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Fatal Retropleural Hematoma from a Ruptured Abdominal Aortic Pseudo-Aneurysm

Farmley et al [1] reported that five patients, or 38% of the 13 cases studied, who had primary penetrating wounds of the aorta caused by missiles and stabbing and who survived the immediate posttraumatic period, developed a false aneurysm which ultimately ruptured. In the absence of a pathologic tract leading away from the retroperitoneal space and peritoneal cavity, any rupture of the abdominal aorta will result in accumulation of blood in the retroperitoneal space or peritoneal cavity, or both. After a thorough search of the literature the author concludes that the case reported here appears to be the only case of retropleural hematoma where the source of the bleeding is the abdominal aorta. Further, this is the only case of a traumatic abdominal aortic pseudo-aneurysm spontaneously rupturing into the retropleural space in the absence of a pathologic tract connecting the retropleural and retroperitoneal and peritoneal spaces without hemorrhage in the latter two spaces. Correct radiographic interpretation of the chest films in the early stages of the development of retropleural hemorrhage can be made by noting the effacement of aortic shadow and the left primary sulcus by a convex homogenous density in the posterior mediastinum and by correlating these results with the clinical presentation.

Case Report

Twenty-one days prior to death this 19-year-old black male was shot with a .25-caliber pistol. An emergency laparotomy with distal pancreatectomy, exteriorization of the colonic perforation, and oversewing of the posterior gastric perforation plus elective gastrotomy and splenectomy were performed. The missile was identified radiographically but not removed from the right lateral chest wall. Postoperative diagnosis was gunshot wound to the abdomen with perforation of the left hemidiaphragm, posterior stomach, liver, and colon. Because of the right pneumothorax a chest tube was inserted after the operation with subsequent drainage of 1000 ml of dark, bloody fluid. The chest tube stopped draining by the first postoperative day. By the third day, because of a 50% right pneumothorax, the patient became short of breath and began complaining of chest pain. This was successfully treated with Emerson suctioning with immediate removal of 25% of the free air. Approximately 2 h after the onset of the symptoms, 250 ml of bright red blood was drained from the right chest. Evidence by X-ray of complete resolution of the pneumothorax was made by the fourth postoperative day. At that time an infiltrate in the left lower lobe of the lung, interpreted as either atelectasis or atelectasis and aspiration, was noted. Clinical documentation of the infiltrate was made six days after the initial radiologic evidence and nine days postoperatively. By the eleventh postoperative day the patient began complaining of severe, nagging, lower-quadrant abdominal pain, which was thought to be due either to ileus,

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urinary tract infection, intra-abdominal abscess, or bowel obstruction. Roentgenologic studies showed a resolving right pneumothorax, an infiltrate in the left lower lung, and gas and stool in the colon but no evidence of bowel obstruction. His white blood count had risen to $20\,000/\text{mm}^3$. Early the next day the patient experienced pleuritic left lower anterior chest pain described as "like being cut with a razor." The pain was worse with inspiration and alleviated by left lateral decubitus. There was a pleural friction rub over the left lower lung. Lateral chest X-ray showed a left anterior density. The patient was treated conservatively with pain medication. By the 13th postoperative day an abdominal ultrasound study (Fig. 1) showed a "semilucent" area defined anterior to the spine midline—a questionable hematoma in the retroperitoneum; no left upper quadrant abscess nor pancreatic pseudocyst was observed. Postoperative edema of the head of the pancreas was noted. Although the leukocyte count had fallen to $6900/\text{mm}^3$ at that time, the left anterior pleural friction rub persisted. X-rays on the 14th postoperative day showed blunting of the right costophrenic angle with clear lung fields. Clinically the patient had less pain. He progressed uneventfully until his discharge with a stoma on the 20th day after admission and operation.

