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AMBULANCE
LECTURES

JOHN M. H. MARTIN, M.D.

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AMBULANCE LECTURES

TO WHICH IS ADDED

A NURSING LECTURE

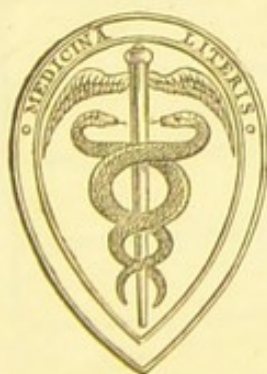
IN ACCORDANCE WITH THE REGULATIONS OF THE
ST. JOHN AMBULANCE ASSOCIATION FOR
MALE AND FEMALE CLASSES

BY

JOHN M. H. MARTIN, M.D.

HONORARY SURGEON BLACKBURN AND EAST LANCASHIRE INFIRMARY
AND HONORARY MEMBER ST. JOHN AMBULANCE ASSOCIATION

SECOND EDITION



LONDON

J. & A. CHURCHILL

11 NEW BURLINGTON STREET

1888

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WHOSE UNCEASING INTEREST AND ACTIVE INFLUENCE

HAVE DONE SO MUCH

TO PROMOTE AMBULANCE WORK

IN ENGLAND.



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PREFACE TO SECOND EDITION.

THE fact of the First Edition of these Lectures having been so soon exhausted is a matter of gratification to me, inasmuch as it proves they have supplied a real want. It also shows a genuine interest in Ambulance work, which I trust may increase. I am deeply convinced of its usefulness and the urgent need of its dissemination.

Some alterations and additions have now been made, which I hope will meet with approval.

ARNHEIM, *February* 1888.

PREFACE TO FIRST EDITION.

I PUBLISH these Lectures almost verbatim as they were delivered, to separate classes of both sexes, at the end of last, and the beginning of this, year.

They were given under the auspices of the St. John Ambulance Association; and are intended—however imperfectly they may succeed—not only as a reference-book of immediate aid to the injured, but also as a guide to those intending to give such lectures: a Nursing Lecture is therefore added. To this end I have not hesitated to make use of all known literature on the subject, in order to make the work as complete as possible.

I therefore now acknowledge my obligations to all sources from whence I have derived any ideas not my own.

The accompanying Illustrations, with few exceptions, have been specially engraved for this work.

ARNHEIM, *October* 1886.

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NOTE TO LECTURE I.

The Lecturer should provide himself with :

Three Society's Diagrams—viz., Skeleton; Blood-vessels, &c.; and Scheme of Circulation.

Loose bones, and an articulated skeleton if possible.

Diagrams of—Lungs and Heart in situ; Heart showing four chambers; Nervous System.

Triangular bandages.

Flannel roller and roller bandages.

Safety-pins.

A black board and chalks.

AMBULANCE LECTURES.



LECTURE I.

THE HUMAN BODY AND ITS CONSTRUCTION.

LADIES, GENTLEMEN,

You meet this evening to commence a course of instruction which I hope will enable you to render not only *help*, but skilled assistance, to your suffering brethren.

Do not think for a moment that I intend you to supplant the surgeon, but to give such efficient aid in the first place that the sufferings of the injured shall be mitigated, and by avoiding injurious meddling, the surgeon when he does undertake the case finds that, thanks to you, no complications have taken place.

That many have their injuries aggravated by ignorant and injudicious interference is undoubted. It is even perhaps within the knowledge of some here present how many an unfortunate wight has

suffered considerable stiffness about the shoulders and neck, if nothing worse, from ineffectual attempts to put necks *in* which were never even *out*, or dislocated as we call it.

I remember vividly a vigorous attempt on the part of a bystander to pull a young man's finger *in* which was fractured, or broken ; and, had I not been present, I verily believe the efforts would have been successful in actually pulling it off, much to his horror—to say nothing of the loss and suffering to the youth.

In these go-ahead times, and in populous districts, such as Lancashire is so amply provided with, where much machinery is in daily use, as well as steam trams and railways, accidents of a serious character are of frequent occurrence ; and, as common humanity dictates that we should give what help we can, it is our duty no less to learn how to give it effectually.

The St. John Ambulance Association was established in 1877 for the purpose of spreading instruction amongst the masses to enable them to give immediate and educated help in cases of accident or sudden illness *until* medical assistance can be obtained. During the few years it has been in operation upwards of 83,000 persons of all degrees and social position have received certificates of successful instruction, including H.R.H. Princess Christian. You do not know at what hour or moment your services may be called into requisition either for friend or stranger ; and the fact of helping a fellow-

creature, perhaps of saving life itself, surely brings to all its own reward.

In cases of accident or sudden emergency, it is of the greatest importance to be cool and calm: use your common-sense—what is usually called presence of mind. Do your work quietly; do not be in too great a hurry, or you are sure to be flurried, and either do your work badly or else forget what to do altogether.

Our lectures shall follow the instructions issued by the St. John Ambulance Association, and, with the aid of diagrams, bandages, splints, and other apparatus with which you shall have every opportunity of practising, I hope, by attention, work, and a little study on your part, that at the end of the course you will have gained some additional knowledge, and be able to cope with almost any emergency.

In this, the first lecture, we commence with a general outline of the human body and its construction, as it is essential you should understand its formation. We shall then pass on to its several functions in as brief a manner as possible.

THE BONES.

Bone, which was originally cartilage, now saturated with salts and containing small blood-vessels, is one of the hardest structures of the human body; it is also tough and elastic. It is composed of animal and earthy matter in the proportion of about one-

third of the former to two-thirds of the latter, which is, phosphate, and carbonate of lime.

The bones form the supports and levers of the body, differ much in size and shape, and are joined one to another by various structures to form the complete framework or skeleton, which in the adult consists of 200 distinct bones.

These are divided into four classes—(a) long, *i.e.*, upper arm and thigh bones; (b) short, *i.e.*, bones of the wrist-joint or carpus; (c) flat, *i.e.*, shoulder or blade-bone; (d) irregular, *i.e.*, vertebræ or spine.

Skull, &c. The head and face are formed of twenty-two bones, which are all united and fixed, with the exception of the lower jaw.

Observe: the skull appears the expansion of the spinal column; it may be considered as such. It contains the brain, and is wonderfully adapted by its dome-like form and strength for its protection. The teeth, which are the hardest structures in the body, are situated in the upper and lower jaw. Four of the organs of special sense are contained in the head—viz., those of sight, hearing, smell, and taste.

Spinal
column.

The spinal column, although apparently consisting of one bone, in reality is composed of twenty-four, called vertebræ, placed one above another, interposed and attached to which are pads of cartilage for the purpose of preventing undue shock or jarring when walking, jumping, or falling on the feet. All people on getting out of bed in the morning are taller than when retiring to rest, in consequence of the connect-

