

stimulated by friction with the hands. Diluted enemata of brandy and ammonia are also serviceable. All stimulating efforts must cease as soon as reaction returns. Should inflammation set in, the ordinary antiphlogistic treatment, previously referred to, will be necessary.

CHAPTER XI.

LOSS OF CONSCIOUSNESS—(CONTINUED).

SYNCOPE.

Syncope from Hæmorrhage.—Thrombi in the Pulmonary Vein.—Anæmia.—Mental Emotion.—Blows on the Epigastrium.—Collapse.

THE normal performance of every function depends on an adequate supply of healthy blood. The delicate machinery ceases when the proportion to each part is not commensurate with its demands.

The continuous pulsatory movements of the heart propel the blood into the vessels which carry it to all parts of the body. A partial or complete cessation of the action produces a condition known as syncope, or fainting. This is characterized by unconsciousness, and by suspension of the powers of volition.

The regular contractions of the heart depend upon several conditions: 1. A sufficient and regular supply of blood, which exercises a stimulating effect on its fibres; 2. A normal proportion of the necessary ingredients in the circulating fluid; 3. A healthy state of the brain and of the nerves and sympathetic ganglia which supply the heart; 4. A special irritability possessed by the muscular fibres, which causes its contractions to continue even when all connection

with the body has been severed, and the extraneous sources of stimulation removed.

This innate power is, for want of a better name, denominated irritability. Of its nature we are totally ignorant. In cold-blooded animals it is particularly noticeable. Any morbid change, which directly or indirectly disturbs the conditions spoken of, is liable to induce syncope.

Syncope is produced by excessive hæmorrhage. This, however, when not too prolonged, is rather of benefit than otherwise. The cessation in the movements of the heart allows the blood to coagulate in the bleeding vessels, and prevents the possibility of hæmorrhage when the circulation is renewed.

Thrombi in the pulmonary vein causes fatal syncope by preventing the blood from passing through the lungs to the left side of the heart, and by producing distention of the right auricle and ventricle.

Syncope arising from a deficiency in the ordinary stimulating ingredients of the blood is witnessed sometimes in anæmia, and in chlorosis. In these diseases the watery portions of the blood are increased, the red corpuscles are diminished, the circulation being at all times exceedingly feeble. In leucocythæmia, where there is a very great excess of white corpuscles, and in phthisis, where there is much general deterioration of the blood, sudden failure of the heart's action is likely to occur after rapid exertion.

Syncope likewise results from mental emotions, such as sudden joy, anger, grief, etc. These act in some peculiar and unknown manner upon the nerves of the heart, suspending their influence. In some cases the emotion has been so great as to destroy life.

Anæmia of the brain and concussion are attended with syncope. Blows on the epigastrium may injure the solar plexus, and cause a fatal reflex paralysis of the heart. The cases of sudden death from drinking cold water while perspiring are similarly accounted for.

Sedatives may induce syncope if the doses are large or too frequently repeated. The majority of sedatives, such as tobacco, colchicum, antimony, prussic acid, etc., act by diminishing the nerve-force. Some consider that digitalis acts on the heart as a tonic, and not as a sedative. It is hard to harmonize with this theory the authenticated cases of syncope, or collapse, following its use in the usual medicinal doses.

Chloroform, when administered to debilitated individuals, may act directly upon the nerves of the heart, and cause paralysis of that organ. Chloroform usually kills by acting through the lungs and producing asphyxia, or through the brain, causing coma.

Severe burns, crushed limbs, surgical operations, etc., are sometimes followed by sudden partial suspension of the functions of the nervous system, and diminished action of the heart, which is commonly known as shock or collapse. Although in many essential points resembling ordinary syncope, there are important differences which distinguish them. The duration of syncope is more brief. The patient either dies suddenly or recovers rapidly. Collapse is prolonged. Syncope is attended with unconsciousness and loss of voluntary motion. In collapse the patient is not completely insensible, the mind is to a certain extent clear, and the power of voluntary movement remains.

Other varieties of syncope arise from disease of the heart or its coverings. Among them are fatty degeneration

of the muscular fibres, angina pectoris, and pericarditis, with effusion.

Persons of delicate frame and sensitive nervous organizations are most subject to syncope. Women are affected more frequently than men. Feeble women, with uterine disorders, will faint from slight injury, or any unusual mental excitement.

The symptoms of syncope are clearly marked. The patient is conscious of a sinking sensation in the epigastric region, and about the heart. There are dizziness, dimness of vision, and ringing in the ears (*tinnitus aurium*). The features are pinched, and the lips and cheeks are pale and cold. The pulse, at first small and fluttering, is at last imperceptible. An impulse can scarcely be recognized in the præcordial region. There is also partial or complete unconsciousness. Respiratory movements may cease altogether, or a spasmodic, irregular sighing is present.

