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ORIGINAL CASE STUDY **OPEN ACCESS**

ISOLATED LEFT SIDED DIAPHRAGMIC INJURY DUE TO BLUNT TRAUMA

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ABSTRACT

Diaphragmatic injury presents as acute emergency and associated with other life threatening injury of other organs. Sudden increase in intra-abdominal pressure may cause injury in the membranous or muscular part of the diaphragm. Early diagnosis is the most important step in the management. Delayed diagnosis can result in a diaphragmatic hernia with high mortality, morbidity and high mortality rate due to complications such as strangulation and incarceration. X-Ray abdomen and chest will be guide for identifying most of the diaphragmatic injury in emergency. We reported two cases, one is presented with respiratory distress immediately following blunt trauma, and other one is presented with acute intestinal obstruction two weeks after blunt trauma both are managed through surgical procedure.

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INTRODUCTION

Traumatic rupture of diaphragm is a serious injury. It is consequence of high velocity blunt trauma to abdomen and thorax, usually by motor vehicle accident (Reda *et al*., 2009). The incidence of diaphragmatic rupture after blunt trauma of abdomino-thoracic region is approximately 0.8 to 5%. Diaphragmatic rupture was first described by *Sennertus* in 1541 while traumatic diaphragmatic hernia was first reported by *Ambroise Paré* in 1579 and surgically repaired by *Riolfi* in 1886. Trauma to chest and abdomen cause injury in the membranous or muscular part of diaphragm due to sudden increase in intra-abdominal pressure. Left sided rupture of diaphragm is more common than right sided due to relative weakness of left hemi-diaphragm. Chest X-Ray (Patil Mallikarjun Devaraddeppa and Shashidhar Buggi, 2009) is most common investigating tool for diagnosis of diaphragmatic rupture in emergency and CT (Panda *et al*., 2014) is used following CXR. MRI is most sensitive investigation but it is costlier and not frequently available at all the centers. Diagnosis is difficult due to coexisting injury and silent nature of diaphragmatic rupture causes delayed diagnosis (Sankalp Dwivedi *et al*., 2010). Delayed diagnosis causes increased morbidity and mortality. Successful management of diaphragmatic rupture depends upon early detection, resuscitation and proper management of the diaphragmatic defect. We reported two cases of diaphragmatic rupture which was not accompanied with any intra-abdominal or intra-thoracic organ injury due to road traffic accident.

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Case report

A 12 years old male admitted in emergency room after road traffic accident. Fluid replacement was started after thorough clinical examination, Patient was in respiratory distress and shock with rapid and feeble pulse. Tenderness over left hemi-thorax and abdomen. Left side diminished respiratory sound on auscultation. X-Ray Thoraco-abdominal was taken. Left sided intercostal drainage tube insertion was planned suspecting left haemothorax in X-Ray. While inserting the chest drainage tube in left side through triangle of safety, it was observed that mass of fat was protruding out of the intercostal incision it seems to be omentum, it was conformed after examination. Then patient was planned for emergency exploratory laparotomy under general anesthesia. On

exploration approximately 4×2 inch^2 rent with irregular edge in the left hemi-diaphragm was seen (Fig.1). Stomach, omentum, spleen, transverse colon and part of jejunum were herniated into left hemi-thorax^2. All contents were reduced, all herniated content and other abdominal organs were normal. The defect in the diaphragm were closed by non absorbable suture in interrupted manner. A intercostal chest tube drain with water seal bag was placed in left hemi-thorax. Chest tube drain was removed on 5th post-operative day. Patient's recovery was uneventful and discharge on 11th post-operative day.

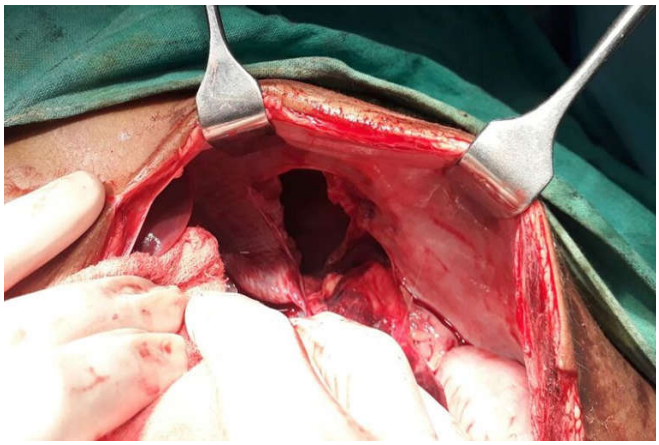

Fig.1. Rent in left dome of diaphragm with irregular margin

Fig. 2. X-Ray chest showing visceral herniation into left hemi-diaphragm, right sided mediastinal shift with in situ nasogastric tube

