

A DEATH DUE TRANS-DIAPHRAGMATIC HERNIA YEARS AFTER FIREARM INJURIES

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INTRODUCTION

Effects of penetrating injuries including firearm injuries can be very variable. Deaths after such injuries can occur immediately after the incident or after a variable period of time. Deaths due to delayed uncommon complications especially after apparent recovery can raise various medico-legal issues.

In these cases, interpretation of the findings by the forensic pathologist can be extremely important in police investigations and subsequent court proceedings. Hence the pathologist must exercise utmost care in analyzing the history and autopsy findings. He must take trouble to review the literature if there is a possibility of alternative explanation for the pathology found in the autopsy. Poor awareness about such complications among the medical profession can make them liable for medical negligence charges.

HISTORY

A 34 year old man has been admitted to General Hospital Batticaloa with abdominal pain, vomiting, constipation and difficulty in breathing proceeded by an episode of cough and cold. He did not have fever at that time. There he has been kept under observation with symptomatic treatment. As the condition worsened, the relatives themselves have brought him to the National Hospital in Colombo three days later.

On admission, he was dehydrated, febrile and had difficulty in breathing. He has divulged a history of firearm injury to the chest four years back.

Blood investigations revealed Polymorphonuclear leucocytosis with normal hemoglobin and platelet counts. Blood urea and prothrombin time were raised. X-rays showed a fluid level in the left side of chest with the shift of mediastinum to the opposite side. There was no gas under the diaphragm. Magnetic Resonance Imaging has been reported as "Appearance suggestive of diaphragmatic hernia probably with diaphragmatic rupture". The condition rapidly deteriorated and he died on the fifth day of his illness.

The body was referred for autopsy after the inquest.

Before the autopsy, when inquired about the old scars seen on the chest and right buttock, the history of gunshot injury to the left side of chest which has happened four years ago (during the separatist war) managed only with inter-costal tube and wound suturing under local anesthesia in a private hospital was confirmed.

AUTOPSY

The body was average built and the height was 174cms. A brownish discharge was noted at the nostrils and the mouth. There were no fresh injuries in the body.

The following scars were found on the body.

1. Shiny brownish, raised, elliptical scar, 3cm x 1.5cm horizontally placed on the left side of the front of the chest below the nipple level, 8cm left to midline and 128cm above the heel level. (Overlying 5th intercostals space) (**Fig-1**).

2. Shiny brownish scar, 2cm x 1cm horizontally placed in anterior axillary line lateral to scar No.1 (**Fig -1**).
3. Shiny brownish raised scar, 3cm x 1.5cm horizontally placed at the back of the left side of chest, 11cm left to midline and 126cm above the heel level (Overlying 7th intercostals space) (**Fig-2**).
4. Shiny brownish scar, 3cm x 1.5cm horizontally placed across the lower margin of the right buttock.

One hundred and fifty milliliters of brownish fluid was found in the left side of the chest cavity. There was congestion of parietal pleura and whitish exudates on the visceral pleura.

The left lung was found compressed and consolidated with the displacement of the mediastinum to the right. The fundus and body of stomach and a part of the transverse colon was found herniated into the chest cavity through a hiatus (a defect measuring 4cmx5cm) in the left side of the diaphragm. A part of the greater omentum has herniated into the chest cavity through a smaller hiatus (2.5cm x3cm) 2.5cm in front of the previous one. (**Fig-3 , Fig -4**) The hiatus had margins with adhesions to surrounding structures.

There was a patch of blackish discoloration measuring 3cm x3cm in the fundus of the stomach. (**Fig -3**)

The stomach was distended with 400ml of blackish fluid. The mucosa showed superficial erosions.

Right and left lungs weighed 300g and 600g respectively with oedema and consolidation of the left lung.

The Brain was congested and weighted 1200g The heart, spleen, kidneys, liver and other organs were macroscopically unremarkable.

No fresh or old fractures were noted in the ribs.

Histology showed pneumonic changes in the left lung, fatty changes in the liver and congestion in the brain and kidneys. The right lung was oedematous.

The edges of the hiatus showed no evidence of acute inflammation or malignancy.

The histology of the other organs was unremarkable.



Fig. 1 – Well healed scars on the front of the left side of the chest.



Fig. 2 – Well healed scar on the back of the left side of the chest.

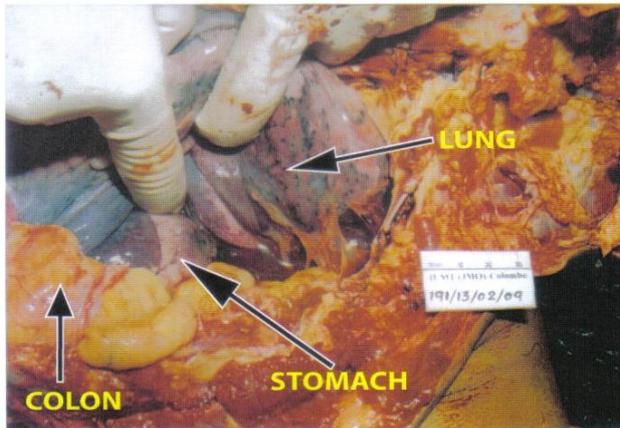


Fig. 3 – Herniation of Stomach, Colon and Omentum into the left chest cavity with adhesions and exudates



