anjay Kumar<sup>1</sup> and Shadab Hasan<sup>1</sup>

<sup>1</sup>Department of General Surgery, RIMS, Ranchi, India.

## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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**Case Report**

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## ABSTRACT

Acute post-traumatic diaphragmatic hernia often goes unnoticed resulting in unpalatable and disastrous consequences for the patient. There may be a delay between the injury and the diagnosis which can cause a diagnostic dilemma to the surgeon. A patient with a diaphragmatic hernia due to trauma that has long been forgotten often presents with unrelated symptoms and signs. We report a case of delayed presentation of left traumatic diaphragmatic hernia in a 60-year-old male who presented eight months after blunt trauma. An intercostal drain (ICD) was placed in the left hemithorax to drain a pleural effusion which had resulted in gastric perforation containing food particles in the drain bag. A delay in diagnosis is often the rule in cases of diaphragmatic hernia due to blunt traumas, patients presenting with complications of missed hernia or interventions thereof because of incorrect diagnosis. This case highlights and emphasizes the importance of proper diagnosis in cases of blunt trauma and the astuteness with which history taking and investigations should be pursued before embarking on any therapeutic intervention.

**Keywords:** *Diaphragmatic hernia; blunt trauma; penetrating trauma; delayed presentation; ICD.*

## 1. INTRODUCTION

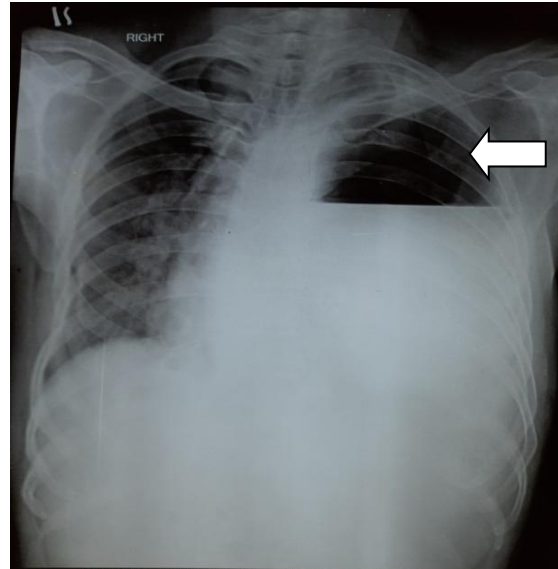
Acute diaphragmatic hernia can be easily diagnosed after high velocity blunt trauma abdomen but patients with delayed diaphragmatic rupture typically do not become symptomatic for months after the initial trauma. Patients with delayed diaphragmatic rupture usually do not come forward with a history of trauma, making the diagnosis difficult. The incidence of diaphragmatic ruptures after thoraco-abdominal trauma is 0.8–5% [1] and up to 30% diaphragmatic hernias present late [2]. These can be divided into penetrating (25%) and non-penetrating (75%) [3]. In blunt trauma, diaphragmatic hernia occurs mostly on the left side, with the left to right ratio being 3:1 due to a sudden rise in intra-abdominal pressure [4]. Incorrect interpretation of X-ray chest or only intermittent hernia symptoms are frequent reasons for incorrect diagnosis [5]. A careful history, physical examination and awareness of the possibility are the prerequisites for timely diagnosis. We report a case of a male patient presenting with cough, dyspnea, vomiting with an intercostal drain (ICD) in situ containing food particles as a case of delayed presentation of traumatic left diaphragmatic hernia.

## 2. CASE PRESENTATION

A 60 year old male presented in the emergency of a hospital with complaints of non-productive cough, dyspnea, pain upper abdomen and vomiting which contained food particles for the last five days. A chest x-ray done showed gastric air bubble but the surgeon missed this finding and interpreted this finding as a transverse line of air fluid level with obliteration of left costophrenic angle, suspecting left pleural effusion (Fig. 1) and left intercostal drainage done was performed.

