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EMERGENCIES,

AND

HOW TO TREAT THEM.

CHAPTER I.

HÆMORRHAGE.

General Considerations.—Results of Negligence.—Arterial and Venous Hæmorrhage.—Effects of Profuse Hæmorrhage.—Natural and Artificial Methods of suppressing Hæmorrhage.—Hæmorrhagic Diathesis.—Transfusion.

MEDICINE is often reproachfully characterized as a science of experiments, a profession remarkable for its brilliant uncertainties and conflicting theories. Superficial observation and imperfect means of study gave origin to this sentiment when the healing art was in its infancy, and it is yet retained by a few who find it a convenient excuse for all their errors. There are conflicting theories in medicine as well as in other professions. Such theories are the mainsprings of progress; they develop strength and incite to laborious investigations.

Uncertainty appertains to every science that has not arrived at its maximum development: but it is not especially characteristic of our profession. The discoveries of to-day will necessarily be modified by the developments of

to-morrow, and the theories of our own time will be replaced by the truths of the future.

The cases of emergency, considered in the following pages, are entirely exempt from the charge of uncertainty; but they are followed by disastrous results when treated by incompetent persons. The *internes* of our large hospitals know that it is not an uncommon occurrence for patients to be admitted in *articulo mortis*; their chances of recovery destroyed by the neglect or ignorance of the attendant outside. The following cases from my hospital note-book may be of interest as examples:

CASE I.—Martin C., aged twenty; occupation, machinist; was admitted to ward eleven, Bellevue Hospital, suffering from incised wounds of the wrist and palm of the hand. On arriving at the hospital, he was partially insensible from loss of blood. The voice could not be raised above a whisper, and the face was extremely pallid and anxious. The pulse could with difficulty be distinguished. The entire clothing of one side of the body was saturated with blood. On making an examination, I found that a folded handkerchief was bandaged over the centre of the wrist, and that the wound in the palm was untouched. The pad was placed on the wrist as if the greatest care had been exercised to avoid pressing on the radial or ulnar arteries. The sides of the pad scarcely reached them. This dressing was applied by a so-called surgeon shortly after the wounds were inflicted. The hæmorrhage in this case was easily controlled by ligatures. The patient, however, developed phlegmonous erysipelas, and, not having sufficient vitality to carry him through, succumbed on the fifth day after his admission.

CASE II.—John M., aged thirty; occupation, laborer; fell

from the front platform of a car at Harlem and had his right foot crushed by the wheel. His friends carried him to a surgeon in the neighborhood, who placed an ordinary bandage on the limb, without any compress over the vessels. In bringing the man to the hospital, the rough jolting of the carriage set the wound bleeding, and by the time he reached his destination he was apparently lifeless. The vessels were tied, and stimulants administered, but he never rallied. Death occurred six hours after his admission. His injuries, independent of the hæmorrhage, might, indeed, have terminated his life; still the chances would have been in his favor if a compress had been applied to the limb to prevent bleeding. The fact that such a thing was not done showed either culpable negligence or deplorable ignorance. It is through such treatment that the percentage of deaths from accidents is increased to an unnecessary degree. To remedy these evils, a thorough knowledge of the treatment of accidents should be impressed on the memory as indelibly as are the letters of the alphabet. Nor should this knowledge be entirely confined to medical colleges and professional men. Non-professionals, with a moderate share of common-sense, might learn to control hæmorrhage, relieve syncope, extract foreign bodies, resuscitate the drowned, and administer an antidote in cases of poisoning. Such knowledge would assist, rather than retard, the labor and usefulness of professional persons.

The varieties of hæmorrhage constitute a large and important class of emergencies. Loss of blood, when profuse, is always attended with danger, and necessitates immediate treatment.

The term "hæmorrhage" is applied to a flow of blood

from any part of the vascular system, with or without rupture of the vessels.

Arterial hæmorrhage is attended with serious consequences. It is readily recognized. The blood is of a bright-scarlet color, and is forced out in successive jets; each jet is synchronous with the movements of the heart. This characteristic spurting is caused by the intermittent force-pump action of the heart driving out the blood. Venous hæmorrhage is distinguished from arterial by the dark-blue color of the blood, which never flows in repeated jets, but oozes slowly from the wounded surface. Venous blood is traveling toward the heart, and there is consequently no force behind to cause a more rapid flow. This form of hæmorrhage is comparatively harmless, unless occurring from very large veins.

