IDIOPATHIC SPONTANEOUS PNEUMOTHORAX IN APPARENTLY HEALTHY ADULTS

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THE purpose of this paper is not to discuss the whole subject of spontaneous pneumothorax, but to briefly review the literature and to report a few cases of that rather rare condition of spontaneous pneumothorax occurring in apparently healthy individuals. Like other "rare" conditions, however, it is found, when looked for, more frequently than is supposed; and not infrequently cases of so-called "pleurisy" are found on examination with x-ray to be cases of spontaneous pneumothorax. It is a comparatively benign condition from which practically all recover. Its causation is still somewhat obscure, and because of this one may be excused for presenting a comparatively small series of cases.

Pneumothorax, or, rather, hydro-pneumothorax, was referred to by Hippocrates, and the well-known sign of Hippocratic succussion was described by the "Father of Medicine" in a few cases of evident pyo-pneumothorax. It was not until the beginning of the last century however that pneumothorax was described, except as a complication of gross disease of the lungs or traumatic injury. The literature is very fully reviewed by Emerson[1] in his exhaustive monograph, and it is from this article that the following review of the literature is abstracted.

We find Benj. Bell, in 1874, referring to cases of pneumothorax that might be produced by coughing, laughing or crying. Itard wrote extensively on pneumothorax in 1803, and Laennec describes very accurately the condition, with symptoms and diagnosis, but all the cases referred to by these early writers were of pneumothorax occurring in obviously diseased lungs —mostly pulmonary tuberculosis. In 1841 Saussir collected 147 cases, and one of these he describes as essential pneumothorax occurring without any apparent lesion in the lung. After this article individual cases of what was called essential or idiopathic pneumothorax were reported by various writers. In 1887 Hall[2] collected 31 cases of pneumothorax occurring in the apparently healthy. In the same year West[3] describes cases of pneumothorax occurring in patients considered healthy, developing during sleep, while sitting still, or while walking quietly, or after some slight exertion. In 1888 Gabb[4] reported a case of a woman who had four attacks of pneumothorax at intervals of one, two and five years with no other apparent disease of the lungs. Others have reported cases with recurrences. West reported a case with three attacks. Goodward reported a case with the first attack on one side and a recurrence on the other. In 1902 Frissell and Reisman[5] reported 2 cases and collected 56 others of non-tuberculous spontaneous pneumothorax. It was a benign form; all but one recovered, and it occurred mostly in young men. There was no formation of fluid and very little febrile reaction.

Because of its rarity, and also its benign course, the etiology of this condition has largely been speculative. Zahn[6] reported 6 cases with autopsy and classifies the causes as follows: (1) pneumothorax with rupture of emphysematous vesicle—2 cases; (2) pneumothorax due to the rupture of an interstitial pleural emphysematous bleb—2 cases; (3) pneumothorax due to tearing of pleura besides old adhesions—1 case; (4) pneumothorax from atrophy of the visceral pleura—1 case.

Emerson in his article reports 2 cases occurring without injury and in discussing etiology mentions that Osler places one of them as due to rupture of an emphysematous bleb. Secretion of gas in the pleural cavity was suggested by Riellier and accepted by Laennec as a possible cause of idiopathic pneumothorax, but Zahn's cases are apparently the first in which autopsy was actually done.

Coming to more modern times, various writers from time to time have reported two or three cases. The only one with an autopsy report is that of Meyer.[7] This patient had three attacks of spontaneous pneumothorax within a year and the post-mortem revealed extreme emphysema of both lungs and no tuberculosis. There is no case reported in the available litera-

ture of an autopsy on a spontaneous pneumothorax in a person who previous to the attack was apparently healthy.

Lewald[8] in 1926 reported 10 cases, one bilateral, and concluded that:— (1) pneumothorax may occur in a person with healthy lungs and result in complete and permanent recovery; (2) in some cases air may pass from one pleural cavity to another, producing bilateral pneumothorax; (3) bilateral pneumothorax may result in complete recovery; (4) unilateral pneumothorax may persist for years. In the discussion on this paper J. A. Miller, Willy Meyer, Gerald Webb, and Lemon expressed the opinion that these cases of idiopathic pneumothorax should all be regarded as of tuberculous origin and be so treated. Palmer and Taft[9] reported 5 cases, and state that only 70 cases have been reported and no more than four cases by one man. In two of their cases a hæmorrhagic effusion developed, a rather unusual complication. Fisher[10] and others have also reported a few cases.