ing fibro-cartilages, or intervertebral substance, not

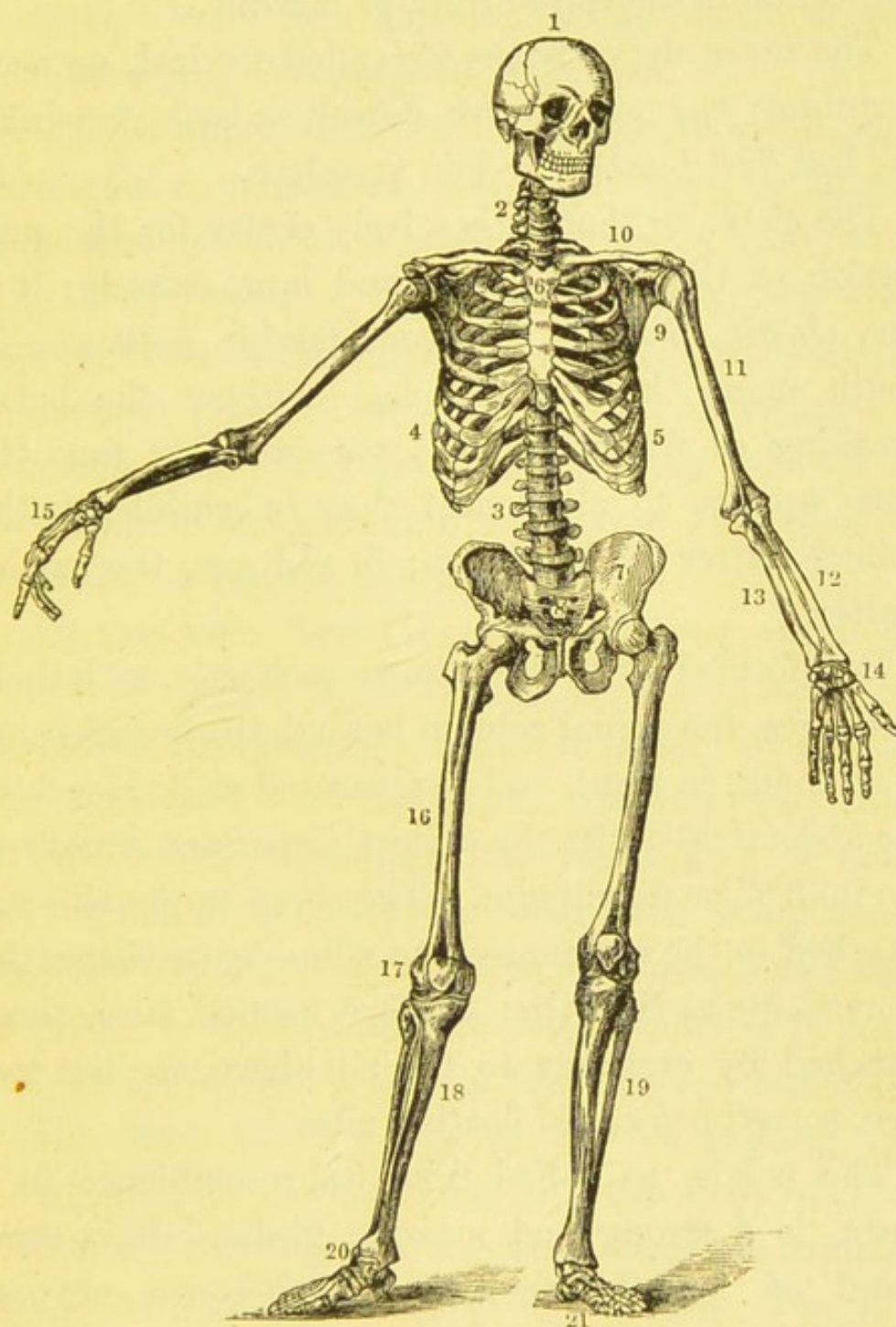


FIG. 1.—THE SKELETON.

Head, 1; spine or back-bone, 2, 3; chest, 4, 5; sternum or breast-bone, 6; pelvis or haunch, 7; sacrum or rump-bone, 8; scapula or blade-bone, 9; clavicle or collar-bone, 10; humerus or arm-bone, 11; radius or outer forearm bone, 12; ulna or inner forearm bone, 13; carpus or wrist, 14; metacarpus or hand proper, 15; femur or thigh-bone, 16; patella or knee-cap, 17; tibia or shin-bone, 18; fibula or splint-bone, 19; tarsus or heel and instep, 20; metatarsus or foot proper, 21.

being so pressed upon. The spine is very flexible, and contains the spinal cord, or marrow.

The seven upper bones are called cervical, or neck vertebræ; the next twelve, dorsal, or back vertebræ; the last five, lumbar, or loin vertebræ.

Thorax.

The chest, or thorax, is a bony cavity for the protection of the lungs, heart, and large vessels; it is very elastic, and can bear considerable pressure—in youth more than in old age—without the bones breaking or fracturing, the reason being (and the same applies to all bones) that in childhood the animal matter predominates; in old age, the earthy matter.

It is formed by twelve ribs on each side, with their cartilages, the spinal column behind, the breast-bone, or sternum, in front, and is separated at its base from the abdominal cavity by a most important muscle—the midriff, or diaphragm. The seven upper ribs are attached to the sternum—true ribs—by cartilages the same shape as the ribs; five are termed false, three attached by cartilage to the rib above, the last two free, sometimes called floating ribs.

Pelvis.

The pelvis, so called from its resemblance to a basin, is a strong and massive girdle. It is composed of four bones—two haunch-bones, or ossa innominata; the rump-bone, or sacrum; and the coccyx. These two last are really a continuation of the spinal column, and are sometimes called sacral and coccygeal vertebræ. The pelvis forms a firm support for the whole trunk as well as the intestines,

and has other important organs in its cavity; on each side there is a cup-like cavity which receives the head of the thigh-bone, or femur.

Of the upper limbs, the shoulder is made up of Shoulder. blade-bone, or scapula, and collar-bone, or clavicle. The shoulder-blade is a flat, triangular bone which Blade-bone. lies on the back of the thorax, covering the seven upper ribs; it strengthens the thorax, and has numerous muscles attached for the movements of the arm, &c. The collar-bone extends between the Collar-bone. breast-bone and shoulder, and serves to sustain the latter in its various positions.

In the arm there is only one long bone—the The arm. humerus—whose upper end, or head, is received into a shallow depression in the blade-bone, thus making the connection with the trunk. In the forearm there are two bones—the ulna on the inside, and the radius on the out or thumb side. The wrist, composed of eight bones, interposes between the forearm and hand proper, which has nineteen long bones—five forming the palm, the remaining fourteen the fingers.

The lower limbs, which we use in walking, run- Lower limbs. ning, &c., also serve to support the body, and are consequently strong and massive. They are arranged much on the same plan as the upper ones. The thigh is formed of one long bone—the femur; the leg of Thigh. two—the shin-bone, or tibia, and the splint-bone, or Leg. fibula. In front of the knee-joint is a prominence formed by a bone—the knee-cap, or patella.

In the foot there are twenty-six bones, joined Foot.

very firmly and closely together, and arranged in a triple arch, extending from the toes to the heel, and transversely. The absence of these arches constitutes what is known as flat foot.

The joints. The connection of two or more bones is called a joint, or articulation, the commonest kinds of movable joints being: (*a*) the ball and socket; (*b*) the hinge. The bones of the skull are immovably jointed. The ends of the bones forming joints are coated with cartilage, which again is covered by membranes secreting an oily fluid to lubricate the parts, called synovial fluid. Were it not for this fluid, the opposed surfaces of our joints would soon be worn down, and every movement accompanied by pain. The joints are kept in position by strong bands and expansions of fibrous tissue and ligaments.

THE MUSCULAR SYSTEM.

The muscular system. The fleshy covering of the skeleton, arranged in different masses, and composed of bundles of reddish fibres endowed with the property of contractility, is called muscle.

Muscles.

There are two kinds: the muscles of animal life, under the control of the will, called voluntary, and those of organic life (found in the gullet, stomach, intestines, heart, lungs, bladder, &c.), not under the control of the will, and called involuntary. The body is balanced by an incessant shifting of the muscles, one group antagonizing another. "Muscles are the most perfect machines; they are distinguished from

all of human manufacture by the fact that frequent exercise renders them stronger and capable of more work." When a muscle acts, one end is fixed, it gets thicker and shorter, and this draws its free end towards the fixed one. In some parts of the body, muscles are placed some distance from the bones on which they act; in such a case, the muscle ends in a fibrous cord or tendon. The muscle which straightens or extends the fingers is an excellent example.

Any of you can make observations on yourselves: move your finger or thumb; you will it, and it is done. These are simple movements; walking, running, &c., are accomplished by the simultaneous action of groups of muscles, and are much more complex.

THE BLOOD AND ITS CIRCULATION.

Blood is an opaque fluid, the colour of which varies The blood. from a bright scarlet-red in the arteries to a deep, dark, bluish-red in the veins. Oxygen, and therefore the air, makes the blood red, and the want of it makes it dark; it is the special agent of nutrition, and the general restorer of that which is lost.

In the adult the quantity of blood is equal to one-thirteenth of the body weight. It consists of minute solid bodies the corpuscles, red and white, floating in a liquid, the liquor sanguinis. The red corpuscles are 500 times more numerous in health than the white.

Blood which is in direct contact with the living

and unaltered blood-vessels does not congregate, but after death it has this property, and separates into a clot, and a pale straw-coloured fluid; therefore you see, when in the healthy body, it does not stagnate, but is regularly and continuously pumped through the blood-vessels.

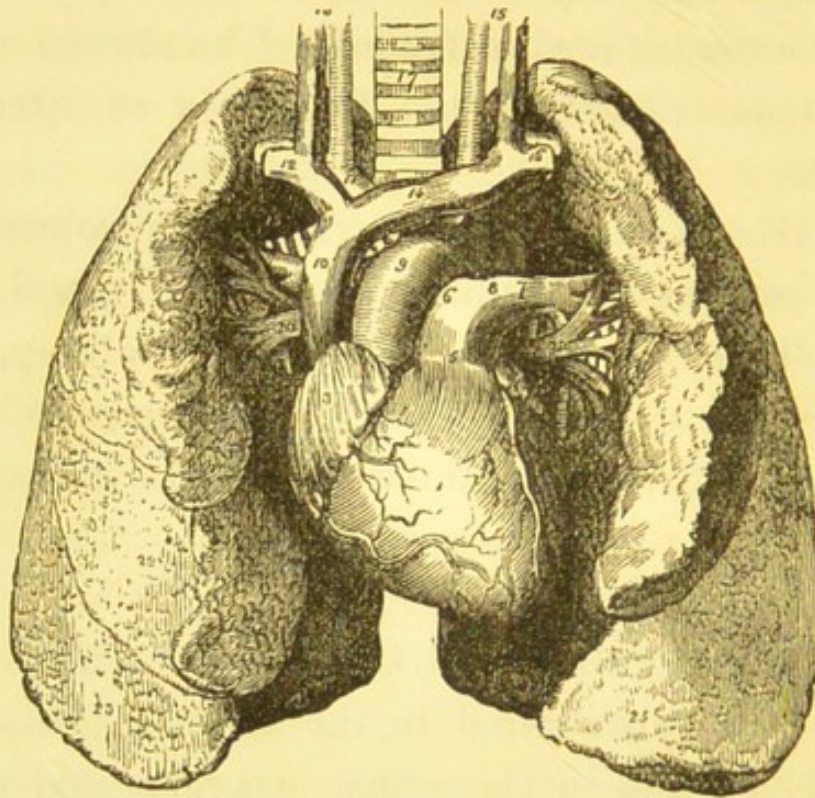


FIG. 2.—THE HEART AND LUNGS (FROM WILSON).