The following day (27 h and 41 min after hospital discharge) he was readmitted, stretcherborne, complaining of a Darvocet[®] tablet allegedly getting stuck in his throat. He apparently vomited several times after the episode and then began to complain of severe abdominal and chest pain. Enroute to the hospital he became listless, and his pulse and heart sounds could not be discerned. Emergency resuscitation was begun and the patient responded. He presented with these vital signs: temperature, 36°C (97°F); respiration, 16/min; pulse, 96/min; and blood pressure, 160/108 mm Hg. His chief complaints were of crampy, nonradiating abdominal pain and chest pain. Physical examination; laboratory studies; chest X-ray; and kidney, ureter, bladder, and upright abdominal films were all interpreted as within normal limits. While waiting to be taken to the ward, the patient was



FIG. 1—Abdominal ultrasound: with the probe 2 cm below the xiphoid process, a semilucent area along the midline anterior to the spine is found towards the right and continuous with the aortic shadow representing the traumatic pseudo-aneurysm of the abdominal aorta.

found unresponsive and in cardiopulmonary arrest. In spite of resuscitation attempts the patient died.

Postmortem Findings

An organized 3.7- by 4.3-cm blood clot was found below the diaphragm slightly to the right and anterior to the celiac artery, which on initial section revealed a dark red jelly-like central core surrounded by fibrin and fine fibrous tissue mesh. Further dissection revealed a 5- by 3.7-cm fusiform fistula with a 0.3-cm-thick, pinkish white, leathery wall. The fistulous opening was directly connected to a perforating wound through the right anterolateral wall of the abdominal aorta below and to the right of the origin of the celiac artery. A dark thin membrane of fibrin was observed partially covering this opening. Superiorly, this tract was pointing towards the left hemidiaphragm and lateral surface of the vertebral body. The wall of the tract was dark red and very shaggy. A massive 1400-ml retropleural hematoma extending from the apical pleural area down to the twelfth rib, posterior mediastinum medially and left of the mid-axillary line laterally, communicated directly with the sinus fistula in front of the celiac artery. This mass filled two thirds of the posterior left pleural cavity, resulting in the displacement of the left lung anteromedially and shifting of the entire mediastinum to the right. The parietal pleura was tense with a minimally granular surface. From the left pleural cavity 300 ml of serosanguinous fluid was recovered. No pathologic tract through the diaphragm proper connecting the abdominal cavity to the thoracic cavity was found even after meticulous examination.

The partially healed gunshot wound of entry was identified along the left anterior lumbar region, and the tarnished .25-caliber missile was recovered from the tissue over the right lateral chest wall at the level of the eighth intercostal space. The operative site and the gunshot wound tract through the abdomen and right hemithorax were unremarkable.

Discussion

The blood from the ruptured abdominal aortic pseudo-aneurysm entered the left retropleural space behind the right crux of the diaphragm. As the right crux of the diaphragm makes its insertion, it loops from right to left anteriorly over the abdominal aorta, thus creating a potential space joining the retroperitoneal and left retropleural spaces.

When Pendergrass and Allbritten [2] first published their roentgenologic findings on retropleural hemothorax, they referred to this condition as the most serious of all the pulmonary complications of lower cervical and upper thoracic sympathectomy. Of the 66 cases that they have studied, 3 developed this complication. From one case 7.2 litres of old blood was aspirated in a two-week period without any serious consequence. Sheff et al [3] found that 18% of the 220 cases who were studied after sympathectomy suffered from retropleural hemorrhage. In general, this condition has been alluded to as a radiographic curiosity whose X-ray features must not be confused with such conditions as the more morbid tumors, cysts, and abscesses of the lungs and parietes. Further, its clinical course is so benign that rarely, if ever, is active surgical intervention necessary [3,4]. It was not until Felson [5] showed a photomicrograph of the condition that its benign course was challenged. The caption suggested that the source of the bleeding was a ruptured intercostal blood vessel, but this was not confirmed by postmortem examination. No history of trauma was elicited.

Following is a compilation of the characteristic roentgenologic features of this condition as it appeared in the literature [2-5]. The lesion appears as a homogenous density in the anteroposterior, posteroanterior, and lateral views, but one may occasionally observe it as either a diffuse density paravertebrally that is not sharply demarcated [3] or as a slightly lobulated, homogenous mass arising from the posterior wall [4]. It is convex in all its

boundaries away from the vertebral or mediastinal region with which it merges imperceptibly. There is no change in the configuration when the patient's position is altered. The costophrenic angle is not affected and the pulmonary markings are usually not prominent. Features similar to an extrapleural tumor with an incomplete lateral border [6] may be observed if the hematoma is located in the periphery.