Onset.—The onset is generally with sudden and severe pain in the side affected. The attack generally develops after some very slight exertion, such as slight cough, laughing, etc. It not infrequently occurs without any particular exertion and may develop during sleep. Accompanying the pain there is definite dyspnœa, sometimes quite severe, generally some cyanosis and a certain amount of shock, rapid pulse, sweating, etc. As a rule the patient rapidly develops tolerance to the condition and beyond some dyspnœa has no other symptoms.

Diagnosis.—In the more marked cases with complete collapse of the lung the diagnosis is made by the four signs—*viz.*, immobile chest on the side of lesion, hyper-resonance, absent breath sounds, and displacement of the heart to the side opposite the lesion. In cases where there is only partial collapse the diagnosis is often missed until an x-ray of the chest reveals a partial pneumothorax. These cases are frequently diagnosed as pleurisy until an x-ray reveals the condition.

Course.—Some cases develop a small amount of effusion, but this very rarely if ever becomes purulent. There may be a slight febrile reaction for a few days, and until the lung re-expands there is some rapidity of the pulse due to displacement of the heart. The lung rapidly re-expands, sometimes within less than a month, generally within three or four months at the most. Some cases have been reported in which the lung was still collapsed after a period of twelve months or even for several years.

Prognosis is almost uniformly good. Where death has occurred there has been extreme emphysema due to asthma or some allied condition. These are not in the class of cases reported here, as all of these had no obvious previous disease of the lungs. Very few cases are reported as having developed tuberculosis after the attack. Those showing manifest tuberculosis afterwards have generally had manifest tuberculosis at the time of the attack.

Treatment.—At the time of the attack rest in bed and morphine to relieve pain is generally all that is required. Where the dyspnœa and cyanosis is severe it may be necessary to withdraw a certain amount of air. This was not required in any of the cases described below. As a rule no treatment is required to re-expand the lungs. Should the pneumothorax persist without any signs of re-expansion it may be necessary to try aspiration of air.

There is then a benign type of spontaneous pneumothorax occurring in young adults, more frequently in males than females. The attack comes on suddenly in a person apparently previously healthy. After the initial shock and slight febrile reaction the lung gradually expands and no apparent harm is done.

Etiology.—This is somewhat obscure. A certain number of cases are reported in which there has obviously been an emphysematous condition preceding the attack and the pneumothorax has been due to rupture of an emphysematous bleb. These are not included in the type of case discussed here. It seems probable that in some apparently healthy persons a small pleuritic adhesion is torn by some slight unusual exertion and the lung ruptured. This explanation is not altogether satisfactory, as some cases showed complete collapse of the lung with no sign of adhesion. In these cases the pneumothorax is probably caused by the rupture of an isolated emphysematous bleb. A number of the cases, though, show only a partial pneumothorax, the lung being prevented from collapsing by other adhesions. The primary cause of the adhesive pleurisy may, among other things, be due to tuberculosis, and to that extent this type of attack is due to tuberculosis. The following seven cases are reported.

CASE 1

J.A.S., male, aged 42, was first seen on March 6, 1925. Three weeks previously he had had a sudden pain in the right side while eating his evening meal and became quite dyspnœic. He came for examination because of dyspnœa and pain in the side.

Examination showed complete pneumothorax on the right side. The heart was displaced to the left. In June there was only slight re-expansion, and a small quantity of fluid in the pleural cavity. In August, 5 months after the pneumothorax, the lung had completely re-expanded, and there were no signs of fluid. Examined one year later, he had been working steadily; he was a little short of breath on exertion. The lung had completely re-expanded. There was no sign of tuberculosis or other disease.

CASE 2

G.B., male, aged 22, was first seen on March 2, 1931. The onset was 10 days previously with pain in side, fever, and some cough.

Family and personal history were negative .

Examination showed a hyper-resonant left base with diminished breath sounds. The x-ray showed a small pneumothorax at the left base. The lung was about one-third collapsed. The patient was kept at rest for about two months. When examined at the end of two months the lung had completely re-expanded. No sign of tuberculosis. He has remained well since.