In large wounds, arterial twigs are divided, and arterial bleeding predominates. In small wounds there is mixture of both varieties. The blood is dark red, and comes away gradually.

The constitutional symptoms accompanying external or internal hæmorrhage are distinctly marked. The lips and cheeks rapidly assume a pallid hue. There are great restlessness and anxiety. The extremities are cold, and often bathed in clammy perspiration; respiration is weak and sighing; the pulse becomes small and rapid; its increased rapidity being due to the efforts of the heart to make up, by frequent impulses, the diminished quantity of blood sent to the tissues. The patient complains of vertigo and dimness of vision, is unable to articulate plainly, and finally lapses into a state of unconsciousness. The heart has partially suspended its movements, and the pulse is imperceptible. With the

syncope the bleeding ceases. There is not sufficient vitality remaining to force more blood from the injured vessels, nor action in the heart to keep up the circulation. Here Nature takes the place of surgical skill. The stoppage of the current allows the blood time to coagulate in the mouths of the bleeding vessels, and to plug them up completely before consciousness is restored or the heart again at work. But, should this fail to occur, the signs previously enumerated are intensified. A slight convulsive movement ensues, and the patient dies. Occasionally, death occurs during a sudden effort of the patient to sit up in bed, or in some other active movement. The effort creates a necessity for increased action of the heart, which is unable to respond to the call, and paralysis of the organ results. The same thing takes place sometimes when persons are greatly debilitated by disease; in rising to dress, or crossing the room quickly, they drop dead. The pulsations are abnormally multiplied, as in the former case.

There is a peculiar condition of the system known as the hæmorrhagic diathesis, in which the slightest scratch or wound of any description produces persistent bleeding. The disease is hereditary, and both sexes are equally liable to it. In Germany, beyond other countries, the largest number of cases have appeared. Seemingly insignificant wounds in persons of this diathesis endanger life. Lacerated wounds of the gums from extraction of teeth or abrasions in mucous canals, which cannot be reached by local applications, are the most serious. The blood does not exhibit the usual tendency to coagulate. The cut vessels are lax and patulous, their contractile power is diminished, and the principal natural means of suppressing hæmorrhage are unavailable.

Our knowledge of its pathology is limited, and chemical analysis shows that the blood possesses the same elements, in normal proportions, as it does in persons entirely free from this disease. The vascular canals in one or two instances have been found thinned, but in the majority of cases there is no marked alteration.

The general treatment of hæmorrhage, when thoroughly understood, can be applied in special cases without difficulty. In this connection it will be well to consider Nature's methods of closing bleeding vessels, before we pass to the appliances of art. Our efforts copy Nature as far as possible:

1. There is contraction of the muscular fibres in the artery, induced by the injury and by admission of air. The contraction closes the wounded orifice.

2. The artery retracts within its sheath, the effused blood coagulates in front of it, and the hæmorrhage consequently ceases.

3. The blood may collect on the surface, coagulate, and compress the wounded vessel.

4. If the cut vessels are small, the bleeding will cease by coagulation of blood within them.

5. Syncope, by allowing coagulation to take place before the circulation is renewed, prevents a recurrence of the bleeding.

In all our surgical methods of stopping external hæmorrhage, there are none more efficient or available than *pressure*. It can be employed over the main artery of the limb, between the wound and the heart, or directly upon the wounded part. When the main artery is to be compressed, an instrument called the *tourniquet* is generally used. If this is not at hand, a *field tourniquet* may be applied in the fol-

lowing manner: A handkerchief is passed loosely around the limb above the wound, and its ends fastened together. A small block of wood, a folded towel, or any substance from which a firm pad can be extemporized, is placed over the artery and under the handkerchief encircling the limb. A stick measuring five or six inches in length is then passed under the handkerchief at right angles, and twisted around until the pad compresses the artery firmly. Turning the stick draws the handkerchief very tightly around the limb and over the artery, so that it is thoroughly secured.

Bleeding from the upper extremity, at any point below the axilla, may be temporarily suppressed by placing a piece of wood an inch and a half or two inches thick under the arm at right angles with the body, and then pressing the arm firmly against the chest-walls. A large book will answer the same purpose. In all cases the material employed must be placed as high as possible in the axilla. When the wound is situated below the knee-joint, the bleeding may be diminished by raising the limb and placing it on the back of a chair, so that pressure will be made in the popliteal space. The weight of the limb in this position is sufficient to close the popliteal artery. In some cases it may be necessary to fold a towel and place it behind the knee between the chair and the limb.