We also reported a case of 37 years old female who met a road traffic accident 16 days back. For that she was treated by local quack conservatively and got symptomatic relief. After 13 day of RTA (road traffic accident) she started developing obstipation for she again consult to quack and symptomatically relieved, on 16th day of accident she developed sign of acute intestinal obstruction (Umer Hasan Bhatti and Surrendar Dawani, 2015) then she rushed to tertiary care center. On through clinical examination she had raised pulse, normal BP, tachypnoeic unable to pass feces and flatus, bowel sound was absent, left sided silent chest but right sided increased breath sound. On X-Ray of thoraco-abdominal area it was found that whole of the stomach with nasogasric tube and transverse colon was herniated into left hemi-thorax^2 (Fig: 2). Whole of left side of lung had been collapsed to upper and inner left hemi-thorax, right side mediastinal shift. Emergency laparotomy was planned, transverse colon, stomach along with spleen was reduced it was hugely dilated, it was deflated with the help of nasogatric tube. This hugely distended stomach and transverse colon has caused obstruction. On reduction whole gut was found healthy. There was rent of size 3×3 inch^2 in left hemi-diaphragm which has regular, fibrosed and cord like margin. Diaphragm was thinned out. Thinned out part was excised and rest part was closed with non-absorbable suture. Left sided intercostal drainage tube with water-seal bag was placed. After full inflation of left lung, intercostal chest tube drain was removed on 5th post-operative day. Patient was discharged on 11th post-operative day. Recovery was uneventful.

DISCUSSION

Traumatic diaphragmatic injury generally develops after blunt and penetrating injury. Clinical three phase classification of diaphragmatic rupture was there. In this clinical staging system, first phase is described as stage where the clinical finding develop during acute period of injury and second phase is described as where the obstructive finding develops related to strangulation and third stage connected to the skip of rupture. Second phase is considered as silent clinical period can take up to month or even years. For optimum approach to traumatic DI (diaphragmatic injury), diagnosis should be stablished during first phase and application of a FAST (focused assessment with sonography in trauma) treatment protocol should be aimed. It must be known to increase mortality and morbidity rates related to strangulation due to delayed diagnosis and treatment. Traumatic diaphragmatic rupture is more common in left side than right side after blunt trauma. On evaluation with regards to blunt trauma it seems diaphragmatic injury on left side 65-85%, right side 15-35% and both sides will be only 1% (Boulanger Bernard R. Milzman *et al*., 1993). Left-sided BTDR is more common than right-sided rupture. The pre-dominance of left-sided BTDR (blunt trauma diaphragmatic rupture) has been explained by increased strength of the right hemi-diaphragm, hepatic protection of the right side, under-diagnosis of right-sided ruptures, and weakness of the left hemi-diaphragm at points of embryonic fusion (Reda *et al*., 2009; Simpson *et al*., 2000). Traumatic diaphragmatic injury is accompanied at 60-100% of the case with visceral organ injury, although liver and spleen injury co-exists with traumatic diaphragmatic injury depends upon the location of rupture develops, major vascular injury and small gut perforation can also be seen. There are limited numbers of case study on isolated diaphragmatic rupture following blunt trauma without any concomitant viscous injury. This case is presented because isolated left sided diaphragmatic rupture not accompanied with any intra-abdominal or intra-thoracic organ injury. CXR is the first investigation to be done and gas shadow of abdominal organ in the thorax or hemi-thorax can be seen. CT is generally a better imaging method in evaluation of diaphragmatic rupture, but there is no gold standard investigation. Although repair is

performed primarily with non-absorbable sutures (Gokhan Haciibrahimoglu *et al*., 2004). In case where primary repair can't be performed because of fragmented tissue loss, repair with mesh should be done, in case of lax and thinned out diaphragm darning should also be done with non-absorbable suture. Potent analgesic should be use to alleviate the diaphragmatic pain as it may cause respiratory insufficiency.

Conclusion

Thoraco-abdominal region is frequently affected in blunt trauma. It should be kept in mind that isolated diaphragmatic injury can develop in patients who is admitted in emergency room due to blunt trauma. Delayed diagnosis of traumatic diaphragmatic injury due to acute period can cause severe pathology such as intestinal obstruction and strangulation, leading to increased mortality & morbidity. Hence immediate and proper surgical intervention should be taken.

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