CASE 3

Mrs. A., female, aged 30; Japanese. She had had a hysterectomy for cancer of the cervix on July 12, 1931. On the day following the operation she developed acute dyspnœa and pain in right side and could only obtain relief by lying on right side. Her pulse was 140 to 150.

Physical examination showed the whole right side to be hyper-resonant. The breath sounds were very distant, but with definite amphoric quality. The heart was displaced to the left. The diagnosis was spontaneous pneumothorax. This was confirmed afterwards by x-ray, which showed almost complete collapse of the right lung. The patient rapidly improved; dyspnœa disappeared in a few days. She left hospital 4 weeks after operation and 3 weeks afterwards the fluoroscope showed the lung to be completely expanded. She has remained well since; no sign of tuberculosis.

CASE 4

H.W.G., male, aged 38, a returned soldier. The history was that in 1916 he had had a shrapnel wound of the left side followed by pleurisy and some effusion. He had been quite well since the war and had been working steadily. On July 5, 1931, while swimming, he took a back dive and immediately felt acute pain in the right side followed by shortness of breath. There was no rise of temperature or pulse, but he had a slight rasping cough. An x-ray of the chest showed definite localized pneumothorax of the lower lobe of the right lung. The x-ray also showed some old shrapnel in the lower lobe of the left lung and slight adhesive pleurisy. Fluoroscopic examination, two weeks after, showed small pneumothorax and a small amount of fluid. One week later the fluid had disappeared and the lung had almost re-expanded. Four weeks after the accident he was back at work. The x-ray showed the lung to be well expanded and no sign of pneumothorax. The patient remained well and was working ever since. No sign of tuberculosis.

CASE 5

B.G., female, aged 22. Her brother had had enlarged glands in neck, and her sister had had glands removed. Twelve years ago she was said to have had dry pleurisy on the right side, but had been in good health since.

On July 24, 1931, while swimming, she took a sudden acute pain in the right side, and was very dyspnœic for 4 or 5 days, but with no temperature. X-ray showed pneumothorax of right side, with the lung about two-thirds collapsed. She was kept in bed for two months, and gained in weight. X-ray, September 11, 1931, showed the lung to be fully re-expanded and there was no sign of lung disease. The patient was kept under observation and on modified rest treatment.

March, 1932, eight months after the first pneumothorax, the patient developed a sharp pain in the left side with shortness of breath. There was no rise of temperature. On examination the pulse was 80, temperature 96°; the breath sounds were diminished over the left side with hyper-resonance. X-ray showed pneumothorax of the left lung with collapse of the upper two-third of that lung. Within a month fluoroscopic and physical examination showed the left lung to be well re-expanded and no sign of lung disease. She was on modified rest treatment all summer.

She reported in September, 1932, weight 118½ pounds (a loss of 4 pounds in three months). An x-ray plate now showed in the mid-mediastinum on both sides definite shadows extending into the parenchyma of the lung, more marked on the right side than on the left. The shadows were well marked, somewhat rounded, and the size of a plum. A diagnosis of mediastinal tuberculosis was made, and the patient put on absolute bed-rest. During the winter of 1932-33 she improved rapidly, gaining seven pounds in weight, and the mediastinal shadows gradually receded.

Re-examined in October, 1933. Her general health was excellent. X-ray of chest showed some slight striated mottling in mid-mediastinum — otherwise no disease.

This is a case of recurrent spontaneous pneumothorax occurring first in the right thorax and then in the left, afterwards developing definite symptoms of mediastinal tuberculosis. In this patient there is a family history suspicious of tuberculosis, and a history of right-sided pleurisy some years before the attack of pneumothorax.

CASE 6

P.W., male, aged 30. There was no family history of tuberculosis and no history of previous serious illness. He was at work scrubbing floors when he felt a sudden pain in the back and right side; a little short of breath. He had some pain in the side for two days and because of this reported to Dr. Eggert on September 1, 1933.

X-ray showed a small spontaneous pneumothorax on the right side. Except for shortness of breath the patient suffered no inconvenience. The lung re-expanded rapidly. An x-ray, taken one month after the attack, showed no sign of pneumothorax and no lung disease. The general health of the patient was excellent.