- | | |
|---|---|
| 1. Right ventricle. | 13. Right common carotid artery and jugular vein. |
| 2. Left ventricle. | 14. Left vena innominata. |
| 3. Right auricle. | 15. Left carotid artery and vein. |
| 4. Left auricle. | 16. Left subclavian vein and artery. |
| 5. Pulmonary artery. | 17. Trachea. |
| 6. Right pulmonary artery. | 18. Right bronchus. |
| 7. Left pulmonary artery. | 19. Left bronchus. |
| 8. Remains of the ductus arteri- | 20, 20. Pulmonary veins. |
| 9. Arch of the aorta. [osus. | 21. Superior lobe of the right lung. |
| 10. Superior vena cava. | 22. Middle lobe. |
| 11. Arteria innominata, and in front of it the right vena innominata. | 23. Inferior lobe. |
| 12. Right subclavian vein, and behind it, its corresponding artery. | 24. Superior lobe of the left lung. |
| | 25. Inferior lobe. |

How does this take place? The heart, a muscular four-chambered bag, is the central organ of the circulatory apparatus, alternately contracting and relaxing (about seventy-two times a minute in health), it acts like a forcing-pump; the arteries, which convey the pure scarlet-red blood to the various parts of the body, and the veins, which bring the bluish-red impure blood back again, are the channels. The motion of the blood is therefore in the arteries *from* the heart, in the veins *to* the heart. Where the arteries end, commences a fine network of minute vessels called the capillaries, which average one three-thousandth of an inch in diameter.

The heart,
the
arteries,
and the
veins.

The chief difference in structure between veins and arteries is that the veins have no complete elastic coat, and the majority possess valves. To those of you who wish to know the mechanism of the circulation I will now describe it. The cause of the circulation is the difference of pressure which exists between the blood in the aorta and pulmonary artery on the one hand, and the two venæ cavæ and the four pulmonary veins on the other.

The circu-
lation of
the blood.

The right auricle receives the dark venous blood from the whole body by the superior and inferior venæ cavæ and coronary sinus. From the right auricle the blood passes into the right ventricle, and from the right ventricle into the lungs. The blood, now arterialized by its passage through the lungs, is returned to the left side of the heart by the pulmonary veins, which open into the left auricle.

Valves.

From the left auricle the blood passes into the left ventricle, and from the left ventricle is distributed by the aorta and its subdivisions throughout the entire body. Valves protect the different orifices of the heart, and thus prevent any reflux. The valve protecting the right upper chamber of the heart is called "tricuspid," being formed of three delicate curtains; that preventing the blood from returning into the left upper chamber, "mitral," being formed of two large flaps. Their mode of action has been likened to that of a lateen sail, if we substitute the blood



FIG. 3.—DIAGRAM OF THE CIRCULATION IN MAN (AND OTHER MAMMALS).

1, Left ventricle; 2, Left auricle; 3, Right ventricle; 4, Right auricle; 5, Pulmonary veins; 6, Lungs; 7, Aorta; 8, Capillaries, superior extremity; 9, Venæ cavæ; 10, Spleen; 11, Intestines; 12, Bladder, &c.; 13, Capillaries, inferior extremity; 14, Liver.

stream for that of the air current. Tendinous cords arising from the sides of the ventricle are inserted into the free edges of these valves, restraining their passage into the auricle.

The commencement of the aorta and pulmonary artery is guarded by valves of a crescentic shape, with their unattached edges turned upwards into the vessel, so as to form pockets which stretch out in the middle line and meet when distended, thus forming a complete barrier to the return of any blood.

The arteries bear different names, and it will be as well for you to familiarize yourself with them—aorta, carotid, brachial, femoral, &c. The one you will know best—the pulse at the wrist—is called radial.

Names of
arteries.

When a sufficient supply of blood is not sent to the brain, unconsciousness takes place, and the person falls down or faints. When an artery gets blocked, and no circuitous, or what we call collateral, circulation is established in a limb, it receives no nourishment, and consequently dies, or mortifies.

From the foregoing you will see that the special function of the blood is the provision of suitable nourishment for the body and the carriage of certain waste materials away.

THE RESPIRATORY OR BREATHING SYSTEM.

You now understand how the blood is propelled through the body. The next thing is to know how it becomes renewed within the body.

Organs of
respira-
tion.

In the cavity of the chest, on each side of the

heart, are placed the essential organs of respiration, the lungs. Protected by the ribs and sternum, and separated from the abdomen by the diaphragm, they are very elastic organs. The air gets into them by the nose, the mouth, and the windpipe, whose upper end is spread out, and contains the organ of voice, called the larynx. In the chest it divides into two tubes, or bronchi, which again and again divide into innumerable smaller branches, finally ending in minute sacs or air-cells. The capillaries surround these sacs on all sides, so that the blood is fully exposed to the action of

Inspira-
tion.

the air. Inspiration, or taking air into the lungs, is performed by the muscles of the thorax contracting, thus expanding the chest-walls. At the same time, the diaphragm descends, increasing its capacity from above downwards, and the air rushing in fills the air-cells. Expiration is the opposite of inspiration, consequently is caused by the relaxation of the muscles—

Expira-
tion.

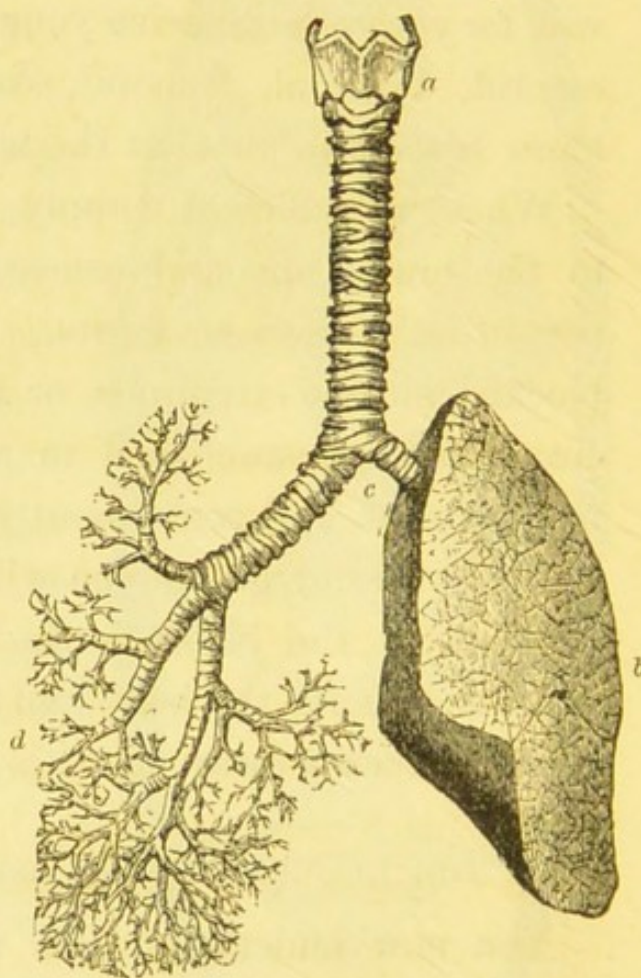


FIG. 4.—THE LARYNX (OPENING OF THE AIR-TUBE), TRACHEA, AND BRONCHI (AIR-TUBES).

a, Larynx; *b*, Lung; *c*, Bronchi; *d*, Ultimate bronchial tubes.

the falling in, as it were, of the chest-walls, and ascent of the diaphragm, assisted by the abdominal muscles.

During inspiration, oxygen is taken into the lungs, and the blood renewed. Expiration gets rid of the blood's chief impurity — viz., carbonic acid.

In health, inspiration takes place from sixteen to eighteen times per minute. So you appreciate how necessary it is that we should breathe pure air and live in an atmosphere free from coal-smoke and other impurities.

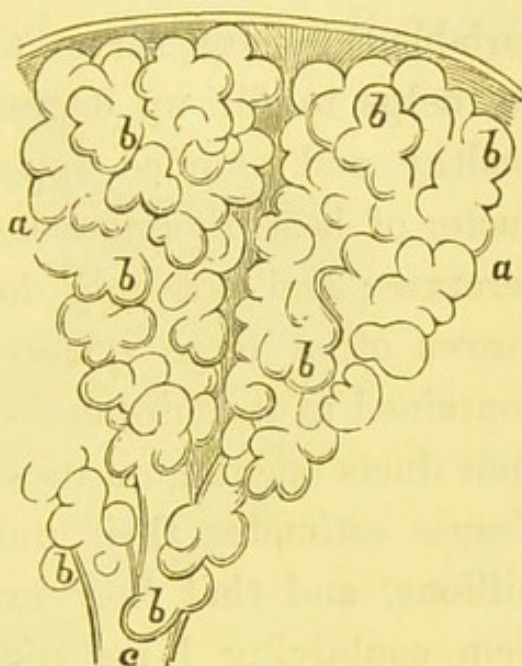


FIG. 5.—*a, a*, Two small groups of air-cells; *c*, The ultimate bronchial tubes communicating with *b*, the air-cells. Magnified (Kölliker).

THE KIDNEYS.