Fig. 4– Hiatus in the left side of the diaphragm

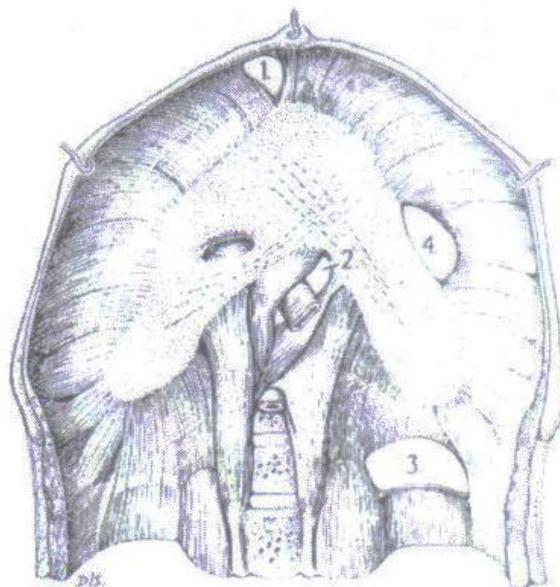


Fig. 5 – Usual sites of congenital diaphragmatic herniae. 1. Foramen of Morgagni, 2. Oesophageal hiatus, 3. Foramen of Bochdalek (pleuro - peritoneal hernia), 4. Dome (after Gray)

DISCUSSION

The deceased has initially had developed gastro intestinal symptoms and respiratory symptoms following an episode of cough and cold. Initially he did not have fever. Therefore it is prudent to assume that his subsequent deterioration and death is mainly due to complications of diaphragmatic hernia and his lung consolidation is a secondary event.

The signs, symptoms and the immediate cause of death of this case could be explained by

herniation of abdominal viscera into pleural cavity. The pneumonic changes in the lungs can probably be following respiratory embarrassment and accumulation of secretions in the airways due to restricted movements as the result of diaphragmatic hernia¹. Necrotic changes taking place in the fundus of the stomach due to ischemia too could have evoked inflammatory response in the adjacent tissues.

Our main task is to discuss the underlying cause of death, more specifically the cause for

the trans-diaphragmatic hernia as well as the cause for its delayed presentation and medical and legal issues which can arise after this death.

Trans-diaphragmatic hernia of abdominal viscera into chest cavity can occur through congenital or acquired defects. Congenital herniations occur through well recognized points in the diaphragm, namely Foramen of Morgagni, oesophageal Hiatus, Foramen Bochdalek and the Dome of the diaphragm^{2,3} (**Fig. 5**). Such herniae have well defined sacs and adhesions are uncommon. Other congenital malformations may also be present in these persons².

The acquired group is either traumatic or post operative and can occur anywhere in the diaphragm. In these cases extensive adhesions are common. A peritoneal sac is usually not present. There can be a delay in presentation for some considerable time¹. They can follow blunt or penetrating trauma such as stabs or firearm injuries^{4,5}.

This case has a history of firearm injury to the chest four years back which had been managed only with wound suturing and intercostal tube drainage. The scars on the left side of the chest were consistent with the given history and duration. Lateral location of the scars indicates that the projectiles might have damaged the left lung resulting haemo-pneumothorax which was treatable with intercostal drainage. It is the usual practice in uncomplicated cases. As the tract of the shot had been located lower down in the chest, it could have either directly gone through the diaphragm twice resulting two defects. It is also probable for the cavitation effect of the bullet to bruise the diaphragm forming defects sometime later. Damage to the diaphragm during intercostal intubation is another possibility. But two hiatus are located in antero-posterior direction. This direction is more in line with the scars due to the entry and the exit of the shot than the direction of the intercostals tube insertion. (**Fig. 4**)

Traumatic diaphragmatic hernia is sometimes diagnosed many years after trauma. In some instances the deterioration can be sudden^{1,4,5}. At times the delay may be due to sealing effect of the omentum or other abdominal contents⁴. In this case the cough and cold episode might have precipitated the herniation via existing defects. Due to the silent nature of diaphragmatic lesions, the diagnosis may be easily missed or difficult even in open surgery^{4,5}. Symptoms and signs can occur due to the obstruction or the strangulation of alimentary tract or due to respiratory embarrassment⁴.

Lack of awareness of the medical profession about such rear and delayed complications of trauma can lead to the failure or delay in diagnosis and treatment. This can raise the issue of medical negligence^{6,7}.

On the other hand, initially the charge for the shooting might have been attempt to commit culpable homicide or attempted murder as the victim had apparently survived the shooting⁸. Four years after the shooting incident, the victim died of a direct and medically recognized complication of the firearm injury. Then isn't it reasonable to consider that the accused is culpable for the death of the victim? This issue can only be resolved by court of law and medical evidence will be scrutinized in detail in this endeavour.

SUMMARY

A Death due Trans-diaphragmatic Hernia years after Firearm Injuries

This is a case of post traumatic trans-diaphragmatic hernia causing signs and symptoms four years after sustaining a through and through firearm injury to the chest. He died due to direct complications of trans-diaphragmatic hernia five days after developing symptoms and signs in a tertiary care hospital. This has happened years after apparently recovery from initial trauma.

This case confirms the probability of developing delayed fatal complications years after penetrating trauma to the chest. It also raises the legal issue of culpability of the assailant for the death of the victim even after apparent recovery.

Possible issue of medical negligence charges as a result of poor awareness of such complications among medical profession is also discussed.

In this type of uncommon autopsies, the forensic practitioner's role in analyzing the history and autopsy findings as well as review of the literature is very important in understanding the sequence of events and excluding alternative possibilities.

(Key words – Trans-diaphragmatic hernia, Penetrating injury, Delayed complications, Culpability, Medical negligence)

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