CASE 7

Mrs. J.W., aged 24 (reported through courtesy of Dr. Trites and Dr. Strong), was admitted to Vancouver General Hospital in May, 1933, because of uterine hæmorrhage and a mass in the pelvis. Laparotomy was performed for removal of a cystic ovary, and curettage. Her previous history was negative as to any lung disease or tuberculosis.

Immediately following laparotomy under intratracheal anæsthesia, she complained of some pain over the heart, and her pulse rate went up over 100. Next day she was definitely dyspnœic and slightly cyanosed, and the heart was found to be displaced to the right, and the physical signs of pneumothorax on the left side. This diagnosis was confirmed by x-ray, which showed the left lung to be well collapsed. She had considerable distress (pain, dyspnœa) for three days. The temperature rose to 101° on the first day, but returned to normal in three days. The pulse went as high as 124 for about the same period. The symptoms gradually subsided and

the patient was discharged after fifteen days in hospital. The lung was almost completely re-expanded on discharge. There were signs of a small pleural effusion for a few days. At present she is apparently well; no signs of pulmonary tuberculosis.

SUMMARY

Seven cases of spontaneous pneumothorax are reported, occurring in apparently healthy adults, all of whom recovered, and, with the exception of one case, showed no apparent lung disease after complete re-expansion of the lung

Four were males and 3 females, a larger proportion of females than usually.

Five occurred between the ages of 20 and 30; two between the ages of 30 and 40.

Only one patient had a history suggestive of previous tuberculous pleurisy, and this one, after two attacks of pneumothorax, developed definite clinical symptoms of tuberculosis. This is one case out of five that have been under more or less observation for two years or over. Two have been under observation less than six months, and it is too early to be certain that no tuberculosis will develop.

Four showed almost complete collapse of the affected lung; in the other three there was only a partial collapse of the lower lobes.

Complete re-expansion of the lung occurred in all without any special treatment. In five the re-expansion was complete within one month; in one, within 10 days. One took two months, and one which had the most complete collapse of any took five months. A small amount of pleuritic fluid was demonstrated in three cases a few days after the attack. A slight rise of temperature followed in practically all cases.

The symptoms of pain, dyspnœa and some collapse varied with the degree of pneumothorax.

In the cases of complete collapse the diagnosis by physical examination was fairly easy, but where the pneumothorax was small and localized the condition was generally diagnosed as acute pleurisy until an x-ray of the chest showed the true condition.

The two cases reported following anæsthesia for laparotomy raise the question if this accident does not occur more frequently following operations than has been recognized. These cases were complete and easily recognized, but the small partial pneumothoraces could be easily overlooked unless an x-ray of the chest were taken shortly after the accident occurred. In the literature available there is no report of similar cases occurring after operation.

Symptomatic treatment at the time of the accident, to relieve pain and distress, followed by rest in bed until the lung has re-expanded or nearly re-expanded is apparently all that is indicated.

CONCLUSIONS

Spontaneous pneumothorax is an accident that may occur in apparently healthy persons.

It is probably caused by some slight exertion sufficient to tear an old pleuritic adhesion, which makes a small rupture in the lung tissue. Probably pleuritic adhesions, especially the slighter ones, are ruptured quite often by violent respiratory efforts, but only rarely do they tear through to the parietal pleura and rupture the lung.

Spontaneous pneumothorax may occur as an accidental complication after anæsthesia.

In the absence of other definite evidence of tuberculosis the type of case referred to here should not be considered as tuberculous, but should be considered as a tuberculous "suspect" and re-examined at intervals for at least a year.

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"ANACIDITY"; A PROTEST.—Dr. F. J. Allen writes: The word "anacidity" should not be allowed to pass into general use without at least a protest from some of our profession, even though the protest be ineffective (or aneffective, as some may prefer to say). The proper word is, of course, "inacidity." Scientific authors of linguistic howlers are not slow to ridicule parallel cases where the unscientific writer flounders in the use of scientific terms. There is no need for the commission of such barbarisms as "anacidity." Everyone who wants to launch a new term should consult a specialist in etymology. If this had been done in the past the medical profession would have been saved from the stigma of inventing such terms as "anoci-association" (for innocu-association), "chemo-taxis" (for chemiotaxis), and "ptomaine" (for ptomatine or ptomine).—*Brit. M. J.*, 1933, **2**: 404.

[To which we might add "appendectomy", "bacteræmia," and "urinalysis." ED.]