Although hardly within the scope of such lectures as these, I cannot overlook the kidneys. They are two large bean-shaped organs placed in the abdomen, on each side the spine below the diaphragm, and are largely supplied with blood; they excrete in the twenty-four hours for an adult, about 50 oz. of water, which holds in solution nearly 2 oz. of solids, waste materials, urea, and uric acid. The water, with the urea and other products of the wear and

tear of the tissues dissolved in it, goes by the name of urine.

THE SKIN.

The skin, which has under it a fatty layer of variable thickness, serves to cover the body, and the fat helps to fill up depressions, giving it a full, healthy, and rounded appearance; it is a bad conductor of heat, therefore helps to regulate the temperature; and not only does it do this, but it also throws off a large quantity of water—the sweat. Contained in its substance are numerous bodies, with their ducts opening on its surface—the sweat glands. Krause estimates their number at two and a half millions, and that they excrete 2 lb. of water per diem, containing 1 per cent. of urea. Suppression of cutaneous activity causes death rapidly; hence, when a large surface is burned or scalded, the interference of exhalation by the skin is an element of danger.

FOOD, STOMACH, ETC.

The conversion of food in the body.

For the maintenance of this wonderful machinery, food has to be taken, the fuel which must be burnt up to produce this never-ceasing work whilst life endures. It is taken into the mouth, ground, or masticated, by the teeth, and mixed with saliva. It then passes behind the windpipe through the gullet, or œsophagus, into the stomach, which is a large muscular bag, whose mucous lining contains numerous glands, pouring out the gastric juice when

stimulated by it. Movements to facilitate the mixing of the food are produced by the alternate contractions and relaxations of the involuntary muscles contained in its walls. On the completion of the stomach-digestion, the food, now chyme, is passed

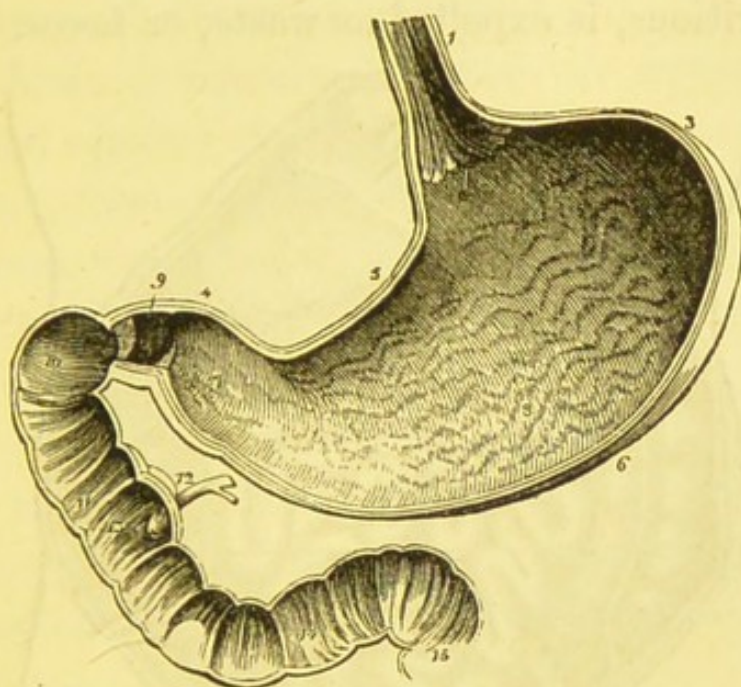


FIG. 6.—VERTICAL AND LONGITUDINAL SECTION OF THE STOMACH AND DUODENUM (FROM WILSON).

- | | |
|--|---|
| 1. Œsophagus. | 10. Ascending portion of the duodenum. |
| 2. Cardiac orifice of the stomach. | 11. Descending portion. |
| 3. Great end of the stomach. | 12. Pancreatic duct and ductus communis choledochus close to their termination. |
| 4. Lesser or pyloric end. | 13. Papilla upon which the ducts open. |
| 5. Lesser curve. | 14. Transverse portion of duodenum. |
| 6. Greater curve. | 15. Commencement of jejunum. |
| 7. Dilatation at the lesser end of the stomach, the antrum of the pylorus. | In the interior of the duodenum and jejunum, the valvulæ conniventes are seen. |
| 8. Rugæ of the stomach formed by the mucous membrane: their longitudinal direction is shown. | |
| 9. Pylorus. | |

on into the intestine, where it is mixed with the bile from the liver (a large organ situated on the right side of the abdomen under the ribs and diaphragm), and the pancreatic juice from the pancreas,

as well as the secretion from innumerable intestinal glands. A small portion of the food is taken up or absorbed straightway by the capillaries of the stomach; the larger part, by those of the intestines and the lymphatics; that not used up, being indigestible or non-nutritious, is expelled as waste, or fæces.

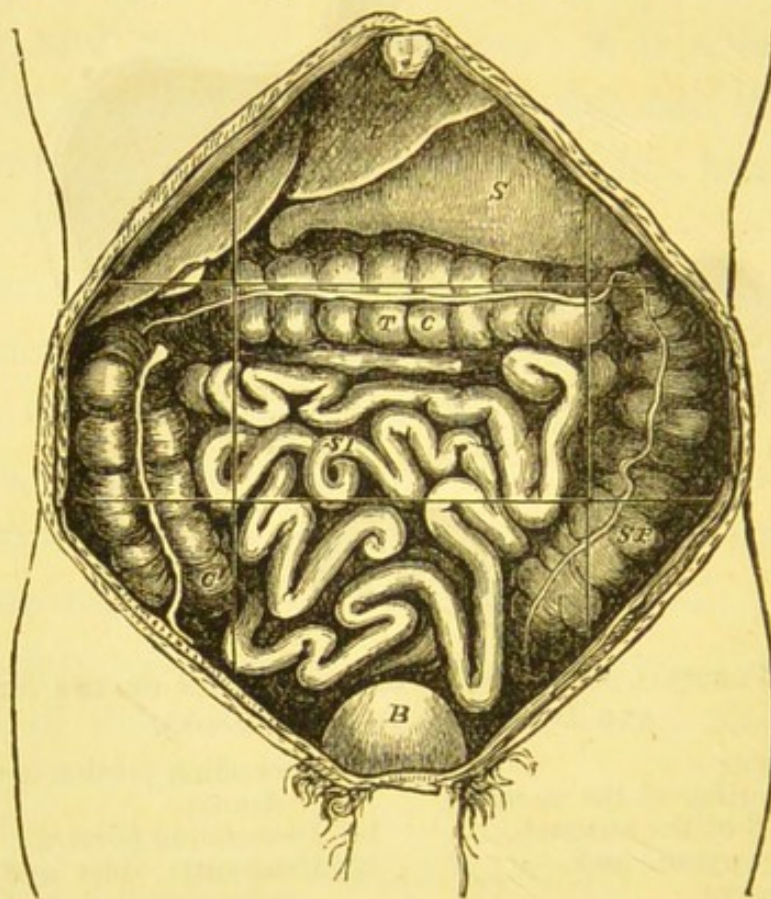


FIG. 7.—THE ABDOMINAL VISCERA *in situ*, THE GREAT OMENTUM HAVING BEEN REMOVED IN ORDER TO SHOW THE PARTS MORE DISTINCTLY. (DRAWN BY J. T. GRAY.)

The lines mark the regions of the abdomen.

- | | |
|-----------------------|------------------------|
| L. Liver. | T C. Transverse colon. |
| S. Stomach. | S F. Sigmoid flexure. |
| S I. Small intestine. | B. Bladder. |
| C. Cæcum. | |

THE NERVOUS SYSTEM.

We now pass on to a description of the nervous system, and, as it must necessarily be brief, I will endeavour to be as explicit as possible.

The organs of digestion, of secretion, of excretion, as well as all I have described to you, our very thoughts, desires, aspirations, are ruled and controlled by this great system. It consists of the brain and spinal cord, and a supplementary system called sympathetic or ganglionic.

The brain is contained within the cavity of the skull, and consists of a large organ of grey and white substance, formed of nerve-tissue. Its conformation and arrangement are most complex ; for the sake of simplicity we divide it into two portions—the cerebrum, or large brain, and the cerebellum, or small brain. The former is best described as being the seat of the intelligence, the emotions, and the will ; the latter, as the central organ for the direction of the harmony of the motions of the body, the regulation of equilibrium, and combined movement.

The spinal cord, which is a continuation of the brain, its upper portion being called the medulla oblongata, is contained in the long canal formed by the junction of the vertebræ. Nine pairs of white cords or nerves from the brain, and thirty-one pairs from the spinal cord, are given off and distributed to the voluntary muscles and the organs of special sense, thus connecting every part of the economy with a centre ; hence this is sometimes called the central nervous system.

