

SIMPLE SPONTANEOUS PNEUMOTHORAX.

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Our knowledge of spontaneous pneumothorax goes back to the days of Hippocrates. It was an ancient belief that air was normally present in the pleural cavity and that a succussion splash indicated the presence of fluid. At the beginning of the nineteenth century, French observers made great contributions to our knowledge of spontaneous pneumothorax. In 1803, Itard of Paris, as a result of autopsies of cases of pulmonary tuberculosis found air in the pleural cavities and in 1819 Lænnec was able to diagnose the presence of pneumothorax by auscultatory methods. Till the middle of the nineteenth century, it was generally believed that the pleura secreted gases but in 1851, Delosea of Berlin reported a case of pulmonary tuberculosis which showed a ruptured emphysematous bulla at post-mortem. In 1853, McDowell of Dublin described the first case of spontaneous pneumothorax in the absence of pulmonary tuberculosis, and since that time a great deal of literature has accumulated with special reference to pulmonary tuberculosis and spontaneous pneumothorax.

More recently, in 1932, H. Kjaergaard of Copenhagen wrote an exhaustive account of the condition from his observation of 51 cases none of whom died as a result of the spontaneous pneumothorax. R. A. Young in opening a discussion in the section of tuberculosis at the annual meeting of the British Medical Association in 1936, drew attention to this important condition and pointed out that it is by no means of rare occurrence.

Ætiology.

There is no question that the commonest cause of spontaneous pneumothorax is pulmonary tuberculosis. G. A. Beatty in March of this year, stated that approximately 10 per cent. of patients suffering from pulmonary tuberculosis die as a result of spontaneous pneumothorax. It appears from the literature, however, that persons suffering from this combination are in the main cases known to have had pulmonary tuberculosis for some time or cases seen for the first time but found to be advanced. The following case from my own records illustrates this:—

A. B., male, aged 29, traveller. Seen first in February, 1937, with a history of bronchitis. He had been X-rayed elsewhere and a "patch" found at the left apex some months previously. There was little sputum, no hæmoptysis, no loss in weight and no night sweats. There was slight dyspnoea but no rise in temperature.

Previous Illnesses. 10 years ago—Pleurisy with effusion.

Family History. One brother died of pulmonary tuberculosis.

The physical signs showed flattening of the left side of the chest with weak breath sounds in both zones and displacement of the apex beat to the left. The sputum showed T.B. in small numbers.

X-ray Report (February, 1937). Right pneumothorax with slight collapse of the upper lobe. Fibrotic changes and active infiltration in both lungs. Heart displaced to the left as a result of fibrosis of the left lung.

The patient was sent to a sanatorium and in June, 1937, X-ray examination showed no trace of the pneumothorax. At the present time, though his symptoms are about the

same, the patient's general condition has greatly improved and he has increased in weight nearly two stone in sixteen months.

The next cause about which much has been written is the rupture of an emphysematous bulla. The following case illustrates this condition:—

C. D., male, city merchant, aged 50. First seen in 1933 with a history of pain in the right chest after having opened his front door, and shortness of breath for 3-4 days prior to examination. There was a history of dyspnoea for some years which he thought was due to increasing obesity. On first examination he complained of indefinite pain in both sides of the chest, mainly in the back. There was no acute pain and only very slight dyspnoea. There was no temperature. He was of the short obese type. There was evidence of mild generalized emphysema with very slight increased resonance of the percussion note on the right side. There was no cardiac displacement.

X-ray photograph showed a small pneumothorax on the right side.

He was put to bed for four weeks and at the end of two months the pneumothorax had disappeared. He was seen again in 1934 and was quite well. In 1938 he was again examined but his condition remained satisfactory.

In view of the very large numbers of persons suffering from emphysema it might be expected that rupture of emphysematous bullæ would be a common occurrence and that spontaneous pneumothorax would be a general disease but it appears that the contrary is true. Very few persons suffering from generalized emphysema are reported as having spontaneous pneumothorax.

The third and most important group of cases, is one which has been variously described as pneumothorax simplex, benign pneumothorax and spontaneous pneumothorax in the apparently healthy. The following case, seen recently is of interest in this connection.

E. F., male, motor driver, aged 25. Seen June, 1938, complaining of pain in the right chest on bending or turning for 2-3 days. Temperature normal. No acute symptoms.