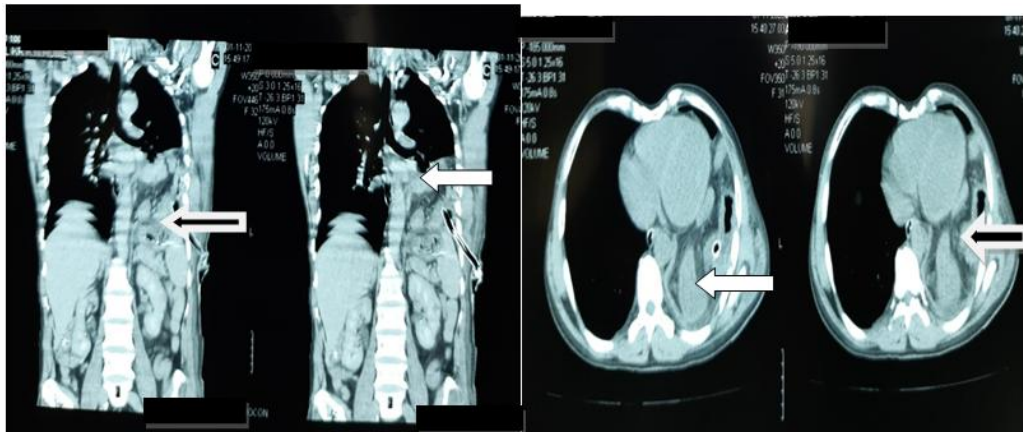
Surprisingly, ICD started draining food particles two days after insertion and the patient was referred to us. On taking a detailed history, the patient told that he had met with an accident i.e. fall from the roof of a moving bus eight months back following which he was admitted in a hospital for two days for pain abdomen. Chest x-ray and ultrasound of the abdomen were done, suggesting mild ascites and mild pleural effusion. The patient was discharged after conservative management. since we had a strong suspicion of

diaphragmatic hernia due to blunt trauma, we performed contrast enhanced CT (CECT) scan of thorax and abdomen which revealed a left sided diaphragmatic hernia with intra thoracic migration of stomach, transverse colon along with its mesocolon and mesentery with the tip of ICD catheter in the stomach as well (Fig. 2), non visualization of diaphragm on left side (absent diaphragm sign).

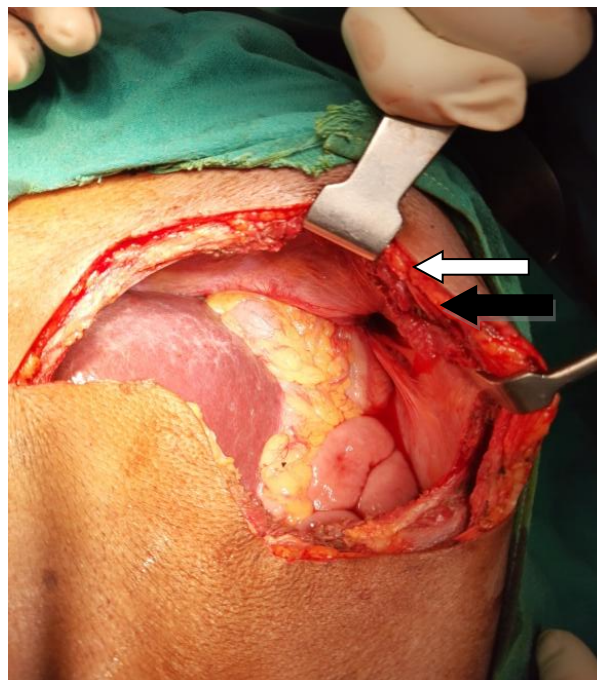


**Fig. 1. Chest X-Ray showing showing gastric air bubble**

We made a diagnosis of delayed presentation of post traumatic left diaphragmatic hernia in latent phase as classified by Grimes with iatrogenic gastric perforation due to ICD and proceeded for exploratory laparotomy with left subcostal incision. Intraoperatively, there was a large rent in the left hemi diaphragm of size 10 x 8 cm through which stomach, transverse colon and mesentery had herniated (Fig. 3). Tip of Intercostal drain was in the anterior wall of body of the stomach and transverse colon was found necrosed circumferentially. Hernial contents were reduced, gastric perforation repaired with interrupted absorbable suture, diaphragm repaired with interrupted non absorbable suture, transverse colon exteriorized as double barrel colostomy and ICD was placed in left 5<sup>th</sup> intercostal space. The postoperative period was uneventful. ICD was removed after five days and colostomy was closed after eight weeks. On follow up, the patient is asymptomatic.



