Haemothorax in haemophilia

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Haemorrhagic pleural effusions are most commonly due to trauma; new growths or pulmonary infarctions are unusual causes. Most haemorrhagic pleural effusions not associated with trauma occur in the course of pulmonary tuberculosis, especially if artificial pneumothorax has been induced. Bernstein, Klosk, and Parsonnet (1946) collected 145 cases of haemorrhagic pleural effusion from the literature; of these, 102 patients had pulmonary tuberculosis and all except four of these 102 patients had had an artificial pneumothorax induced.

The condition of haemothorax was originally described by Pitt (1900). Good reviews were made by Perry (1938) and by Hartzell (1942), who dealt particularly with the necropsy findings in the published cases. The clinical manifestations of haemophilia vary considerably, but nevertheless exhibit a pattern. The typical presentations are well known and include haematoma and excessive bleeding from cuts. It not infrequently happens, however, that when haemophiliacs present with diseases of other systems, the clinical picture may be seriously altered by the presence of the coagulation defect; haemothorax is a good example of this.

In this paper two such patients will be described together with a third who sustained a haemothorax after a chest injury.

Although the classical monographs on haemophilia by Birch (1937) and Schloessmann (1930) refer to pulmonary haemorrhage, they do not mention intrapleural haemorrhage in haemophiliacs. Likewise, in a study of 40 haemophiliacs (Davidson, Epstein, Miller, and Taylor, 1949), haemothorax was not a complication. A more recent personal study by Kerr (1963) of 70 haemophiliacs, together with the histories of a further 62 such patients, also includes no incident of pleural haemorrhage or spontaneous pneumothorax, although reference is made to the case reported by Burke and Salzman (1959). In describing two patients with haemothorax, Freedman, Levine, and Solis-Cohen (1943) noted that one was a haemophilic man who developed spon-

taneous severe pain in the left chest 36 hours before admission; signs of fluid were present in the left hemi-thorax. No comment was made on the presence of air in the pleural cavity. Daily aspirations of the chest yielded up to 500 ml. of blood with considerable relief of symptoms, but 23 days later a chest radiograph was reported as showing a residual encysted effusion.

The radiological appearances of pleural haematoma in haemophilia have been described (Pendergrass and Neuhauser, 1942) in a man with a long history of haemophilic complications, who developed severe chest pain in 1936 and who was diagnosed and treated for haemothorax; the treatment included blood transfusions and two paracenteses of the chest. Twenty-three transfusions were given and he became very ill. He later improved, and the first chest radiograph seen by the authors two years later in 1938 showed the presence of several opacities in the pleura which they concluded were haematomata. A radiological follow-up during the next three years demonstrated the progressive diminution of these shadows to minimal proportions.

Burke and Salzman (1959) described a moderately affected haemophilic who developed a spontaneous pneumothorax associated with bleeding into the pleural cavity. Fresh blood and plasma transfusions were given to assist haemostasis, and aspiration of air was achieved through a catheter in the right intercostal space. Later it became necessary to carry out rib resection because of empyema, and finally decortication was undertaken; but despite transfusions of fresh blood the patient died from mediastinal compression due to haemorrhage. Another report (Kay and Kupfer, 1957) dealt with the development of spontaneous haemothorax in a haemophilic student. Under cover of lyophilized anti-haemophilic plasma, a paracentesis was carried out and yielded much blood; but this was followed five days later by prolonged bleeding from the paracentesis track. Repeated aspirations led to the formation of a massive haematoma in the chest wall. In spite of these difficulties the patient

eventually recovered, and two months later his chest film was clear apart from pleural thickening.

Three non-haemophilic patients with spontaneous haemothorax were discussed by Bernstein *et al.* (1946); one was attributed to emphysematous pulmonary bullae, a second to adenocarcinoma of the lung, and a third to pulmonary tuberculosis.

CASE RECORDS

CASE 1 Patient G. M. was a known haemophiliac who was diagnosed in 1955; he had a history of prolonged bleeding after dental extractions and after a biopsy of the elbow for suspected tuberculosis, which in fact proved to be a haemarthrosis. In October 1957 he fell off a motor-cycle and fractured several ribs; his chest was strapped, but he became progressively more short of breath and pale and was admitted to the Manchester Royal Infirmary. On examination he was dyspnoeic at rest and shocked but not cyanosed. The trachea was deviated to the right but the apex beat was not displaced; marked dullness was present over almost the whole of the left chest with diminished vocal resonance and absent breath sounds. There was clinical evidence of fractures of two ribs on the left. A diagnosis of haemothorax was made, and radiological examinations supported this. The haemoglobin level at that time was 40% (5.8 g./100 ml.). He was transfused with two pints of fresh blood and sedated with morphine. Tetracycline, 250 mg. every six hours, was given orally.

Essential tests of haemostasis were performed. The platelet count was normal, the whole blood coagulation time (Lee and White) was 8 min., and the serum prothrombin consumption index was 22% (normal up to 10%); the thromboplastin generation test showed a plasma deficiency diagnostic of haemophilia.