All the above features are helpful, especially in the florid stage and particularly when the evidence of sympathectomy is shown and the lesion is located in the superior mediastinum. If the bleeding is in the lower posterior mediastinum and at an early stage, and there is no history of sympathectomy, what then? This case report is being addressed to this dilemma. Like everything else in medicine, the clinical symptoms are very helpful. The patient complained of pleuritic-type pain, both classic and referred in nature. The radiographic picture (Fig. 2) is shown for comparison.² This picture was taken six days before his discharge and showed nothing but the blunting of the right costophrenic angle resulting from a relatively old pleural reaction. Notice the clearly demarcated margins of the aortic shadow. Figure 3 is a normal left lateral view taken two days earlier. Take note of the sharply contoured left primary sulcus. Figure 4 is an erect posteroanterior chest film taken hours before his death; it shows effacement of the aortic shadow by a homogenous convex density

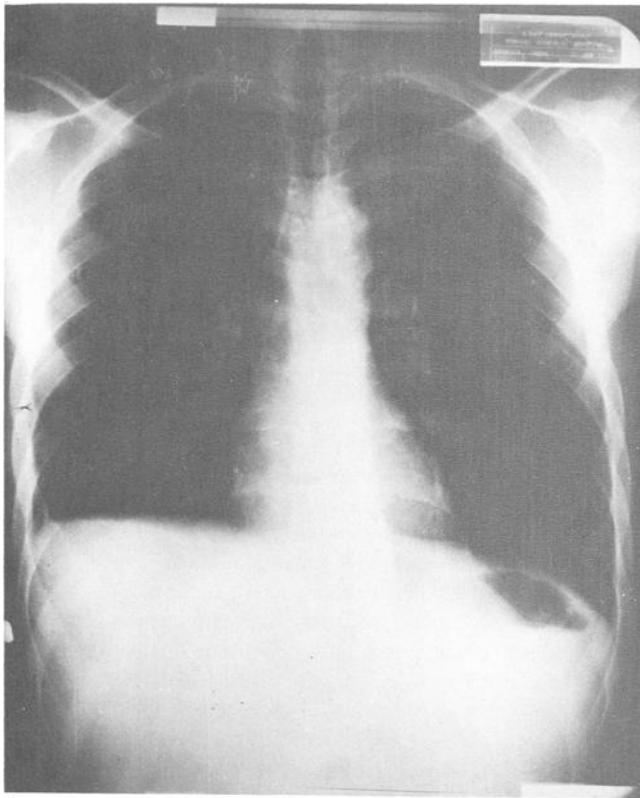


FIG. 2—Posteroanterior view: essentially a normal chest X-ray demonstrating the well-demarcated aortic shadow.

²No corresponding lateral films were taken at the same time.

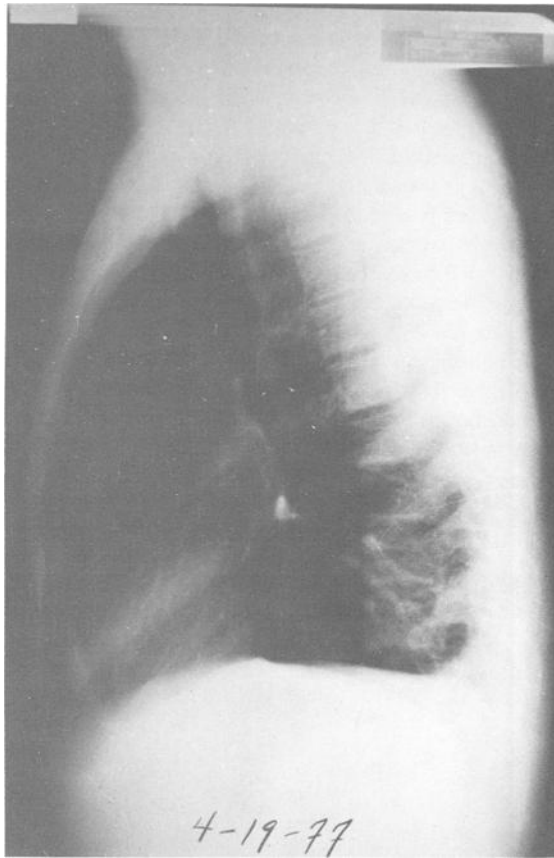


FIG. 3—Lateral view: essentially a normal chest left lateral film showing the sharply contoured primarily sulcus marking.