**Fig. 2. CECT of thorax and abdomen (black arrow shows ICD tube, white arrow shows gastric content in left hemithorax)**



**Fig. 3. A rent in left hemi diaphragm (white arrow shows rent in left hemi diaphragm, black arrow shows stomach herniated through the rent in diaphragm)**

### 3. DISCUSSION

Traumatic diaphragmatic hernia can occur after penetrating (25%) and blunt trauma (75%) [6]. It is more common on the left side as the liver protects the right hemi diaphragm. Only 13% of traumatic diaphragmatic hernias are right sided [7]. A sudden increase in the intra-abdominal pressure against the fixed diaphragm is the cause of rupture of the diaphragm. The commonest rupture site is the postero-lateral surface along the embryonic line as it is the weakest part of the diaphragm.

Grimes has described three phases of diaphragmatic injury- the acute phase, latent phase and obstructive phase [8]. In the Acute phase, the diaphragmatic injury may be missed as patients have nonspecific pain in the chest and left upper abdomen. Others have features of shock, respiratory failure, concomitant visceral injury and coma. The latent phase is associated with transient herniation of the viscera, upper GI symptoms, chest pain, and dyspnea. In the obstructive phase, patients present a months to years later with incarceration, obstruction, strangulation and perforation. The delayed

presentation may be due to delayed rupture or delayed detection which is more common [9].

Chest x- ray is the initial investigation modality with a sensitivity of 33% in left sided and 18% in right sided rupture [10]. It shows herniated stomach or bowel, irregularity of diaphragm, basal opacity mimicking collapse, the elevation of hemi diaphragm or nasogastric tube above the level of the diaphragm. CT scan of the thorax is more a useful tool for diagnosis in uncertain cases. CT scan thorax has 61-71% sensitivity and 87-100% specificity for acute diaphragmatic injury [11]. The important signs are sharp discontinuation of the diaphragm, visceral herniation, lack of visualization of the diaphragm (absent diaphragm sign), and constriction of the bowel or stomach at the site of herniation (collar sign).

Laparotomy is mandatory which can be done through thoracoabdominal approach to look for concomitant abdominal injury. Thoracotomy can be done in the right sided diaphragmatic hernia for better access and repair [12]. In delayed presentations, some advocate thoracotomy since the adhesions within the chest can be freed and repair of hernia can be done easily. Newer options are laparoscopy and video assisted thoracoscopic surgery.

#### 4. CONCLUSION

In conclusion, traumatic diaphragmatic hernias can present early or in a delayed fashion: however, they are often missed after injuries that are ignored and detected late when complications develop. A high index of suspicion with emphasis on the history of blunt trauma however, trivial, should be taken into consideration for diagnosis along with perusal of radiological investigations. If the diagnosis is uncertain after chest radiograph, a CT scan of the thorax should be done. Interpretation of Chest X- ray should include irregularity of diaphragm, the elevation of hemidiaphragm or nasogastric tube above the level of diaphragm and presence of bowel loops in the thorax, to avoid any iatrogenic injury as inadvertently happened in our case. Since intercostal drainage is a common procedure in surgery and correct interpretation of chest x-ray is of paramount importance to avoid mistakes. Chest x- ray with air fluid level should always be evaluated further if there is history of blunt trauma before inserting chest tubes to avoid unsavory complications.

#### CONSENT DISCLAIMER

As per international standard or university standard, patients consent has been collected and preserved by the authors.

#### ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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