During the next few days he did not improve, although the haemoglobin rose to 66% (9.8 g./100 ml.). In order to prevent long-term pulmonary complications we aspirated the haemothorax: two pints of blood were accordingly removed from the left hemi-thorax, and this led to relief of dyspnoea. On the following day chest aspiration was repeated and one and a half pints of blood were removed—again with immediate relief. However, an hour later the patient complained of sudden pain in the chest and became very dyspnoeic and hypotensive. Radiographs confirmed that further intrathoracic bleeding had occurred. Despite the immediate transfusion of one pint of fresh blood followed by two pints of stored blood, he died the same evening.

At necropsy approximately nine pints of blood and clots in the left pleural cavity were found and the heart was pushed over to the right side. The lower lobe of the left lung was ragged and one piece of clot contained a small portion of lung tissue; the remainder of the lung was collapsed. The left fifth and sixth ribs were fractured, but they had not penetrated the pleura. In this patient the combination of

traumatic damage to the lung and haemophilia produced bleeding, which could not be controlled.

CASE 2 Patient J. I. had a history of prolonged bleeding from the umbilical cord in infancy and later of haemarthroses, retroperitoneal haematoma, multiple bruising, haematuria, and epistaxes. His maternal uncle was a known haemophiliac.

In October 1957 he developed a moderate degree of breathlessness, which lasted for two days and which he ignored until late one evening when he developed a tight feeling in the chest which soon progressed to a severe pain in the right chest; he became acutely dyspnoeic, and this was followed by sweating, coldness, and then loss of consciousness. He was sent to hospital and by the time of arrival he had recovered and was no longer in acute respiratory distress. There was slight tracheal deviation to the left with diminished movement of the right chest; over the whole of the right chest the percussion note was impaired, with decreased breath sounds, decreased tactile fremitus, and decreased vocal resonance.

A diagnosis of spontaneous haemothorax was made, and radiographs confirmed the presence of fluid in the chest. It was thought unwise to aspirate, but evidence that the fluid was in fact blood came when a blood count showed that the haemoglobin had fallen, first to 80% and then on the following day to 64%. No transfusions of fresh blood or plasma were given. Improvement was rapid both clinically and radiologically. Seven days after admission the physical signs indicated a lessening in the amount of blood present in the thorax. Radiographs of the chest showed a marked improvement, and the fluid had almost completely disappeared. Pyrexia, which was apparent from admission and which was probably due to absorption of blood, settled after a week.

CASE 3 Patient W. S., an 18-year-old boy and a known haemophiliac, had been under the care of this department since the age of 4 years with a variety of complications, including epistaxis, haemarthrosis, retroperitoneal haematoma, and excessive haemorrhage after trauma and after dental extraction. A family history revealed that a maternal uncle and maternal male cousin were haemophiliacs, one having died from haemorrhage after tonsillectomy. In 1955, when tests of haemostasis were first done on the patient, the whole-blood clotting time was 15 min.; the serum prothrombin consumption index was 50%; platelet count 300,000/c.mm.; prothrombin activity 72%; and the six-minute thromboplastin generation time using patient's plasma was 36 sec. (normal 14 sec.).

On 5 November 1964, while having a drink with a friend in a local inn and without any provocative cause, he developed a stabbing pain above the right shoulder blade, which spread through to the front of the chest at the sternal border and was worsened by coughing and sneezing. After this he noticed moderate shortness of breath, but was able to walk

home, albeit with some difficulty. He spent a restless night and woke next morning very breathless and with the pain still present. He remembered spitting up a piece of black material that was not blood.

He was admitted to this hospital, where he was found to be dyspnoeic at rest but not cyanosed. The trachea was deviated to the right and expansion of the right hemi-thorax was impaired. Over the right upper chest the percussion note was hyperresonant, whereas at the base it was stony dull; breath sounds were impaired over the right upper chest, but at the base they were bronchial in character. The blood pressure was 100/70 mm. Hg. The temperature was 98.2° F.

A diagnosis of right pneumothorax with right basal effusion was made (Fig. 1). He was given 500 ml. of snap-frozen plasma, and a diagnostic tap of the effusion revealed blood-stained fluid. Intermittent aspiration of the pneumothorax was maintained by a second indwelling needle in the fourth right intercostal space anteriorly. These measures produced appreciable improvement, but when he was seen the following morning it was considered that the risk of bleeding from the needle track outweighed the advantages of intermittent aspiration, particularly as

there was no evidence that a valvular pneumothorax was present. In spite of transfusions of snap-frozen plasma (250 ml. every six hours), further serious bleeding occurred into the hemi-thorax, and the patient's condition quickly deteriorated. His haemoglobin, which on admission was 11.1 g./100 ml. (76%), fell in three days to 7.1 g./100 ml. (48%); a radiograph (Fig. 2) of the chest showed almost complete obliteration of the right lung by fluid. Using ⁵¹Cr-labelling of the patient's red cells, it was determined that approximately 3,300 ml. of blood had been lost into the chest.