Pressure may be made in a wound with the thumb and fingers, picked lint, compressed sponge, or towels. In hæmorrhage from the carotid artery, pressure may be made with the fingers along the inner edge and lower half of the sterno-mastoid muscle. The subclavian artery is compressed as it passes over the first rib, by pushing firmly with the thumb in the subclavian triangle behind the sterno-mastoid.

Pressure may be exerted on the brachial artery at the inner border of the coraco-brachialis and biceps muscles. The femoral artery is readily controlled as it passes under Poupert's ligament, midway between the anterior superior spinous process of the ileum and the pubes. The abdominal aorta may be compressed with the hand a short distance above and to the left of the umbilicus.

In wounds of the palm of the hand, or other places where there are many inosculating vessels injured, it will be expedient to place a pad or compress in the opening. Whenever the bleeding is profuse, and the main artery cannot be controlled, it is absolutely necessary to stuff the wound quickly with picked lint or other available substance. It must be filled up, packed tightly, and a bandage firmly applied. In the course of a few hours coagula may form in the vessels, when the lint may be removed and the wound properly dressed.

Cold is a useful adjunct in suppressing hæmorrhage. It is employed under various forms. For moderate bleeding, cloths wrung out of ice-water and placed over the part will answer. Ice in solid lumps, or pounded and secured in rubber bags, or without intervening material, is excellent in profuse hæmorrhage. Cold produced by the evaporation of ether, directed to the surface in the form of spray, has lately come into use. Prof. William H. Thompson, of this city, employs it with good results in *post-partum* hæmorrhage.

Cold acts by stimulating the arterial walls to contract, and by assisting in the formation of coagula. Cold and pressure can be used together.

Styptics.—Under this head are included all medicinal agents which control hæmorrhage. The most efficient are

certain preparations of iron, as the solution of the persulphate and the sub-sulphate, commonly known as "Monsel's solution."

Nearly all the vegetable astringents belong to this class. The best are tannic or gallic acids, oak-bark, catechu, and nut-galls. Preparations of alum, and common salt (chloride of sodium) are sometimes used. The iron and other substances are applied by means of a camel's-hair pencil or a sponge. They are dipped in the solution and rubbed thoroughly into the wound. These agents act by coagulating the blood as it flows from the vessels, and by contracting the muscular fibres around and in their walls. The coagula thus formed should not be removed until all danger of a recurring hæmorrhage has passed.

Torsion can be employed with advantage where the arteries are small. This method consists in seizing the bleeding vessel with forceps and twisting it around until a piece is torn off, or its orifice completely closed. Some advocate merely one or two turns of the forceps; others believe in tearing off a portion of the artery.

Ligation must be resorted to when pressure, styptics, and milder measures fail. The ligatures in general use are silk. The bleeding vessel is first seized with an artery-forceps, the ligature passed around and tied. When arteries of medium size are ligated for aneurisms, or in wounds, the middle and internal coats are cut through, and the external wall brought in contact. A clot forms on each side of the ligature, permanently closing the canal as far as the next collateral branch. When deep-seated vessels are wounded, it is always necessary to go down in the wound and tie above and below the opening in the artery, as the lower is frequently

the seat of secondary hæmorrhage from collateral branches. Some advocate complete division of the vessel before tying, if it be only partially cut across. An artery is tied in the wound, because, in ligating at a distance above, the bleeding might continue through anastomosing branches below the ligature. If the wound is punctured and deep seated, it must be enlarged to enable the surgeon to reach the vessel. The wound at first should only be increased enough to allow the operator's finger to enter and close the bleeding orifice; afterward it can be enlarged at pleasure, without danger. When branches of the external or internal carotids are wounded through the mouth, it is necessary to depart from the rule of ligation in the wound, and tie them in the neck. (See article on ligation of arteries.)