pointing superiorly and laterally toward the left. The inferior and mediastinal edges merge imperceptibly with the diaphragmatic and mediastinal shadows, respectively. The lateral view (Fig. 5) shows that the left primary sulcus has been obliterated by the retropleural hematoma. An anteroposterior supine view taken postmortem (Fig. 6) disclosed a homogenous mass with a convex lateral border and a medial margin merging with the mediastinal shadow. There was also a massive shift of the mediastinal content to the right.

Through radiopathologic correlation, this case has clearly demonstrated that retropleural hematoma is a very serious and sometimes fatal condition. A review of the literature shows that one of the undeniable facts about retropleural hematoma is that its morbidity and lethality are primarily dependent on the source of the bleeding. The finding of a homogenous density with an ill-defined medial border and convex lateral, inferior, and superior borders, associated with the effacement of the aortic shadow on the anteroposterior view and the primary sulcus marking on the lateral view, is diagnostic of an early lower posterior retropleural hemorrhage when associated with the classic clinical picture of pleuritis. Further, with appropriate history and physical examination findings, one can suspect the presence of an aortic pseudo-aneurysm by means of abdominal ultrasound studies where it appears as an increase in the overall diameter of the aortic shadow along the midline and anterior to the spine. Since neither retropleural hemorrhage nor aortic pseudo-aneurysm was ever con-

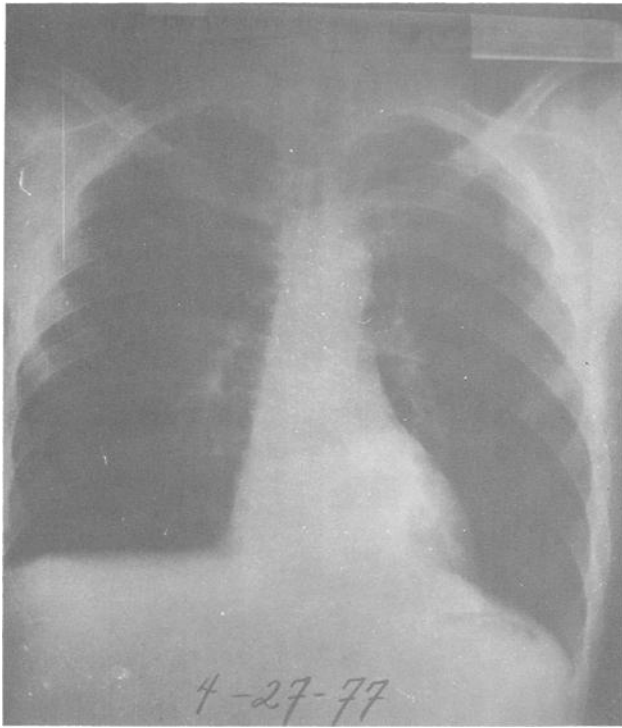


FIG. 4—Posteroanterior view: the left margin of the aortic shadow is obliterated by the developing retropleural hematoma posterior to the heart, appearing as a homogenous density with convex superior and lateral margins and with its inferior and medial margins blending with the mediastinal and diaphragmatic shadows, respectively.

sidered, antemortem confirmatory diagnosis of the traumatic aneurysm by aortography was never ordered.

Summary

This paper has reported a case of sudden unexpected death in a 19-year-old man, shot in the abdomen, who was surgically treated and discharged. He died of massive left retropleural hematoma from a spontaneous rupture of a traumatic pseudo-aneurysm of the abdominal aorta. Diagnosis of the retropleural hemorrhage and the aortic pseudo-aneurysm was possible, though not made antemortem, through chest X-rays and ultrasound studies of the abdomen correlated with the patient's symptoms. Early radiologic signs of the hematoma consisted of obliteration of the aortic silhouette on the anteroposterior view and the left primary sulcus on the lateral film by a convex expanding homogenous density whose medial border blended imperceptibly with the mediastinal shadow. On ultrasound study the pseudo-aneurysm appears as semiluculent midline shadow anterior to the vertebral column and related to the aorta, giving the latter an appearance of increased diameter.

