

depends on the amount of blood lost. If there be much exhaustion, the usual stimulants, together with small doses of opium, may be given; and, as a last resort to save from impending death, the operation of transfusion, referred to in a former chapter, may be employed. Injections of hot water have also been employed with great advantage.

CHAPTER IV.

WOUNDS OF IMPORTANT ORGANS.

Wounds of the Throat, Lungs, Pericardium, Heart, Abdomen, Intestines, Bladder, Perineum, Joints, Arteries, Veins.—Perineal Section.—Paracentesis, Thoracis.—Gunshot Wounds, etc.

WOUNDS of the throat vary in extent, from simple incision of the integument to complete severance of the larynx, trachea, and œsophagus. They are inflicted with razors or other sharp cutting instruments, and are usually the result of attempted self-murder. The upper part of the throat seems to be the point of selection in these cases: rarely is the cut made at the lower portion. The carotid artery and jugular vein are thus saved, and a better chance of recovery given to the patient.

In the majority of wounds of the throat an opening is made into the air-passages. The most common seat of these wounds is between the thyroid cartilage and hyoid bone, and over the larynx. In the former the thyro-hyoid membrane is cut through; the epiglottis may be cut off, or injured so as to seriously affect the power of swallowing. The food may pass without hinderance into the larynx and out of the external opening, as the epiglottis is not in place to prevent it, or is in a semi-paralytic condition from the injury, and fails to appreciate, or prevent the passage of the food down the wrong canal. The appearance of food in the

wound is therefore not a positive indication of injury to the cesophagus.

Wounds inflicted on the side of the neck may cut the pneumogastric or phrenic nerves. In such cases there is interference with the respiratory movements, and subsequent congestion of the lungs, which may ultimately destroy life, independent of any other complications. Wounds of the back of the neck, unless implicating the spinal cord, are not fatal. Some authorities say that they are followed by paralysis of the lower limbs and loss of sexual power; this is doubtful.

Wounds inflicted between the lower jaw and hyoid bone are the least dangerous of anterior wounds, although they are sometimes attended with great hæmorrhage and with difficulty in swallowing (dysphagia).

The danger and causes of death in wounds of the throat are: 1. Hæmorrhage; 2. Asphyxia. 3. Inflammation of the air-passages and lungs, as laryngitis, bronchitis, and pneumonia. 4. Nervous depression and starvation.

The principal danger is from excessive bleeding. Bleeding may be profuse even in superficial wounds. The blood from the numerous plexuses of veins in front of the neck and around the thyroid gland may flow in sufficient quantity to destroy life. When the large vessels, such as the carotid arteries or jugular veins, are cut, death occurs in a few moments.

Secondary hæmorrhage not unfrequently takes place from sloughing of the walls of the vessels, between the tenth and the twentieth day.

Asphyxia may arise from infiltration of serum into the mucous membrane of the larynx at its upper part (*œdema*

glottidis), or from blood flowing down into the air-passages. Internal hæmorrhage may go on slowly for some time without attracting special attention, the shock of the injury and deficient aëration of the blood benumbing the sensibility of the mucous membrane.

Laryngitis may occur from extension of inflammation from surrounding parts, or directly from a wound of the larynx. The most dangerous inflammations are bronchitis and pneumonia. These complications arise principally from the inhalation of cold air through the opening in the throat. In ordinary breathing, the air is heated by passing through the nose, and thus loses its irritating qualities.

In all suicidal attempts upon life, there is extreme mental depression, which tends to prevent recovery.

Treatment.—As the great danger arises from loss of blood, the first efforts are directed to suppress the flow. This is accomplished either by means of *pressure*, or with the *ligature*. If the bleeding vessel cannot be reached in the wound, sufficient pressure may be made to stop the hæmorrhage, while the upper or lower portions of the wound are enlarged and the vessel searched for. Should it not be found, and the hæmorrhage be still threatening, the carotid arteries must be tied. If the wound does not implicate the air-passages, the edges may be drawn together with strips of adhesive plaster. In doing this, care should be taken to leave an opening for the discharges from the wound. The cellular tissue of the neck is very loose, and, unless this be done, pus and other inflammatory products will burrow at the base of the neck, between the muscles and vessels, and produce serious trouble. The same rule holds good when the wound extends into the air-passages. No attempt

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should be made to close the aperture for several hours, or until all danger from hæmorrhage has passed away. Even then the central portion of the wound should remain unclosed for the exit of the subsequent discharges. In closing the wound and preventing gaping, the head should be flexed on the neck, and retained there by means of bandages passed over the head and under the arms. Cloths wet with cold water may then be applied to lessen inflammation. If there is venous oozing in the canal, a large tube may be introduced, and pressure made by plugging around it (*Ericsson*).