Acupressure, as a means of suppressing hæmorrhage, has not been before the profession a sufficient time to test its claimed superiority over ligation. The method was first brought into notice by the late Dr. Simpson, of Edinburgh, who, in adopting it, almost abandoned the ligature. The canal of the artery is obliterated by means of a sharp needle introduced at one side of the artery, and passed over the vessel into the tissues on the opposite side. Another method is by passing a common sewing-needle, armed with fine wire, *behind* the artery, allowing the head and point of the needle to be exposed, and then bringing the wire over the tissues covering the artery and fastening it to the point of the needle. In this case the artery is compressed between the wire and needle, and not, as in the former, by the needle and underlying tissues. When acupressure is employed on medium-sized arteries, the needle can be removed in three or four hours with perfect safety, as by that time a

firm coagulum will have formed which closes the canal. This method, of course, will give the wound a better chance to heal, as the ordinary ligature is necessarily a source of irritation.

In large vessels, such as the femoral, the needle must remain in for fifty or sixty hours at least, in order to insure success in the operation.

Cautery.—Years prior to the introduction of ligation, and before the discovery of chloroform and ether blessed suffering humanity, it was customary, after amputation of a limb, to touch the bleeding stump with a red-hot iron, or to plunge it into a vessel of boiling tar, to stop hæmorrhage. Happily, modern science, in its advances, has driven this barbarous practice almost entirely from the profession. Occasionally, however, even at this day, the actual cautery is made use of. Hæmorrhage from the neck of the uterus, after removal of tumors, and from other organs not accessible to ordinary means, can be thoroughly controlled by the hot iron.

Position.—When the bleeding is moderate, simple elevation of the wounded limb will retard the current coming from the heart, and thus assist in stopping the flow. It is always to be employed in conjunction with other measures previously mentioned.

After the cessation of the hæmorrhage, the lost vitality of the patient must be restored. Bottles filled with hot water are to be applied to the extremities, and the body is covered with warm blankets. Tablespoonful-doses of brandy and a few drops of ammonia should be administered every fifteen or twenty minutes, or at such intervals as the case may require, until reaction is thoroughly established. Sub-

sequent irritability of the nervous system is to be treated with opiates.

When the loss of blood is so great that reaction is impossible through the ordinary methods, resort must be had to transfusion. This operation consists in abstracting blood from a robust man or woman, and injecting it into the veins of the exsanguinated patient. If an apparatus for the purpose is not at hand, or its use but little understood, a common hard-rubber syringe, with a capacity of five or six ounces, will answer. An opening is made in one of the veins of the forearm, and into this a canula, adapted to the point of the syringe, is inserted. A bandage tied below the incision prevents further bleeding. The syringe, warmed and charged with the fresh blood, is introduced, and the piston steadily forced down until the instrument is emptied. From ten to twenty ounces may be injected at one sitting, and the operation may be repeated if necessary. Care must be taken to force out all air from the syringe before it is used. The efficacy of this operation has been fully proved. Patients have been restored to life under circumstances which were such as to almost preclude the hope of recovery.

I have lately employed a modification of Dieulafoy's aspirator in transfusion. The arm is bandaged as in the ordinary method for venesection, and a needle of the aspirator inserted into the distended median basilic vein. The stop-cock of the aspirator is then turned, and the blood rushes in and fills up the cylinder. A vein in the patient's arm having been exposed, and an opening made in it for the insertion of a canula, the tube from the opposite side of the aspirator is attached, and the blood forced through it into the vein. See APPENDIX.

CHAPTER II.

HÆMORRHAGE—(CONTINUED).

Bleeding from the Nose, Mouth, Lungs, Stomach, Intestines, Kidneys, Ureters, Bladder, Urethra.—Echymosis.

EPISTAXIS, or bleeding from the nasal passages, is the most frequent and least dangerous of all internal hæmorrhages. It occurs generally from one nostril. Repeated hæmorrhage from the left nostril is said to be a certain indication of splenic disease.

Some of the capillary vessels of the nasal mucous membrane communicate directly with those of the cranial cavity, and, when epistaxis appears during congestion of the brain, its action is decidedly beneficial in diminishing the quantity of blood in that organ. In inflammations of the mucous membrane, a rupture of the distended and engorged capillaries may be the commencement of a healthy action. All cases of epistaxis, however, are not attended with the same good results: the bleeding may be so persistent as to seriously endanger life.

The ancients considered bleeding from the nose as an indication of fever, and bled and purged the unfortunate patient while any trace of the disorder remained. The blood was supposed to be overheated, and in a state of ebullition, which rendered its removal necessary.