Previous Illness. Right spontaneous pneumothorax, 1936. This occurred when driving a car and was of acute onset.

Physical Signs. Weak breath sounds in the right chest with decrease of vocal resonance and fremitus. No marked change in the percussion note. No dyspnoea.

X-ray Examination. Partial pneumothorax on the right side. No other evidence of lung disease.

A great deal of controversy has arisen about the ætiology of this so-called simple pneumothorax as the condition only rarely causes death. Kjaergaard gives a survey of six cases described by various authors between 1860 and 1922 in which post-mortem examinations were obtained. He reports as follows:—"In each of these cases, the cause of the pneumothorax is found to be a rupture of a solitary vesicle at the apex of the lung with or without scar tissue." Furthermore in the series of 51 cases most thoroughly investigated by Kjaergaard, no patient died of his or her pneumothorax. This striking statement confirms the opinion that simple pneumothorax has a good prognosis. Of the 51 cases, two died from other causes, and in one, a female, the autopsy showed a thin walled emphysematous vesicle the size of a goose egg on the surface of the right lower lobe.

J. L. Wilson (1937) asserts that the assumption that latent tuberculosis is the cause of most cases of spontaneous pneumothorax is no longer tenable and states that in over one thousand consecutive admissions to the William Wirt Winchester Hospital, there was only one case of spontaneous pneumothorax with complete recovery, three years before the onset of pulmonary tuberculosis.

It thus appears from the literature at present available that all authorities are united in the belief that simple spontaneous pneumothorax bears no direct relationship to active pulmonary tuberculosis. We are left, therefore, with the theory that some form of vesicle is the cause of the condition and Kjaergaard describes two types:—

- (a) The scar tissue vesicle found at the apex of the lungs (possibly near scars resulting from healed tuberculosis).
- (b) The emphysematous valve vesicle due to a local emphysematous change but without scar tissue.

A curious fact is that the condition occurs frequently in the young male and Kjaergaard's figures are instructive. Of the 51 patients, 36 were men and 15 were women and the age group 20-30 contained as many as 22 cases. Furthermore, although one would be led to believe that persons in hard laborious occupations would be the more frequent sufferers, an inquiry into the work of such patients shows no great difference in the incidence. Another interesting fact is that the majority of cases show the lesion on the right side.

Clinical Features.

Although there is no doubt that in most cases the onset is acute, many persons give no such history and a spontaneous pneumothorax may be found by accident or as a result of routine X-ray examination. Pain is the earliest and commonest symptom and is felt on the side affected. In case C. D., although the pain began on the right side, it became more generalized and was felt at the back of the chest. Deep inspiration increases the pain. Occasionally a slight cough associated with a little frothy sputum may be observed.

The development and degree of shortness of breath depends entirely on the extent of the collapse for it is obvious that the greater the amount of air in the pleural cavity, the more serious and urgent the symptoms. The symptoms range from moderate dyspnoea to severe shock accompanied by pallor and faintness. F. G. Chandler (1938) cites the case of a man of 32 who exhibited severe pain on the right side with dyspnoea and collapse. A surgeon performed laparotomy and nothing but an enlarged liver was found. Later the patient was found to have a large pneumothorax which was unimproved by the withdrawal of air. Olive oil with Gomenol was injected into the pleural cavity and in less than seven weeks the lung became completely re-expanded.

The physical signs in any case of spontaneous pneumothorax must depend largely on the amount of air present in the pleural cavity. The changes in percussion note may vary from normal to hyper resonance. Usually, however, reduction in breath sounds, vocal resonance and fremitus will be elicited. The greater the collapse, the more definite the physical signs. The position of the heart is of value in that the displacement is towards the opposite side. Most cases of partial pneumothorax show no displacement but in all cases with more than this amount of air, the heart will be pushed over towards the opposite side. A small quantity of fluid may develop at the extreme base but is usually too small to produce physical signs.

Bulging on the affected side may be observed when complete collapse is present but otherwise no change is found.

The rare condition of hæmopneumothorax when present may produce added physical signs. A succussion splash is diagnostic of the presence of fluid in the

pleural cavity and would lead to further investigation. Happily, hæmopneumothorax is an extremely rare lesion.