When the œsophagus is wounded, the patient can be fed through the opening by means of a flexible catheter, or the tube of an ordinary stomach-pump. I have found the latter to be much better for the purpose than the catheter, as a larger quantity of food can be introduced in a given space of time, and the wound therefore sooner relieved from the presence of an irritating substance.

Patients should always be removed to a very warm room, with a temperature of from 80 to 85° Fahr. Stimulants, and nourishing diet, in the shape of beef-tea or chicken-broth, should be freely administered.

WOUNDS OF THE THORAX, LUNGS, ETC.—Non-penetrating wounds of the thorax are treated like simple wounds in other parts of the body. They do not require consideration here.

Penetrating wounds may involve the internal mammary and intercostal arteries, the pleura, lungs, heart, and great vessels, either alone or collectively. When the internal mammary artery is cut, the blood flows slowly into the anterior mediastinum, or into one or the other pleural cavities. It is diagnosed by the location of the wound and the grad-

ual development of syncope consequent upon the loss of blood.

The protection afforded to the intercostal vessels, by the long groove in which they run, happily prevents them from being wounded, except in very rare instances. In wounds of these vessels, the hæmorrhage may take place in the cavities of the pleura, underneath the muscles and fascia of the chest, or escape internally. The immediate danger to life is not very great, but the utmost difficulty in suppressing the hæmorrhage is commonly experienced.

Penetrating wounds of the chest, without injury to the lungs, are exceptional. Injury to the lungs may be excluded, if there is no expectoration of blood, or hæmorrhage from the wound. If the hole is large, sufficient air may pass into the cavity of the pleura to compress the lung and completely destroy its action. In such a case, death may ensue.

The most dangerous wounds of the lung are produced by bullets. Foreign bodies in the delicate structures of the lung cause great irritation, and more inflammation than simple laceration would. They are not, however, necessarily fatal. Many instances are on record of foreign bodies remaining embedded in the lung-substance for years, without interfering specially with respiration. In the summer of 1868, I made a *post-mortem* examination on the body of Major D.—, an old Mexican veteran who had received a gunshot-wound twenty years before. In the upper portion of the left lung was embedded a large, old-fashioned musket-bullet, completely encysted. The lung was about one-quarter its original size, and was carnified around the projectile. The major had enjoyed comparatively good health, notwithstand-

ing its presence. He, strangely enough, supposed that the bullet was in the lung of the opposite side, and his friends were of the same opinion.

The signs of a wound of the lung are plain and well marked. There is great difficulty in breathing (*dyspnœa*), expectoration of blood (*hæmoptysis*), and of red, frothy mucus from the air-passages, and emphysema. There may or may not be hæmorrhage from the external opening. On auscultation, small moist râles may be heard near the seat of injury. The patient's face is pallid and anxious, and the pulse small and rapid. In some cases the bleeding goes on inside the chest, until the lung is compressed by it, and signs of syncope show themselves. Internal hæmorrhage may be diagnosed by the increased paleness of the countenance, flickering pulse, vertigo, and dimness of vision, increased dulness over the affected side, absence of the respiratory murmur. If the blood be poured out to any extent in the parenchyma of the lung, there will be dulness on percussion near the wound, and bronchial breathing.