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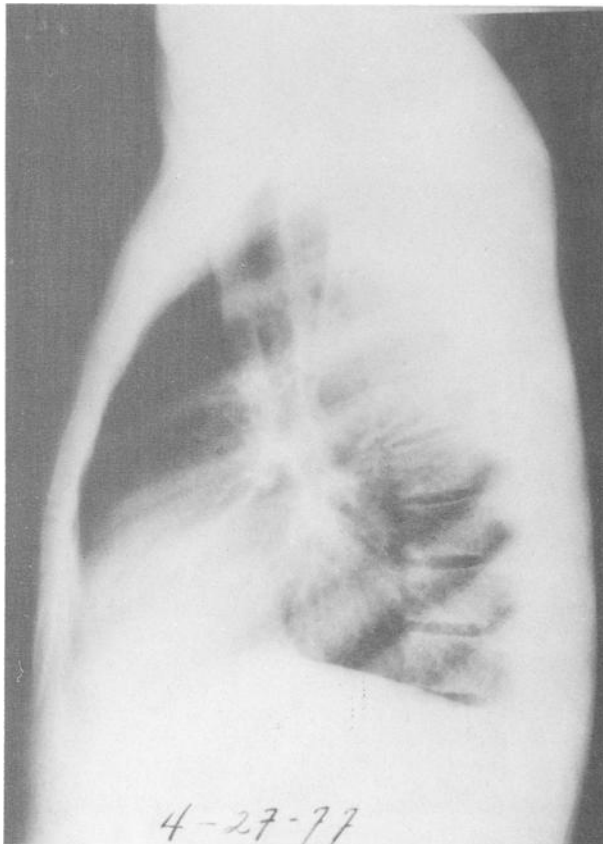


FIG. 5—Lateral view: because of the retropleural hematoma seen as a homogenous infiltrate in the anterior lower chest film, the primary sulcus notch is obliterated.

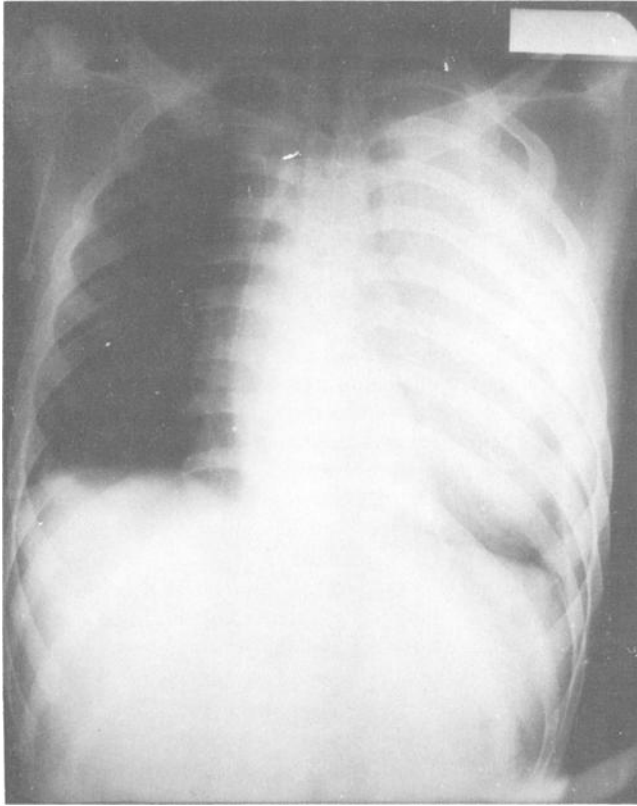


FIG. 6—Postmortem anteroposterior view: a massive shift of the mediastinal content to the right caused by the huge 1400-ml retropleural hematoma is observed. The hematoma has a generally convex silhouette except along its medial border, where it merges imperceptibly into the mediastinal density.

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