In spite of these physical signs, the absence of them does not preclude a diagnosis of pneumothorax and X-ray examination is absolutely essential to avoid misdiagnoses; even with this assistance, I am convinced that cases are missed because of unsatisfactory films. In one case described by Kjaergaard, the X-ray photograph showed a large vesicle the size of a hen's egg on the surface of the right lower lobe. This was in a patient who had three attacks of spontaneous pneumothorax on the right side. Previous X-rays were examined and found to have similar but smaller shadows. The case is apparently the only one out of the series of 51 which showed this lesion on X-ray examination.

Lastly, it must not be forgotten that a diagnosis of muscular rheumatism is sometimes made in patients without acute symptoms.

Types.

Kjaergaard gives a most elaborate typing of cases, dividing them into five groups as follows:—

1. Partial pneumothorax.
2. Coat-formed pneumothorax.
3. Total pneumothorax without or with very slight displacement.
4. Total pneumothorax with moderate displacement.
5. Tension pneumothorax.

R. A. Young considers this classification to be unnecessarily complicated and suggests an alternative as follows:—

1. Partial.
2. Complete. (Complete retraction with or without mediastinal displacement.)
3. Valvular or tension pneumothorax where the opening is valvular and the intra-pleural pressure is greatly raised.
4. Bilateral pneumothorax which may be simultaneous or successive.
5. Hæmopneumothorax.

Kjaergaard sub-divided his cases still further, e.g.:—

- Chronic pneumothorax.
- Alternating pneumothorax.
- Pneumothorax alternating with pneumopericardium.
- Pneumothorax with subcutaneous emphysema.
- Recurrent pneumothorax.

In my own case, E. F., a period of two years elapsed before the second attack but it appears that second attacks usually occur about one year after the first.

Prognosis.

All authorities seem to be agreed that simple spontaneous pneumothorax has a very good prognosis and in this connection Kjaergaard's figures are of great value. In his series none of the 51 cases died of the pneumothorax and in his study of the literature up to 1932, he found that of 200 typical cases, only six

terminated in death as described above. Of these six, four had hæmopneumothorax, one had tension pneumothorax and one had bilateral pneumothorax. It appears, therefore, that these three types are the most serious and with them must be included pneumothorax associated with subcutaneous and mediastinal emphysema.

Kjaergaard's final words on prognosis are as follows:—

“My after examinations have shown that the probability of this event (later development of pulmonary tuberculosis) is so slight that it may be left out of account in practice.”

In other words, patients who have had pneumothorax simplex are no more nor less liable to develop pulmonary tuberculosis than any one else.

Treatment.

The treatment of simple spontaneous pneumothorax must of necessity depend on the extent of the lesion, and in the vast majority of cases, rest in bed for about two weeks followed by a short period of convalescence is sufficient. This at least may assist in preventing the lesion becoming worse.

Most partial pneumothorax cases require no treatment other than rest in bed but all patients must be efficiently controlled by frequent X-ray examinations. For relief of pain it may be found necessary to employ morphia. If the dyspnoea and heart displacement should become severe it is advisable to take the pleural pressure with an artificial pneumothorax apparatus. If the pressure is found to be positive, air may be slowly withdrawn to relieve distress but should not be lowered below atmospheric pressure. This withdrawal may be obtained by reversing the flow of air in the apparatus.

When the symptoms are very severe—for example in the case of tension pneumothorax, it is very important to remove air either repeatedly or by placing a needle in the pleural cavity. If the air continues to accumulate, a large needle should be inserted and attached to a tube, the distal end of which is placed under water at floor level.

Oxygen by nasal catheter or tent, should be administered. Hæmopneumothorax calls for extreme measures but as I have insisted above, it is fortunately a very rare condition: oxygen and transfusions may be necessary. When bleeding has ceased, blood should be removed but the intrapleural pressure should not be lowered below atmospheric level.

Various treatments have been utilized in dealing with cases of chronic pneumothorax and injections of the patient's own blood have been tried. Other methods include the injection of 30 c.c. of hypertonic glucose solution (30 per cent.). These methods are employed with the object of producing congestion and exudation in the pleura and so bringing about the formation of adhesions.

Patients who have had simple spontaneous pneumothorax should do no heavy work for at least one year after the attack and must report for frequent X-ray examinations.

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