The passage of air into the cellular tissue (*emphysema*) is a common accompaniment of wounds of the lung. It may occur when a part of the lung-tissue is ruptured by pressure on the chest-walls, or penetrated by the broken end of a rib, independent of any external wound. When it proceeds from rupture of the vesicles alone, and extends to the surface, its usual course is through the cellular tissue of the posterior mediastinum up to the neck, whence it travels to other parts of the body. A case of this kind came under my care in Bellevue Hospital, in a patient whose chest had been severely injured by a derrick. The ribs were not, however, broken. In a few hours after ad-

mission to the ward, emphysema manifested itself, and spread slowly over the neck and face, and finally involved the thorax and abdomen. The face, arms, and trunk, became distended to an extreme degree. He suffered greatly from pain and difficult respiration. There was some expectoration of a reddish-colored, tenacious mucus, circumscribed bronchial breathing over the left lung, near the apex, a hot skin and rapid pulse, with other indications of pneumonic inflammation. It was regarded as a hopeless case. In ten days from the time of admission, the emphysema diminished rapidly, and, at the end of three weeks, no trace of it was present. The patient was discharged cured.

In wounds which open externally, the air is drawn in with each inspiration, and forced out during expiration, some of it passing into the cellular tissue. It may remain localized near the wound, or it may extend gradually to other parts. Emphysema is always recognized by the elasticity of the swelling, and by the peculiar crackling, crepitant sensation, communicated to the fingers on pressure.

The air, instead of passing out into the cellular tissue, may accumulate in the pleural cavity, giving rise to *pneumothorax*. In certain cases of hæmorrhage, this has a salutary rather than an injurious effect, as the compression of the lungs will stop the flow of blood.

PNEUMOCELE, or hernia of the lung, may take place before the external wound heals, or after it is entirely closed. When protruded through the wound, it may be pushed partly back, and the aperture closed by a compress. Some cases of pneumocele have been treated by cutting, and by strangulating the extruded portion. If the hernia be a

remote result of the wound, and covered by the integument, all that is necessary is to protect it by a hollow pad.

Treatment.—When the intercostal arteries are wounded, they may be either compressed or ligated. Ligation is almost impossible. The best method is to fasten a piece of sponge to a ligature and force it through the wound into the cavity of the chest, and then draw it partially outward so as to make it press directly upon the arteries (*Poland*). Digital compression, kept up by relays of assistants, has in some cases been effectual. Some recommend passing a silk or wire ligature around the rib, drawing tightly, and thus closing the wounded vessel. See APPENDIX.

Others close the external wound, and allow the blood to escape into the cavity of the chest. A large quantity of blood may be lost in this way, but not enough to destroy life.

Wounds of the internal mammary arteries are more difficult to reach than the preceding. Pressure may be tried, in the manner described above. If it do not succeed, ligation may be resorted to. This operation is usually performed at some point above the fourth interspace; below this point, the operation cannot succeed.

The method of ligating the artery is described by Dr. Poland* as follows: "An incision is made two inches in length along the side of the sternum, and in an oblique direction, from above downward, and from without inward, forming with the axis of the body an angle of forty-five degrees: the centre of the incision to be three or four lines from the border of the sternum.

"Having divided the skin, cellular tissue, and origin of the pectoralis major muscle, the intercostal space is brought

* Holmes's Surgery, article Wounds.

into view; the intercostal muscle is now carefully divided upon a director, and the edge drawn apart by retractors, and the arteries exposed."

IN WOUNDS OF THE LUNG an attempt must be made to control the hæmorrhage by internal medication. Small doses of acetate of lead, sulphuric acid, alum, or other astringents, may be given. Ice applied externally is always of service. Should the blood accumulate in the interior, it must be removed. If it does not flow out by changing the position of the patient, a cupping-glass may be placed over the aperture, and the fluid started in this way. Of course, this procedure should not be instituted while any danger of further hæmorrhage remains. Some prefer enlarging the external wound, while others allow it to heal, and afterward perform *paracentesis thoracis*.

This operation is usually made posteriorly near the angle of the scapula, between the seventh and eighth ribs. The best instrument to employ is a small trochar and canula. When the point of opening is selected, the integument is incised with a scalpel, and the trochar introduced. As the stylet is withdrawn, the patient should be turned over on the affected side, and firm pressure made on the thoracic walls. In this way there is little danger of air entering the cavity. Dr. Bowditch, of Boston, uses a suction apparatus to prevent air from passing in, and to assist in evacuating the liquid. Dieulafoy's aspirator answers all purposes.

When the hæmorrhage has ceased, the external wound is thoroughly closed, and the lips held together by adhesive plaster. Simple water-dressings, dipped in a solution of carbolic acid, are then applied over the part until it is healed.

If pneumo-thorax exist of sufficient extent to compress

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