Because of the grossly impaired pulmonary circulation we thought it would be dangerous to increase the amount of snap-frozen plasma being given (1,000 ml. in 24 hours), and so we supplemented this with human anti-haemophilic globulin (A.H.G.), 450 to 650 units every six hours, together with such amounts of packed red cells as were indicated by the prevailing haemoglobin level. This regime succeeded in raising the plasma A.H.G. 30 min. after infusion from 0 to 40%, a satisfactory haemostatic level. Oral tetracycline, 250 mg. every six hours, was given.

Two days after admission the patient was seen by Mr. Frank Nicholson, who advised daily aspiration

FIG. 1. *Chest radiograph 7 November 1964 shows right pneumothorax with basal effusion.*

FIG. 2. Chest radiograph 10 November 1964 shows right hemi-thorax uniformly opaque except for a small amount of air in an incompletely expanded right upper lobe. A few small pockets of air also remain in the right upper zone. No fluid level is seen, indicating solidification of the contents of the pleural cavity.

of blood from the chest, because it would give immediate relief and minimize the risk of eventual pulmonary collapse with encystment of the haemothorax. This course of action would have entailed the strong possibility of further bleeding from needle tracks, and at the time we only had sufficient human A.H.G. concentrate to ensure adequate haemostasis for three to four days. We therefore considered that it was safer not to aspirate and to risk ultimate pulmonary damage. After three days on the regime of intensive plasma and A.H.G. therapy, the patient's condition improved, dyspnoea was appreciably reduced, and the pain was diminished. The blood haemoglobin level first stabilized at about 8.8 g./100 ml. (60%) and then rose spontaneously. We attempted to estimate how much absorption of blood from the thorax was occurring; this was made possible by determining the amount of radioactive chromium (previously tagged for red-cell volume studies) in a 24-hour urine collection. From this it was found that breakdown products from about 60 to

80 ml. of blood were present; this figure gave a rough estimate (assuming no further bleeding had occurred and that absorption of blood was constant) of 47 days for complete absorption of the blood in the pleural cavity. Clinical evidence of absorption was provided by the presence of slight icterus and a constant pyrexia of around 100° F.

Two weeks after admission there was a significant improvement in the well-being of the patient and also in the physical signs, which showed distinct evidence of re-aeration of the right lung. Daily radiographs of the chest at this time, however, did not permit an assessment of the state of pulmonary collapse, because there was still so much pleural blood obscuring the lung. Serial films were taken during the next few months, and from these (Figs 3 and 4) gradual re-expansion of the lung was evident. Three months after onset he was able to walk without restriction and was quite free of pain. Considerable wasting of the musculature of the left hemi-thorax was apparent, and for this appropriate physiotherapy was instituted.

FIG. 3. *Chest radiograph 28 November 1964 shows that improvement has taken place. The right main bronchus is patent, and expansion of the right lung is taking place.*

FIG. 4. *Chest radiograph 11 January 1965 shows that about half the right lung has re-expanded.*

DISCUSSION

It is clear from our experience and from the published accounts that pneumothorax in haemophiliacs is a relatively rare occurrence, but now that centres for the treatment of haemophilia exist in this country it is probable that this complication in the disease may be recognized more frequently. The symptoms, physical signs, and radiological findings in the cases reported here and in the literature present little difficulty in diagnosis.

It is important to find out if the previous medical history suggests the possibility of a haemorrhagic disease, and, if so, the diagnostic tests should include the platelet count in case of thrombocytopenia, and the serum prothrombin time or, better, the thromboplastin generation test if haemophilia is suspected; a normal whole-blood clotting time does *not* exclude haemophilia since such a result is found in 41.7% of patients (Wilkinson, Nour-Eldin, Israëls, and Barrett, 1961).

The management of haemothorax in the haemophilic patient has presented some difficult decisions. The patients described by Pendergrass and Neuhauser (1942), Burke and Salzman (1959), Kay and Kupfer (1957), together with our patients G.M. and W.S., had extremely stormy courses in two instances leading to death. All these subjects had aspirations of blood from the chest—some multiple. However, one of our patients (G.M.) had an injury to the lung, and one may only surmise what his progress would have been had he not been a bleeder. One patient (J.I.) had no chest aspiration and made a quick and complete recovery. Although W.S. did have a needle aspiration the results pointed to what might have happened if this had been repeated; in retrospect we think that the right decision was taken in not carrying out further aspirations of blood. The risk of further bleeding, of the intro-

duction of infection, and of other complications made a conservative approach advisable. This regime depends on the correction of the coagulation deficiency by rigorous measures, including the administration of anti-haemophilic globulin or fresh plasma.

SUMMARY

Three haemophilic patients are described who sustained haemo-pneumothorax, one being traumatic in origin.

Although the diagnosis is straightforward, the management often proves difficult. Transfusion of fresh and stored blood and of snap-frozen fresh plasma appropriate for the treatment of haemophilia is needed as soon as possible, and if human A.H.G. concentrate is available, it is especially valuable in the early stages. The use of aspirating needles for the removal of pleural fluid or the release of air should be restricted to the relief of urgent symptoms, such as occur in valvular pneumothorax.

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