

fills with blood. Coughing is usually induced. There may be only an ounce or so brought up before the bleeding stops, or the bleeding may continue for days, the patient bringing up small quantities. In other instances, particularly when a large vessel is eroded or an aneurism bursts, the amount is large, and the patient after a few attempts at coughing shows signs of suffocation and death is produced by inundation of the bronchial system. Fatal hæmorrhage may even occur into a large cavity in a patient debilitated by phthisis without the production of hæmoptysis. I dissected a case of this kind at the Philadelphia Hospital. The blood from the lungs generally has characters which render it readily distinguishable from the blood which is vomited. It is alkaline in reaction, frothy, and mixed with mucus, and when coagulation occurs air-bubbles are present in the clot. Blood-moulds of the smaller bronchi are sometimes seen. Patients can usually tell whether the blood has been brought up by coughing or by vomiting, and in a majority of cases the history gives important indications. In paroxysmal hæmoptysis connected with menstrual disturbances the practitioner should see that the blood is actually coughed up, since deception may be practised. Naturally, the patient is at first alarmed at the occurrence of bleeding, but, unless very profuse, as when due to rupture of an aortic aneurism in a pulmonary cavity, the danger is rarely immediate. The attacks, however, are apt to recur for a few days and the sputa may remain blood-tinged for a longer period. In the great majority of cases the hæmorrhage ceases spontaneously. It should be remembered that some of the blood may be swallowed and produce vomiting, and, after a day or two, the stools may be dark in color. It is not well during an attack of hæmoptysis to examine the chest. It was formerly thought that hæmorrhage exercised a prejudicial effect and excited inflammation of the lungs, but this is not often the case.

(2) *Pulmonary Apoplexy; Hæmorrhagic Infarct.*—In this condition the blood is effused into the air-cells and interstitial tissue. It is rarely indeed diffuse, breaking the parenchyma as the brain tissue is broken in cerebral apoplexy. Sometimes, in disease of the brain, in septic conditions, and in the malignant forms of fevers, the lung tissue is uniformly infiltrated with blood and has, on section, a black, gelatinous appearance.

As a rule, the hæmorrhage is limited and results from the blocking of a branch of the pulmonary artery either by a thrombus or an embolus. The condition is most common in chronic heart-disease. Although the pulmonary arteries are terminal ones, blocking is not always followed by infarction; partly because the wide capillaries furnish sufficient anastomosis, and partly because the bronchial vessels may keep up the circulation. The infarctions are chiefly at the periphery of the lung, usually wedge-shaped, with the base of the wedge toward the surface. When recent, they are dark in color, hard and firm, and look on section like an ordinary blood-clot. Gradual changes go on, and the color becomes a reddish brown. The pleura over an infarct is usually inflamed. A mi-

croscopical section shows the air-cells to be distended with red blood-corpuscles, which may also be in the alveolar walls. The infarcts are usually multiple and vary in size from a walnut to an orange. Very large ones may involve the greater part of a lobe. In the artery passing to the affected territory a thrombus or an embolus is found. The globular thrombi, formed in the right auricular appendix, play an important part in the production of hæmorrhagic infarction. In many cases the source of the embolus cannot be discovered, and the infarct may have resulted from thrombosis in the pulmonary artery, but, as before mentioned, it is not infrequent to find total obstruction of a large branch of a pulmonary artery without hæmorrhage into the corresponding lung area. The further history of an infarction is variable. It is possible that in some instances the circulation is re-established and the blood removed. More commonly, if the patient lives, the usual changes go on in the extravasated blood and ultimately a pigmented, puckered, fibroid patch results. Sloughing may occur with the formation of a cavity. Occasionally gangrene results. In a case at the University Hospital, Philadelphia, a gangrenous infarct ruptured and produced fatal pneumothorax.

The *symptoms* of pulmonary apoplexy are by no means definite. The condition may be suspected in chronic heart-disease when hæmoptysis occurs, particularly in mitral stenosis, but the bleeding may be due to the extreme engorgement. When the infarcts are very large, and particularly in the lower lobe, in which they most commonly occur, there may be signs of consolidation with blowing breathing.

**Treatment of Pulmonary Hæmorrhage.**—In the treatment of hæmoptysis it is important to remember the condition of the pulmonary circulation and the nature of the lesions associated with the hæmorrhage.

The pressure within the pulmonary artery is considerably less than that in the aortic system. We have as yet very imperfect knowledge of the circumstances which influence the lesser circulation in man. Researches, particularly those of Bradford, indicate that the system is under vaso-motor control, but our knowledge of the mutual relations of pressure in the aorta and in the pulmonary artery, under varying conditions, is still very imperfect. Experiments with drugs seem to show that there may be an influence on systemic blood-pressure without any on the pulmonary, and the pressure in the one may rise while it falls in the other, or it may rise and fall in both together. In Andrew's Harveian Oration these relations are thoroughly described, and a statement is made, based on Bradford's experiments, as to the action on the pulmonary blood-pressure of many of the drugs employed in hæmoptysis. Thus ergot, the remedy perhaps most commonly used, causes a distinct rise in the pulmonary blood-pressure, while aconite produces a definite fall.