Nerves which move the muscles are called motor nerves ; those which convey impressions, say of taste or smell, are called sensory nerves, or nerves of

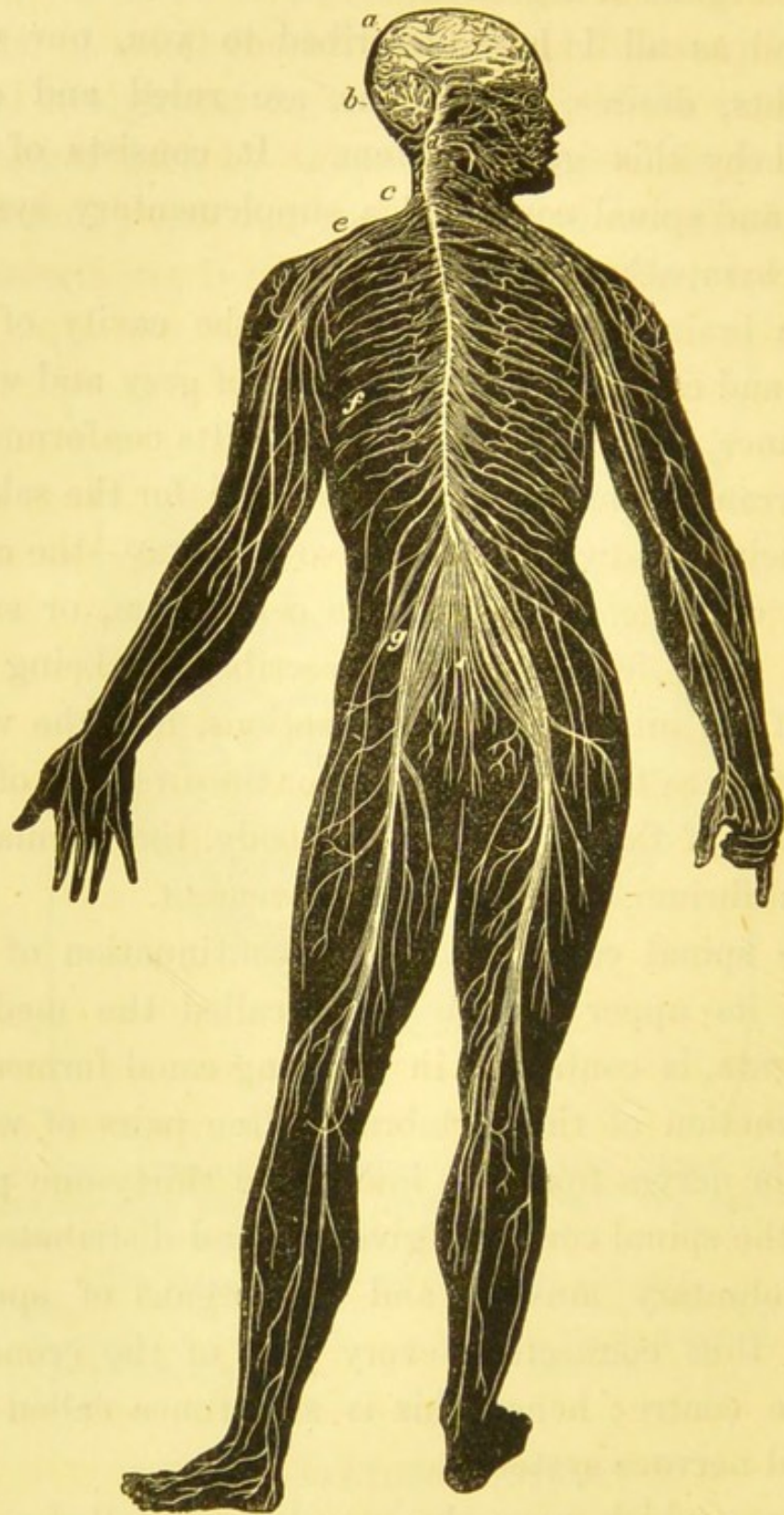


FIG. 8.—THE NERVOUS SYSTEM.

a, Cerebrum. *b*, Cerebellum. *c*, Spinal Cord. *d*, Medulla oblongata.
e, Brachial plexus. *f*, Branches of spinal cord. *g*, Great sciatic nerve.

sensation. There are also mixed nerves of motion and sensation, which are called compound or mixed nerves.

All the muscles of the body which act independently of the will are called involuntary, and are presided over by the sympathetic nerve, which is in constant action, both sleeping and waking. The movements of the heart, the regulation of the supply of blood, all the organic functions, secretion, and excretion, are performed through its influence. It is a double cord, situated on each side of the spine, distributing filaments to all the organs and vessels of the body. It communicates with the other nerves. Its distinguishing feature is the swellings on it, at pretty regular intervals, which are composed of collections of nerve-cells; hence the name ganglionic.

BANDAGES.

I will now describe the bandages which are used to cover wounds, and, after the lecture on each evening, I shall expect you to practise and become proficient in their application.

They are of two kinds—the roller and the Esmarch triangular bandage. They serve the purpose of affording support to different parts of the body when injured, of keeping dressings on wounds, of fixing and maintaining splints in proper position, and preventing undue muscular action or disturbance by the patient himself; or, during

transit, they are used also for applying pressure to stop bleeding; also to protect wounds from the sun, dirt or dust, and the attacks of flies or other insects.

Roller
bandages.

Roller bandages are made of unbleached calico, linen, flannel, or other suitable material. In length and breadth they vary according to the particular region for which they are required. The most useful roller bandage is one 6 yards long and 3 fingers broad. For the chest, one (or, better, two) 6 inches broad and 3 yards long will be necessary, whilst, for the fingers, $\frac{1}{2}$ to $\frac{3}{4}$ inch broad and a yard long at the outside ought to suffice.

Bandaging. There is a great art in bandaging properly, although it appears so simple, and it requires some practice. If a bandage is applied too tightly, mortification may follow in consequence of arrested circulation for too long a time. The rule is to *apply* evenly without creasing, neither too tightly nor too loosely. Where considerable pressure is necessary, as in using it as a tourniquet to arrest hæmorrhage, it must be done; but, understand, it is only temporarily, until such time as the surgeon may arrive.

Esmarch's
triangular
bandage.

For ambulance work, Esmarch's triangular bandage is recommended as being sufficient for all purposes. The Association supplies them of unbleached calico at sixpence each, with illustrations on them showing the different ways of application, and accompanying each bandage are printed instructions for its use. When once you know your work, you can readily provide yourself with any number

made out of ordinary unbleached calico; in cases of necessity, you may even use your necktie or pocket-handkerchief or any available material in the same way.

I will now read you the official instructions how to apply this bandage, and then show you the mode of application, not forgetting—if last, yet not least—how to tie a knot.

“THE TRIANGULAR BANDAGE.—This bandage, known as the ‘Esmarch bandage,’ is a triangular piece of linen or calico, made by taking a piece of either of these materials, about 40 inches square, and cutting it diagonally into halves. Of the three borders of the bandage, the longer is called the *lower*, the others the *side*, borders. Of the three corners, the upper one opposite to the lower border may be named the *point*, the two others the ends.

“When not in use, it should be folded perpendicularly down the centre, placing the two ends together. Then the ends and the point should be brought to the centre of the lower border or base



FIG. 9.—THE REEF-KNOT.

of the perpendicular line, thus forming a square. This should be folded in half, and again twice until

it assumes the form of a small packet, $6\frac{1}{2}$ by $3\frac{1}{2}$ inches.

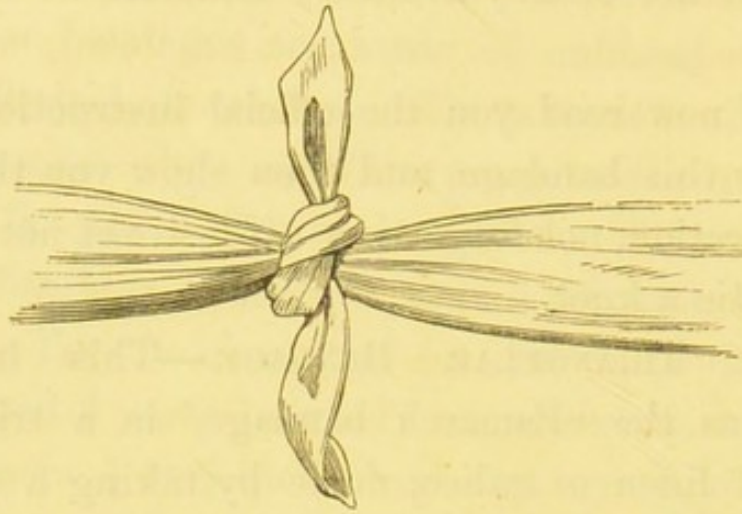


FIG. 10.—THE “GRANNY.”

“For use, it is folded *broad* or *narrow*. Having spread out the bandage, commence by carrying the

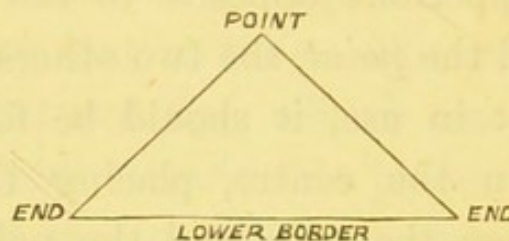


FIG. 11.—THE TRIANGULAR BANDAGE.

point over to the lower border; when it is required broad, fold it lengthways twice; and when narrow three times.

“The bandage is fastened either by pinning the ends together, or by knotting them into a reef-knot.

“*Wound of the Scalp.*—Fold the lower border lengthways to form a plait like a hem $1\frac{1}{2}$ inch wide, place the middle of the bandage on the head

so that the plait lies crossways before the forehead, the point hanging downwards over the nape of the neck. Carry the two ends backwards above the ears, cross at the back of the head, bring forwards, and tie on the forehead. Then stretch the point downwards, and turn it up over the back of the head, and fasten it on the top with a pin.

