

TRAUMATIC ACQUIRED DIAPHRAGMATIC HERNIA IN OUR EXPERIENCE

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ABSTRACT

Introduction: Traumatic diaphragmatic hernia is potentially life-threatening due to the sudden protrusion of abdominal organs into the pleural cavities due to the pressure wave or the dynamic force caused by the BLUNT Compression .This kind of Blunt trauma may be overlooked easily and a misdiagnosis of some other minor trauma may be considered as Pivotal and attention seeking However a high index of suspicion is essential during the primary survey itself.

Material and Methods: A clinical study of 60 patients is conducted with a diagnosis of Traumatic Diaphragmatic Hernia

Results; >60 years of age group is the most affected Male gender is the most common affected. Left side is the most common side affected. In 53 cases BLUNT injury was the cause . In 7 patients penetrating injury was the cause. Out of 60 patients 51 patients had acute presentation with associated injuries. 9 patients had delayed presentation after various period of time after the conservative management during the admission and discharge from the hospital, All the 7 patients with penetrating injuries had Emergency Laparotomies and the appropriate treatment for the traumatic diaphragmatic rupture
44 of the Blunt injuries also had an EEL and the appropriate treatment of the diaphragmatic rupture and of the associated injuries. 9 with delayed presentations had total conservative management and hence the tiny rents in the diaphragm without any abdominal organ herniation had delayed presentations at a later date after discharge from the hospital. 2 case succumbed to death after the emergency management one due to the respiratory failure and the other one due to the hollow viscus perforation followed by sepsis.

Conclusions; Morbidity and mortality associated with diaphragmatic rupture is predominantly due to the associated injuries and hence due to the injury severity Score during the Primary and Secondary Survey. Comorbidities of any kind and low immune status are contributory to the morbidity and mortality.

Keywords : Emergency Exploratory Laparotomy(EEL), Traumatic Diaphragmatic Rupture, Penetrating injuries. CHD (Congenital Diaphragmatic Hernia, RTA (Road Traffic Accident) VATS (Videos Assisted Thoracoscopic Surgery),CECT (contrast Enhanced Computerized Tomography) E-FAST(Extended Focussed Assessment with Sonography in Trauma)

INTRODUCTION

Traumatic diaphragmatic rupture due to blunt injury is noteworthy as a marker of severe acute trauma. Its incidence is 0.5 to 5 percent of the hospitalized victims of the motor vehicle accidents Approximately 7 percent of these victims undergo EEL. The preoperative diagnosis is seldom made due to the Mask effect caused by the major skeletal or neurosurgical injuries those draw emergent attention of the clinician.^{1,2}

Intra-thoracic injuries commonly associated with diaphragm rupture include multiple rib fractures, pneumothorax and hemothorax and lung contusion .Which prolong the hospital stay ,morbidity and cost . The patients with diaphragmatic hernia may present with marked respiratory distress, decreased breath sounds on the affected side, Presence of gastric contents upon insertion of a chest tube, which will lead to the suspicion of traumatic herniation .Presence of gastric contents (previously ingested food particle , faecal contents if large bowel) auscultation of bowel sounds in the chest. Delayed presentation may give a recent past history of blunt trauma to the chest or abdomen ,a trivial- one though so as not to seek any medical help as there would have been no external indication of trauma in the form of contusions. They may present at a later date either with minimal respiratory embarrassment non-seasonal or sometimes a more acute presentation like an intestinal obstruction or a more catastrophic gangrene and sepsis. among long delayed patients. Hence a stringent primary survey, a battery of investigation like erect chest x- ray inclusive of upper abdomen, HRCT ,Chest is a mandate at the context of major trauma.^{2,3}During EEL for trauma a thorough survey of the upper limits of the abdominal cavity is highly yielding in diagnosing even a minute or tiny rent or breach in the diaphragm.

MATERIALS AD METHODS

This study was a cross-sectional study being conducted in the department of cardiovascular and thoracic surgery at Kurnool Medical college, Kurnool which comprised all patients with post traumatic diaphragmatic hernia undergoing operation in our department from May 2019 to November 2020. We excluded those with multiple injuries and those with decreased level of consciousness at presentation. The study protocol was approved by the institutional review board and the ethics committee. All the patients provided their written consents after the study protocol was described to them by the attending physician.

Inclusion criteria: Both genders with ASA-Grade-1 & 2 cases of Poly trauma with Diaphragmatic hernia.

Exclusion Criteria: Multiple injuries, ASA-3 or more, poor GCS.

A detailed history was taken for each patient along with comprehensive general, physical, systemic and local examination of all cases. This was done to rule out any associated injuries and to determine the involvement of other systems and type of injuries causing diaphragmatic hernia. Further investigations made included complete blood count, biochemical profile, chest x-ray after the insertion of the naso gastric tube, as well as conducting other diagnostic procedures including CT scan abdomen/ CECT with oral contrast like Gastrograffin study. In doubtful case of diaphragmatic herniation avoid ICD insertion in spite of haemothorax, await for HRCT. If pneumothorax an insertion of 16 G needle in the second inter costal space in the mid clavicular line to relieve the respiratory distress temporally.