The attack lasts from a few seconds to two or three minutes. It is very rarely prolonged beyond two minutes. Resuscitation would not be possible if the heart's pulsations were absent for five minutes (*Walsh*).

Recovery is announced by attempts at swallowing, by sighing, movements of the body, restoration of warmth and color to the cheeks, and a return of the radial pulse. In some cases the attack may terminate with nausea and vomiting.

Although in most cases syncope is easy of recognition, mistakes are sometimes made and erroneous opinions given. It is therefore well to consider the morbid states for which it may be mistaken.

There is a class of persons called *malingersers*, who, from

sordid or other motives, feign various forms of illness, and syncope is sometimes simulated. Prostitutes or disorderly characters, in order to escape detention in the station-house, or a subsequent visit to Blackwell's Island, work on the sympathies of the police official, until a carriage is ordered, and they are conducted to the hospital. Once there, unless the doctor in attendance is particularly disgusted with the performance, the patient will likely be discharged the next day without trouble. These cases are readily recognized by the fact that the pulse is beating with its accustomed fullness and regularity, that the temperature of the body is normal, and that an announcement of an intention to draw blood from the arm, or shave the head and apply ice, is followed by an avowal of the patient that she is much better, and will not require further treatment.

Ordinary syncope is readily distinguished from hysterical stupor by the fact that the patient has not lost consciousness, nor is the action of the heart or pulse specially altered.

Poisoning from carbonic acid gives a dark, livid color to the countenance, the insensibility is continuous, and the pulse can be felt in the wrist. Poisoning from urea, or Bright's disease, is diagnosed by the accompanying dropsical swelling of the lower limbs, urinous odor, and the presence of casts and albumen in the urine.

A person in a state of deep syncope may be considered dead, but if the characteristic signs of death are understood, little difficulty will be experienced in making a correct diagnosis. (*See article on Asphyxia, page 147.*)

Treatment.—In mild cases, where the patient is only partially unconscious, stimulating inhalations of eau-de-cologne, vapor of ammonia, sprinkling the head and face

with cold water, or placing the patient in a cold draught of air, will suffice to restore sensibility.

Where there is complete unconsciousness, more urgent measures will be necessary. In all cases, the patient should be placed in the recumbent position, with the head lower than the shoulders. This is done in order that the blood flowing toward the cerebrum may have the assistance of gravitation, and also to accelerate the current travelling from the lower extremities toward the heart. All superfluous clothing should be removed from the chest and throat. Collars, neck-ties, and other articles which constrict the neck, hinder recovery. The stimulating inhalations of ammonia, etc., are of little avail in complete syncope, for there is scarcely any respiratory movement; the nostrils, however, may be moistened with the liquid. Cold water, thrown violently in the face, or sprinkled forcibly on the chest, striking the palms of the hands, and rubbing them rapidly, are efficacious in all cases. An efficient remedy is to dip a plate in hot water and place it over the epigastric or præcordial regions; either place will answer. All these methods may be combined in the treatment of individual cases. Should they fail, galvanism may be carefully tried. Too much is worse than too little. One pole of the battery may be placed at the upper part of the spinal column, and the other moved up and down over the sternum and præcordia. The poles may also be applied along the course of the spinal accessory nerve. The action of the heart has in some cases been renewed by exciting the spinal accessory and the four upper cervical nerves (*Valentin*).

The treatment of syncope resulting from excessive hæmorrhage has been discussed in a preceding chapter.

CHAPTER XII.

ASPHYXIA.

Respiratory Apparatus.—Effects of Non-aëration of Blood.—Strangulation.—Compression of Thorax.—Inhalation of Poisonous Gases.—Signs of Death.—Drowning.

THE pathological changes arising from defective aëration will be better understood if we glance briefly at the processes which regulate the supply of oxygen, and the elimination of carbonic acid. To describe in detail these important phenomena would lead us beyond the prescribed limit of this work. We must confine our attention to such as have a special bearing upon the morbid actions in question.

The respiratory apparatus comprises the larynx, trachea, bronchi, and lungs. The lungs, the heart, and great vessels, are contained within the cavity of the thorax or chest. A large, flat muscle, called the diaphragm, forms the floor of this cavity and separates it from the abdomen. Each lung is composed of bronchial tubes, air-cells, vessels, and nerves. The bronchial tubes commence at the termination of the trachea. They divide and subdivide, becoming smaller as they pass in, until they terminate with a diameter of $\frac{1}{10}$ of an inch in the intercellular passages or bronchioles. Around these passages and terminal bronchi, the air-cells are clustered in a manner similar to the arrangement of "leaves on a