“ *Wound of the Forehead, Side, or Back of Head.*—Fold the bandage narrow, lay its centre over the wound, and, carrying the ends backwards, cross



FIG. 12.—BANDAGE FOR HEAD—
FROM BEFORE.



FIG. 13.—BANDAGE FOR HEAD—
FROM BEHIND.

them at the opposite side, carry forward, and tie in front.

“ *Wound of Jaw, or Side of Face.*—Fold the bandage narrow, place the centre under the chin, carry the ends upwards one at each side, and tie on the top of the head.

“ *Wound of the Eyes, or Front of the Face.*—Apply the bandage in a similar manner as for the last.

“ *Wound on the Chest.*—Place the middle of the bandage on the chest with the point over the

shoulder, carrying the two ends round the chest, and knot at the opposite side. Next draw the point over the shoulder downwards, and tie or piece it to one of the ends.

“*Wound of Shoulder.*—Lay the centre of the bandage on the top of the arm with the point up the side of the neck, and the lower border lying on

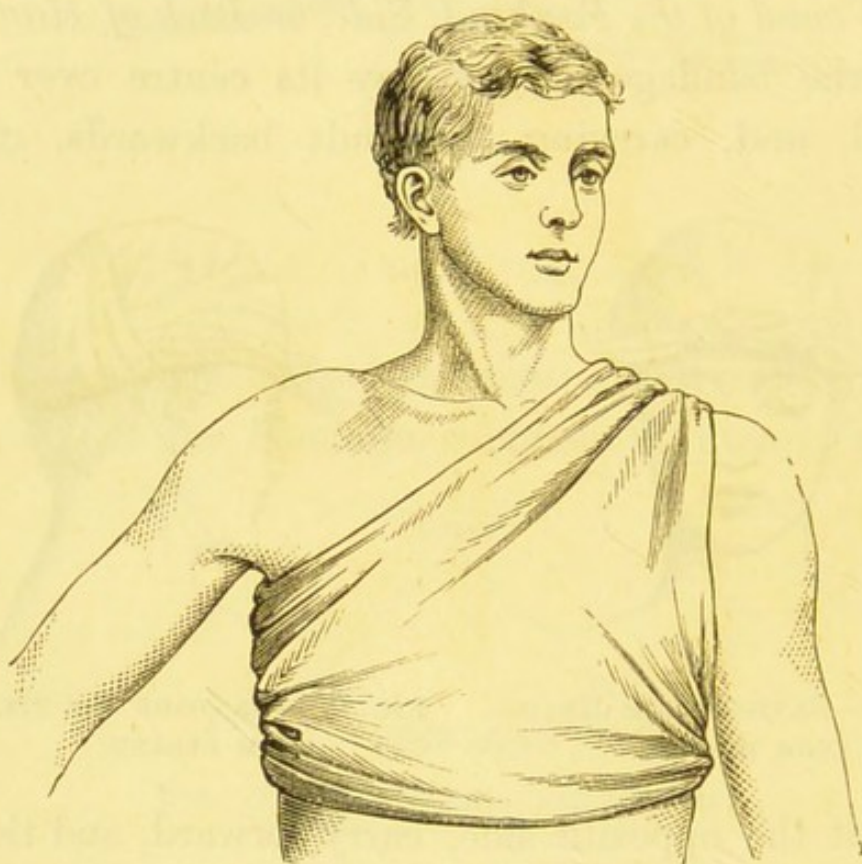


FIG. 14.—BANDAGE FOR CHEST—FROM BEFORE.

the middle of the upper arm. Carry the two ends round the arm, and, crossing them on its inner side, bring them back and tie on the outside. Take a second bandage, fold it, and make a smaller arm-sling of it; then draw the point of the shoulder bandage under the sling, fold it back on itself, and fasten with a pin on the top of the arm.

Wound of the Hip.—Fold one bandage narrow, and tie it round the body as a waist-belt. Lay the centre of a bandage on the wound with the point upwards, pass the ends round the upper part of the thigh, cross and carry to the front, and knot them

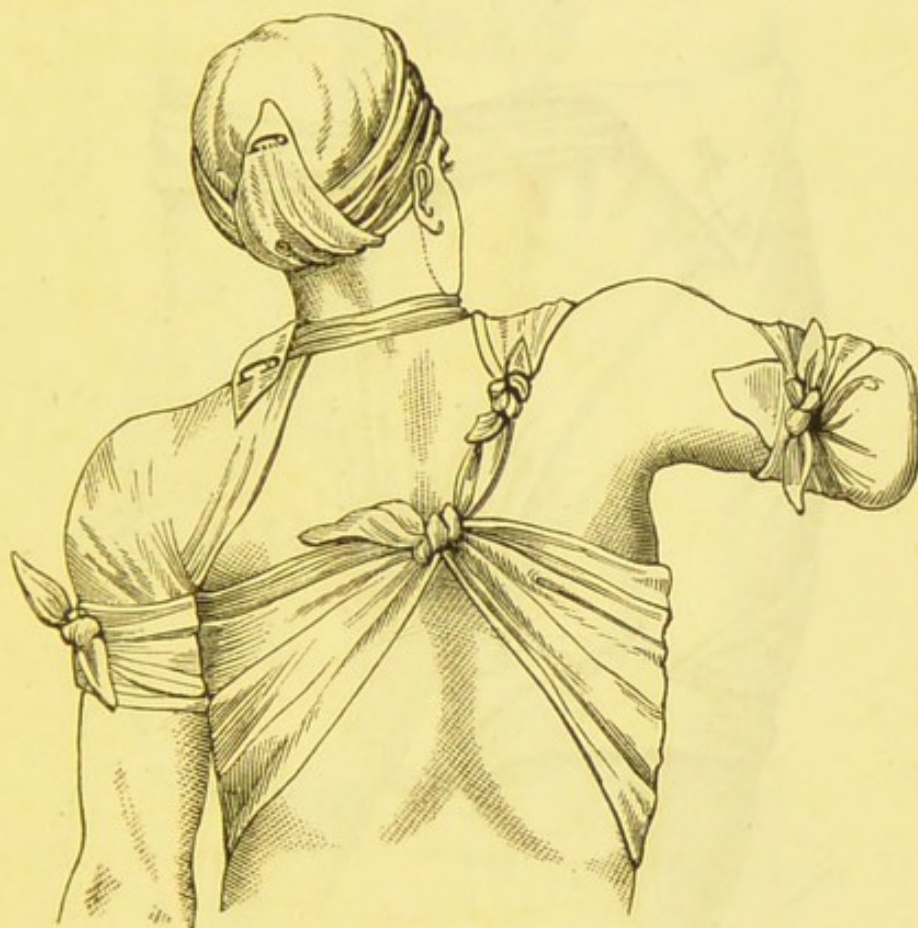


FIG. 15.—BANDAGES FOR CHEST, SHOULDER, HEAD, AND STUMP OF ARM—FROM BEHIND.

together. Next pass the point under the waist-belt, and fasten with a pin.

Wound of the Upper Arm.—Place the centre of a broad-folded bandage on the front of the limb, carry the ends round to the opposite side, cross them, bring them back, and knot them together. Next take a second broad-folded bandage; throw

one end over the shoulder on the wounded side, carry it round the neck so as to be visible at the opposite side, then bend the arm carefully, and carry the wrist across the middle of the bandage hanging down in front of the chest. This done, take the

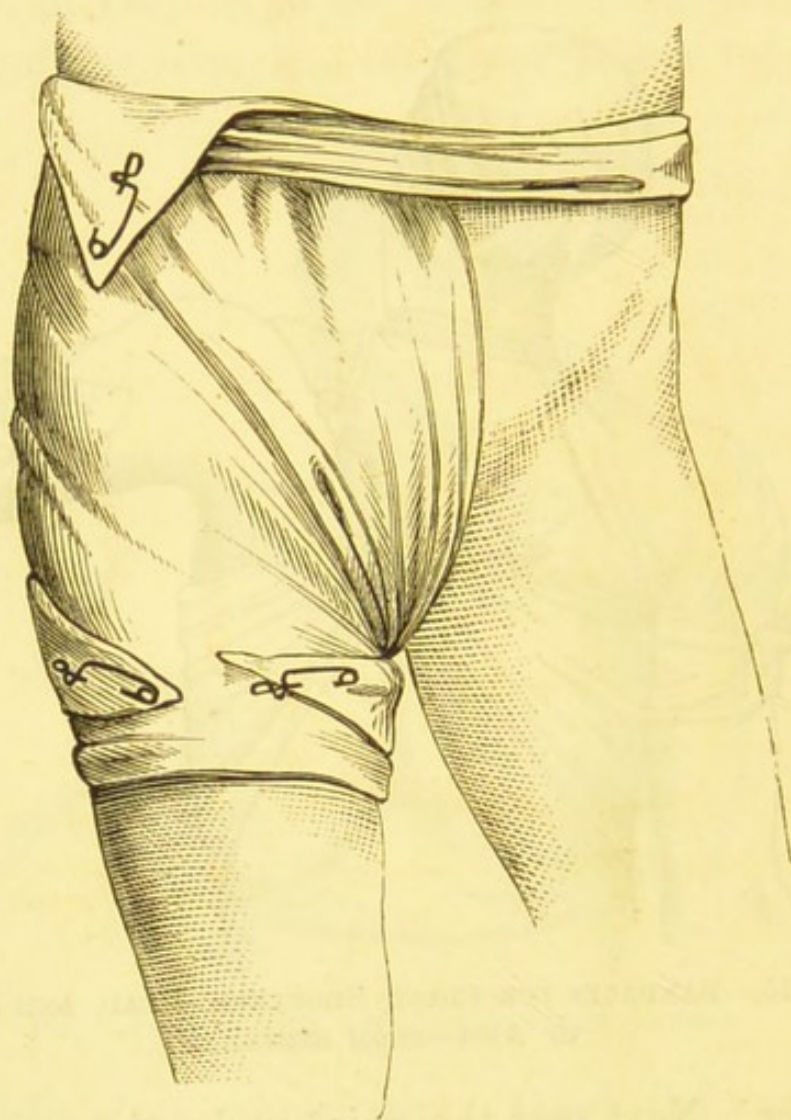


FIG. 16.—BANDAGE FOR HIP.

lower end over the shoulder on the sound side, and knot the two ends together at the nape of the neck. This is called the smaller arm-sling.