Congenital Diaphragmatic eventration may be ruled out by repeated interrogation during history taking and previous medical records like previous chest x rays. Eventration is just an elevation of the dome of the diaphragm either congenital are acquired due to neurological defect or acquired due to neuropraxia, ice cold injuries in an open heart on CPB, Phrenic nerve injury which should be ruled out. Point to be noted that Eventration is best an elevation of the dome of the diaphragm without herniation of any intra-abdominal viscera into the pleural cavity.

Operative findings included associated intra-abdominal injuries, and herniated intra-abdominal viscera and all the patients were monitored during post-operative period in which chest x-ray was performed in all the patients to determine chest expansion. Post-operative complications were noted and managed. Preoperative mortality was defined as death before surgical intervention and operative mortality as death within 30 days of operation or during post-operative hospitalization. Survival was defined as the interval between the date of surgery and time of the last follow-up. During follow-up all the patients were seen at the outpatients' clinic at intervals of two weeks during first three months, and in three to six months in the next three years.

Surgical management

If the diaphragmatic injury is discovered during the acute phase of polytrauma, the standard surgical approach of laparotomy or, less commonly, thoracotomy. The generally accepted protocol in the acute setting is that of mid line vertical laparotomy because of concomitant intra- abdominal injuries are more likely to be present than thoracic injuries. The problem regarding which approach to use, arises when the diaphragmatic injury goes unnoticed for months or years. Most surgeons approach long-standing hernias via a transthoracic or thoraco-abdominal approach because the herniated intra-abdominal contents tend to be firmly attached to intrathoracic structures. Making a transabdominal approach difficult. Minimally invasive techniques for diaphragmatic repair are becoming more common than before. with advances in technology and surgical skills, repairing both acute and chronic diaphragmatic hernias is possible with laparoscopic, thoracoscopic, or combined approaches. Minimally Invasive VATS may be applied when E-FAST is negative and isolated blunt trauma chest is present: the same procedures may be converted as therapeutic one.

Operative details

As in any case of trauma, the patient’s condition must be stabilized, and he or she must be resuscitated to the extent possible before operative treatment. People with traumatic hernias frequently have concomitant injuries and require emergency exploration. With traumatic ruptures, the surgical approach depends on the timing of the diagnosis with the surgical intervention. In the acute phase of trauma, an abdominal approach is preferred. In the latent phase of trauma, a transthoracic approach may be necessary because patients often have adhesions to the intra thoracic organs. Acute injuries are repaired with one prolene permanent sutures. Small lacerations may be repaired by using interrupted, horizontal mattress, or figure-eight sutures: larger lacerations may be repaired with continuous or double-layered closures. Absorbable sutures are associated with a high rate of recurrence. There is some limited evidence to suggest that the use of biologic mesh in traumatic diaphragmatic repair may be feasible, at least in chronic cases. But most of them are Acute street injuries and hence meshes and artificial materials are avoided, to avoid future infections.

Laparoscopic abdominal exploration in the setting of trauma is becoming a popular way to determine diaphragmatic integrity is retained or not. It provides a minimally invasive mechanism by which the diaphragm can be directly viewed to determine if an injury has occurred. In the absence of other intra-abdominal injuries, the diaphragm can easily be repaired by applying laparoscopic techniques. The best utility of laparoscopy is with penetrating thoracic and abdominal injuries when intraperitoneal penetration is being considered and if a projectile has injured the diaphragm as in the case of an arrow or missile (gunshot injuries)

Statistical analysis

Data was analysed by Statistical Package for the Social Sciences version 12.0 (SPSS Inc., Chicago, IL). Descriptive results are presented as mean ± standard for 95% confidence interval (CI) or proportions wherever appropriate.

RESULTS

9 patients had delayed presentation after various period of time after the conservative management during the admission and discharge from the hospital, All the 7 patients with penetrating injuries had Emergency Laparotomies and the appropriate treatment for the traumatic diaphragmatic rupture

44 of the Blunt injuries also had an EEL and the appropriate treatment of the diaphragmatic rupture and of the associated injuries. 9 with delayed presentations had total conservative management and hence the tiny rents in the diaphragm without any abdominal organ herniation had delayed presentations at a later date after discharge from the hospital. 2 case succumbed to death after the emergency management one due to the respiratory failure and the other one due to the hollow viscus perforation followed by sepsis.

Table-1: Demographic details in study

Age interval in years	Number of patients	Percentages
<18 yrs	2	3.33

18-50 yrs	8	13.33
51-60 yrs	10	16.67
61-65 yrs	40	66.67
Gender		
Males	47	78.33
Females	13	21.67
Type of injury		
Blunt	53	88.33
Penetrating	7	11.67

61-65 years of age group is the most affected Male gender is the most common affected. Left side is the most common side affected. In 53 cases Blunt injury was the cause. In 7 patients penetrating injury was the cause.