The anatomical condition in hæmoptysis is either hyperæmia of the bronchial mucosa (or of the lung tissue) or a perforated artery. In the



latter case the patient often passes rapidly beyond treatment, though there are instances of the most profuse hæmorrhage which must have come from a perforated artery or a ruptured aneurism in which recovery has occurred. Practically, for treatment, we should separate these cases, as the remedies which would be applicable in a case of congested and bleeding mucosa would be as much out of place in a case of hæmorrhage from ruptured aneurism as in a cut radial artery. When the blood is brought up in quantities—in mouthfuls at a time—it is almost certain either that an aneurism has ruptured or a vessel has been eroded. In the instances in which the sputa are blood-tinged or when the blood is in smaller quantities, bleeding comes by diapedesis from hyperæmic vessels. In such cases the hæmorrhage may be beneficial in relieving the congested blood-vessels.

The indications are to reduce the frequency of the heart-beats and to lower the blood-pressure. By far the most important measure is absolute quiet of body, such as can only be secured by rest in bed and seclusion. In the majority of cases of mild hæmoptysis this is sufficient. Even when the patient insists upon going about, the bleeding may stop spontaneously. The diet should be light and unstimulating. Alcohol should not be used. The patient may, if he wishes, have ice to suck. Small doses of aromatic sulphuric acid may be given, but unless the bleeding is protracted styptic and astringent medicines are not indicated. For cough, which is always present and disturbing, opium should be freely given, and is of all medicines most serviceable in hæmoptysis. Digitalis should not be used, as it raises the blood-pressure in the pulmonary artery. Aconite, as it lowers the pressure, may be used when there is much vascular excitement. Ergot, tannic acid, and lead, which are so much employed, have, I believe, little or no influence in hæmoptysis. Ergot, according to Bradford, produces distinct rise in the pulmonary blood-pressure. One of the most satisfactory means of lowering the blood-pressure is purgation, and when the bleeding is protracted salts may be freely given. In profuse hæmoptysis, such as comes from erosion of an artery or the rupture of an aneurism, a fatal result is common, and yet post-mortem evidence shows that thrombosis may occur with healing in a rupture of considerable size. The fainting induced by the loss of blood is probably the most efficient means of promoting thrombosis, and it was on this principle that formerly patients were bled from the arm, or from both arms, as in the case of Laurence Sterne. Ligatures, or Esmarch's bandages, placed around the legs may serve temporarily to check the bleeding. The ice-bag on the sternum is of doubtful utility. In a protracted case Cayley induced pneumothorax, but without effect.

Briefly, then, we may say that cases of hæmorrhage from rupture of aneurism or erosion of a blood-vessel usually prove fatal. The fainting induced by the loss of blood is beneficial, and, if the patient can be kept alive for twenty-four hours, a thrombus of sufficient strength to prevent further bleeding may form. The chief danger is the inundation of the

bronchial system with the blood, so that while the hæmorrhage is profuse the cough should be encouraged. Opium should not then be used, and stimulants should be given with caution.

In the other group, in which the hæmorrhage comes from a congested area and is limited, the patient gets well if kept absolutely quiet, and fatal hæmorrhage probably never occurs from this source. Rest, reduction of the blood-pressure by minimum diet, purging, if necessary, and the administration of opium to allay the cough are the main indications.

## II. PNEUMONIA

(Lobar, Croupous, or Fibrinous Pneumonia; Pneumonitis; Lung Fever).

**Definition.**—An infectious disease characterized by inflammation of the lungs and constitutional disturbance of varying intensity. The fever terminates abruptly by crisis. Secondary infective processes are common. An organism, the *diplococcus pneumoniae*, is invariably found in the diseased lung.

**Etiology.**—Pneumonia is one of the most wide-spread of acute diseases. Hospital statistics show that the ratio to other admissions is in the proportion of twenty to thirty per thousand.

It prevails at all ages. Children are quite as susceptible to it as adults, and it is the special enemy of old age. Males are more frequently affected than females. Dwellers in cities and persons whose occupations are associated with exposure, hardship, and cold are most liable to the disease. Contrary to the general rule in infectious diseases, newcomers and immigrants seem less susceptible than the native inhabitants. Debilitating causes of all sorts render individuals more susceptible. Alcoholism is perhaps the most potent predisposing factor. Persons weakened by disease are especially prone to it; thus we find many cases in connection with chronic Bright's disease, diabetes, the chronic affections of the nervous system, and protracted fevers. One important predisposing cause is a previous attack. No acute disease recurs with such frequency. Instances are on record of individuals who have had ten or more attacks.

Climate does not appear to have much influence. The disease prevails equally in cold and in hot countries, but it is stated that on this continent it is more prevalent in the Southern than in the Northern States. More important is the influence of season. Statistics everywhere show that more persons are attacked from December to May than in the summer and autumn. Seitz's large statistics of 5,905 cases in Munich give 32 per cent in winter, 36·8 per cent in spring, 15·3 per cent in summer, and 15·7 per cent in autumn. Bell's statistics of the Montreal General Hospital show practically the same distribution, but it is worth noting that during January, the coldest month of the year, in which the mean temperature for ten years was 13·75° F., the percentage was compara-