“ *Wound of the Forearm.*—Dress and bandage the wound as in last case. Then take a second bandage,

throw one end over the shoulder at the sound side, and carry it round the back of the neck so as to be visible at the opposite side, where it is to be held



FIG. 17.—BANDAGES FOR SHOULDER, HAND, ELBOW; AND A SMALL ARM-SLING.

fast; place the point behind the elbow of the injured arm, and draw down the end in front of the patient. Next bend the arm carefully, and place it across the

chest on the middle of the cloth. Then take the lower end upwards over the shoulder on the wounded side, and knot to the other end at the nape of the neck. This done, draw the point forward round the

elbow, and fasten it with a pin. This is called the larger arm-sling.



FIG. 18.—LARGE ARM-SLING.

“ *Wounds of the Hand.*—Take a bandage, spread it out, and lay the wrist on the lower border with the fingers towards the point. Next turn the point over the fingers, and carry it up on the wrist. This done, take the ends round the wrist, fixing the point, cross them, carry them back

again, and knot together. Take a second bandage, and support the forearm in the larger sling.

“ *Wounds of the Thigh, Knee, or Leg.*—Dress and bandage in the same manner as was directed for wounds of the upper and forearm.

“ *Wounds of the Foot.*—Take a bandage, spread it out, and place the sole of the foot on its centre, with the toes in the direction of the point. Draw the point upwards over the toes and instep of the foot; then take the ends forward round the ankle, cross on the instep, carry them downwards, and knot them together on the sole of the foot.

To Secure Fractures.—Surgical or improvised splints may be adjusted to a broken limb by taking two triangular bandages, folded broad or narrow

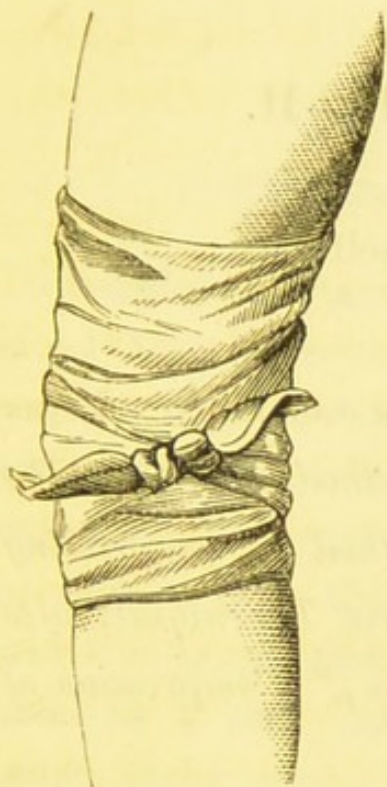


FIG. 19.—BANDAGE FOR KNEE.

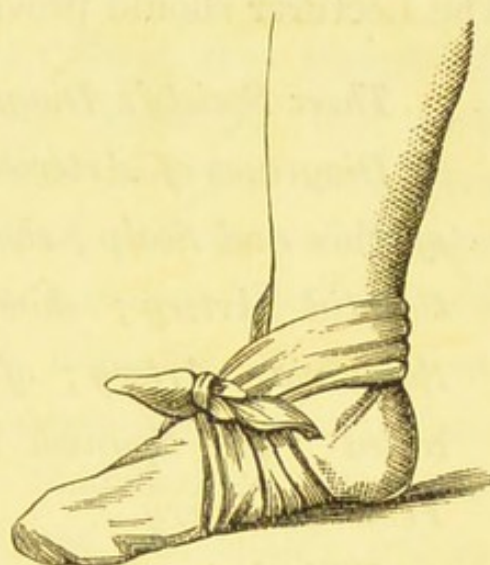


FIG. 20.—BANDAGE FOR FOOT.

according to circumstances, and tying them securely, one above and the other below the fracture."

NOTE TO LECTURE II.

The Lecturer should provide himself with :

Three Society's Diagrams—

Diagrams of Arteries of Face and Scalp ; Veins of Face and Scalp ; showing method of compressing Carotid Artery ; showing method of compressing Subclavian Artery ; of a Garrot Tourniquet, also called " The Spanish Windlass ;" Compression of Femoral Artery.

Völker's tourniquet.

Petit's tourniquet.

Esmarch's Ambulance tourniquet.

Esmarch's Braces.

An ordinary ruler.

Padded key.

Burnt cork.

LECTURE II.

HÆMORRHAGE, OR BLEEDING.

THE different ways of controlling the escape of blood from wounds, however inflicted, will now engage our attention. There are few accidents which will test your qualities of courage and energy more than the occurrence of a violent bleeding, and in such a case the prompt adoption of measures and treatment such as will come under your notice, and—as I said before—a modicum of common-sense, under most circumstances will enable you to restrain it. Every wound bleeds, because in every wound blood-vessels are injured, but the kind of hæmorrhage, as well as its danger, varies with the size and character of the blood-vessels which have been injured.

There are three kinds of hæmorrhage—arterial, venous, and capillary.

Kinds of hæmorrhage.

Capillary bleeding is an oozing of blood, and is found to accompany slight wounds and abrasions; therefore the amount depends upon the extent of injury. Capillary bleeding from inflamed tissues may be very severe, and, if not checked, may even prove fatal.

Capillary bleeding.

Venous
bleeding.

Venous bleeding wells out in a continuous, dark, steady stream, and, as in the case of ruptured or wounded varicose veins, there may be a very small opening indeed, not at all commensurate with the amount of blood lost.

Arterial
bleeding.

Arterial bleeding is the most dangerous of all. The bright red blood *spurts* out in a forcible stream (it is only in arteries of very large size that it comes in jerks), driven by the strong pump-action of the heart, estimated at a pressure of 4 lbs. to the square inch.

Treatment

How are you to deal with cases of bleeding?

You know that blood, like water, will not run uphill unless compelled to do so. The effects of position and of an unhindered return of blood to the heart are thus very important; yet how often may one see a person bleeding severely at the nose, stooping over a basin, with a tight collar round his neck, or a bleeding ulcer in the leg with a ligature below the knee in the shape of a garter! Again, you must not forget there is no bleeding from the exterior of the body which cannot be temporarily arrested by firm pressure with the fingers. Never *heed for the moment* whether the bleeding be arterial, venous, or capillary; the thing required is to stop it, and pressure will always do this.

Pressure, and the removal of all hindrances to the return of blood to the right heart, are the cardinal points you have to bear in mind for arresting all forms of hæmorrhage.

In the description of the circulation of the blood (page 13) you will remember that I told you the circulation in the arteries is *from* the heart, and in the veins *to* the heart. Its practical application is this :—Pressure must be applied in wounds of arteries on the heart, or proximal, side, and in wounds of veins on the far, or distal, side. In capillary hæmorrhage, pressure is to be used over the whole of the bleeding surface.

In health, when the heart and blood-vessels are *Position.* sound, the circulation keeps steadily going on, and no matter what position we happen to be in, standing up, lying down, or otherwise, the blood never gravitates to the most dependent parts. The columns of blood in the arteries and veins mutually balance each other, and the force that drives the blood down the arteries lifts it up in the veins; the only assistance given, you remember, is that the veins have valves preventing too great a backward pressure. Let a vessel, however, be opened, and this balance is at once destroyed, especially if the wounded vessel be in a dependent part of the body; hence the necessity of *always* raising the wounded part above the level of the trunk.

The application of cold, in the shape of water or ice, diminishes the size of the arteries and capillaries; *Applica-
tions.* then there are astringents or styptics, such as iron, alum, tannin. Sulphuric acid has been used to check continued bleeding from the gums after the extraction of teeth, and I have seen great injury done in

consequence. Matico you will find in such cases a very useful and innocent astringent.

Position
of the
arteries.