Table-2: Depending on Type of injury

Blunt acute	Number of patients	Percentages
Right side	21	35
Left side	32	53.33
Penetrating injuries		
Right sided	4	6.67
Left sided	3	5
Total	60	100

Blunt left sided injuries were more, total 53 cases, Right sided-21, left sided-32

Site of diaphragmatic rupture : Penetrating injury-7 cases, Right sided-4, left sided-3

Table-3: Complications associated in study

Complications	Number of patients	Percentages
Acute blunt		
Uneventful	51	85
Death	2	3.33
Acute penetrating		
Uneventful	7	11.67
Late total	9	
Uneventful	8	88.89
Death	1	11.11

Out of 60 patients 51 patients had acute presentation with associated injuries. 9 patients had delayed presentation after various period of time after the conservative management during the admission and Discharge from the hospital, All the 7 patients with

penetrating injuries had Emergency Laparotomies and the appropriate treatment for the traumatic diaphragmatic rupture.

DISCUSSION

Diaphragmatic hernia can be either congenital or acquired. Acquired hernia can be primary/spontaneous or secondary. Congenital diaphragmatic hernia in adulthood can occur through an anterior parasternal Morgagni foramen or through a posterolateral, mainly left sided, named as Bochdalek hernia.⁵ CDH may be diagnosed in utero and be prepared for the baby delivery at a tertiary centre. Earlier was an emergency repair but now may be a delayed procedure after the consideration of several factors, the discussion of which is beyond the scope of this article.

Blunt trauma of the lower chest and upper abdomen is the major cause of diaphragmatic rupture and hernia. Traumatic diaphragmatic hernias are produced by a sudden increase in the pleuroperitoneal pressure gradient at areas of potential weakness along embryological points of fusion and insertion. A spontaneous rupture implies the absence of trauma, but there is always possibility of forgotten trauma in the past⁶

Diagnosis is based on the clinical presentation and confirmed by imaging such as chest X-ray (nasogastric tube insitu), abdominal CT scan and CECT CHEST and abdomen. Common radiological findings include elevated hemidiaphragm, blunting of the costophrenic angle, distortion of the diaphragmatic borders, curling of gastric tube into the thorax, mediastinal shift, pleural effusion or presence of air-filled gastrointestinal structures in the thoracic cavity. Diaphragmatic hernia accounts for about 0.8-1.6% of blunt trauma abdomen. Approximately about 4-7% of the patients who undergo emergency laparotomies for trauma have a diaphragmatic injury.^{8,9}

In present study >60 years of age group is the most affected. Male gender is the most common affected with ratio male : female of (4:1) men being more outdoors. Left side is the most common side affected. In 53 cases Blunt injury was the cause. In 7 patients penetrating injury was the cause. Blunt Left sided injuries were more, total-53 cases, Right sided-21, left sided-32. Penetrating injury-7 cases, Right sided-4, left sided-3 . In the Reddy EV et al⁹ study, average age was 43.4 years. Three of the five cases were males. Four of the five cases were on the right side, consistent with Saroj et al. whose average age was 36 years, M:F = 11:2 and Rt:Lt = 12:1.

In our study Out of 60 patients 51 patients had acute presentation with associated injuries i.e., poly trauma. 9 patients had delayed presentation after various period of time after the conservative management during the admission and discharge from the hospital, All the 7 patients with penetrating injuries had Emergency Laparotomies and the appropriate treatment for the traumatic diaphragmatic rupture. Traumatic ruptures of the diaphragm are often the result of severe accidents (RTA) like blunt or penetrating trauma. Blunt or indirect trauma is mainly caused by traffic accidents or fall from height.^{10,11} It commonly leads to laceration of the posterolateral part as this develops as the weakest part during embryological

period and is hit by a pressure gradient at the time of high-impact accidents.^{x,13} Penetrating or direct trauma to the diaphragm can be caused by gunshot injuries, stab wounds or impalement lesions.¹⁴

The most accurate method of making the diagnosis of diaphragmatic hernia is exploration in operation theatre. The management of diaphragmatic hernia is surgical and typically involves primary or patch closure of the diaphragm through an open or laparoscopic (abdominal or thoracic approach) or combined techniques.

Although there are few studies in literature describing laparoscopic approach in diaphragmatic hernia repair, we presented our experience and found it to have all the advantages of minimal access surgery and to be a safe procedure, either laparoscopic or thoracoscopic

CONCLUSION:

Thorough clinical examination, battery of investigations, and emergency services and an expeditious intraoperative inspection of both the hemi diaphragm to rule out minor most diaphragmatic injuries and a high index of suspicion towards late presentation of a diaphragmatic hernia. An X-ray chest and erect abdomen may be considered before the planned discharge or a screening thoracoscopy. Patient should be advised follow up at any of the alarming respiratory symptoms. For smaller diaphragmatic defects and at an earlier presentation, thoracoscopy or laparoscopic intervention may be considered. Laparoscopic diaphragmatic hernia repair is feasible, acceptable, affordable, superior, and safe alternative to open repair with better short-term postoperative outcomes and a recurrence rate similar to the open approach

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