The position of the arteries next demands our attention, so that you may know where to exercise pressure apart from the wound, and also to know when a wound is in a dangerous situation. Commencing with the upper part of the body, a large artery ascends on each side the neck to the head. If you draw a line from the joint between the collar-bone and breast-bone to the angle of the jaw, it will

Carotid and
vertebral
arteries.

show you the direction of the vessels. They are called the carotid arteries, and they split into numerous branches up the face and scalp. One division enters the skull to supply the brain, where it communicates with its fellow and the branches of another large artery, the vertebral, also supplying the brain. The facial and temporal arteries, branches of the external carotid, supply the face and scalp; splitting into finer divisions, they end by communicating with those of the opposite side.

Wounds of
the head.

Wounds of the head are of very frequent occurrence, and, whether caused by falling on hard material, or inflicted by hard material such as a poker, have all the characters of an incised wound or clean cut, in consequence of the scalp



FIG. 21.

PAD WITH TWISTED BANDAGES APPLIED TO STOP BLEEDING FROM TEMPORAL ARTERY.

intervening between two hard bodies—*i.e.*, the skull and weapon. Bleeding is pretty brisk, frequently arterial. What have you to do? Place your finger at once firmly on the wound (digital compression), and see if you can

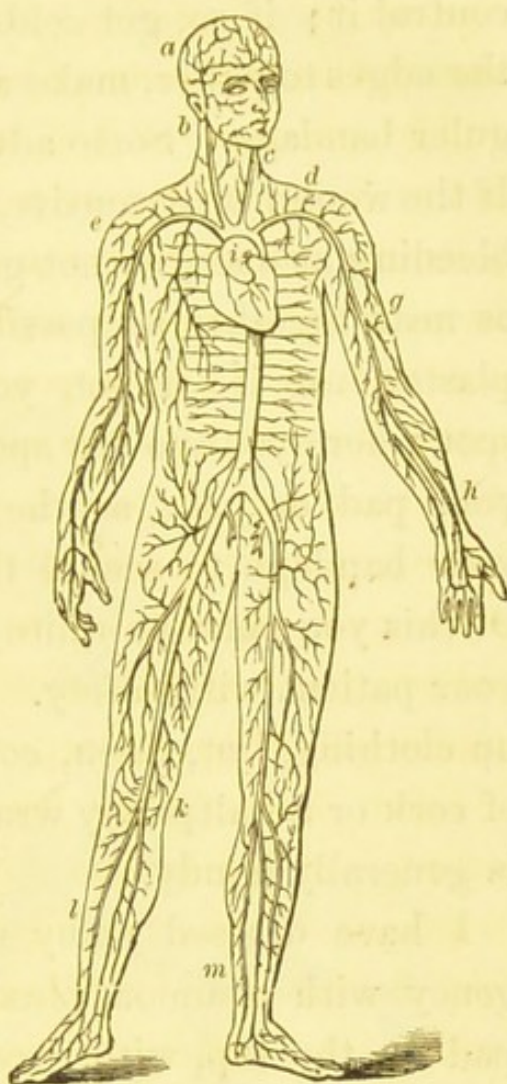


FIG. 22.—THE ARTERIES.

This figure is intended to give a general idea of the position of the chief arteries. The main artery, *i*, called the aorta, springs from the left side of the heart, and arching backwards courses down close to the spine as far as *f*, where it divides into two large branches. From this main arterial trunk branches are distributed to all parts of the body. Two large vessels, named the carotid arteries, *b*, *c*, run upwards, one on each side of the neck, and divide into branches which supply the brain and head; of these, the figure shows the temporal artery, *a*, running upwards in front of the ear; and the facial artery, near *b*, which winds over the lower jaw to the face. Each of the upper limbs is supplied by a large artery which passes under the collar-bone, over the first rib, down through the armpit and along the inner side of the arm to a little below the front of the elbow, where it divides into two branches—one of which runs down the outer part, the other down the inner part, of the forearm, as far as the hand, where they unite to form two curves or arches in the palm, *d*, *e*, *g*, *h*; the artery is called subclavian, *d*, when near the collar-bone; axillary, when passing through the armpit, *e*; brachial, when between the armpit and elbow, *g*; and in the forearm the outer artery is called radial, *h*, the inner one the ulnar; and the curves formed by the two vessels in the hand are named palmar arches. Each of the lower limbs is supplied by a large artery which enters the thigh at the centre of the fold of the groin, and coursing downwards passes back, about the lower third of the thigh, into the ham; a little below the knee-joint it divides into two branches, one of which runs down the fore part, the other down the hinder part, of the leg to the foot, *f*, *k*, *l*, *m*; the artery of the thigh is called the femoral artery; that of the ham, the popliteal artery; that of the fore part of the leg, the anterior tibial artery; and that of the hinder part of the leg, the posterior tibial artery.

control it; if so, get cold water, wash it well, bring the edges together, make a pad, and apply your triangular bandage. Some advise cutting the hair close. If the wound be extensive, and you are unable to stop bleeding at once, do not get alarmed; draw its edges as near together as possible; if you have sticking-plaster, use it; if not, you must do without. The spot where you see any spouting is the place to apply your pad, or pads, as the case may be; then apply your bandage to secure the pads in their position. Of this you must be quite sure before you can leave your patient with safety. Pads may be made of torn-up clothing, lint, linen, cotton, tow, flannel; a piece of cork or a halfpenny wrapped up in a handkerchief is generally handy.

Handy
pads.

First
dressings.

I have dressed many scalp wounds in an emergency with common pins and worsted, and a light pad on the top, with excellent results, and if I had the arrangement of the "Soldiers' first dressing" it certainly should contain a packet of good-sized pins and some worsted or strong thread.

Cuts on
the face.

You may have to deal with lacerations and cuts of the face; if there is not much bleeding, direct your attention in the first place to cleansing the wound. It is no easy matter to cleanse some wounds thoroughly, and will require patience and gentleness on your part. If an artery has been cut, the hæmorrhage will be profuse. You can check it by pressing the bleeding point firmly against the jaw, or, that failing, note the position of the facial artery

coursing over the angle of the jaw; apply a pad there as well as over the wound, and bandage firmly.

I have shown you the position of the carotid arteries; do not forget it, for wounds of these vessels are generally fatal *at once*, from the immense loss of

Wounds of
the neck.

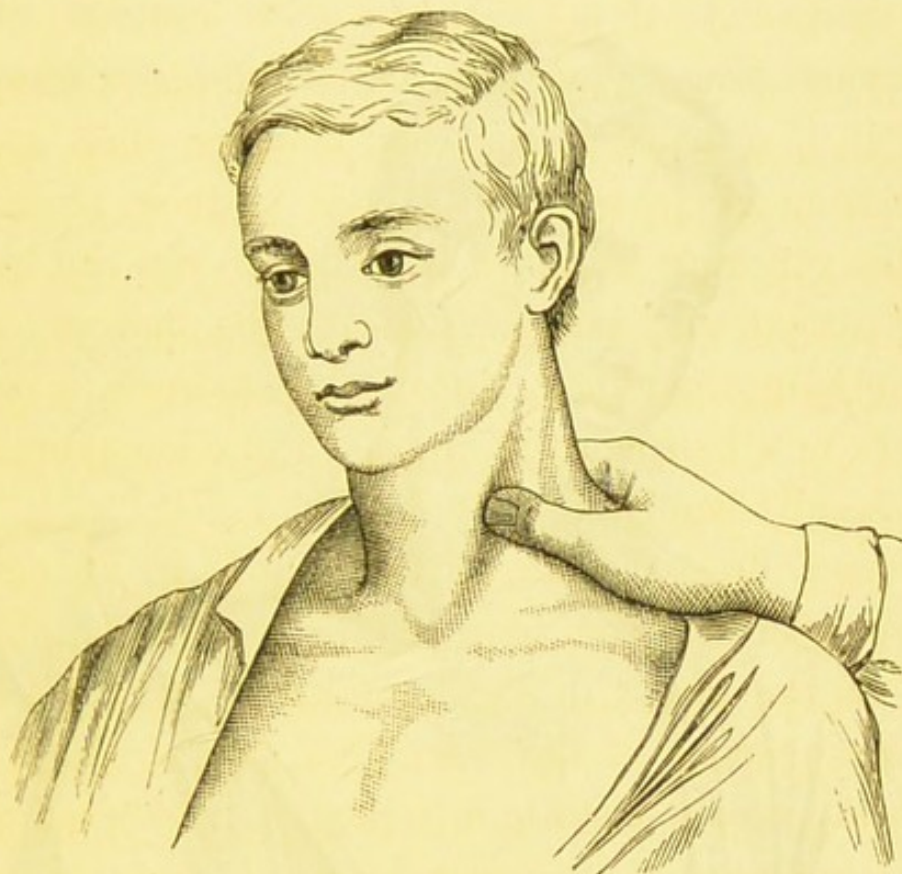


FIG. 23.—DIGITAL COMPRESSION OF THE CAROTID ARTERY.

blood. They are not frequent in ordinary life, except as the result of attempts at suicide or murder; the majority of suicides even fail to cut the carotids, but divide the jugular veins only. Should you be called to act in one of these dreadful emergencies, you must do your best to stop the bleeding by pressing the injured artery with all your strength backwards against the spine in the position over the vessel

and nearest the heart, as indicated in the illustration, and, if your thumb tires, place the other on it in much the same manner until medical assistance arrives. Any attempt on your part to put on a compress will assuredly be attended by a fatal flow; so digital compression is your only chance. It is as

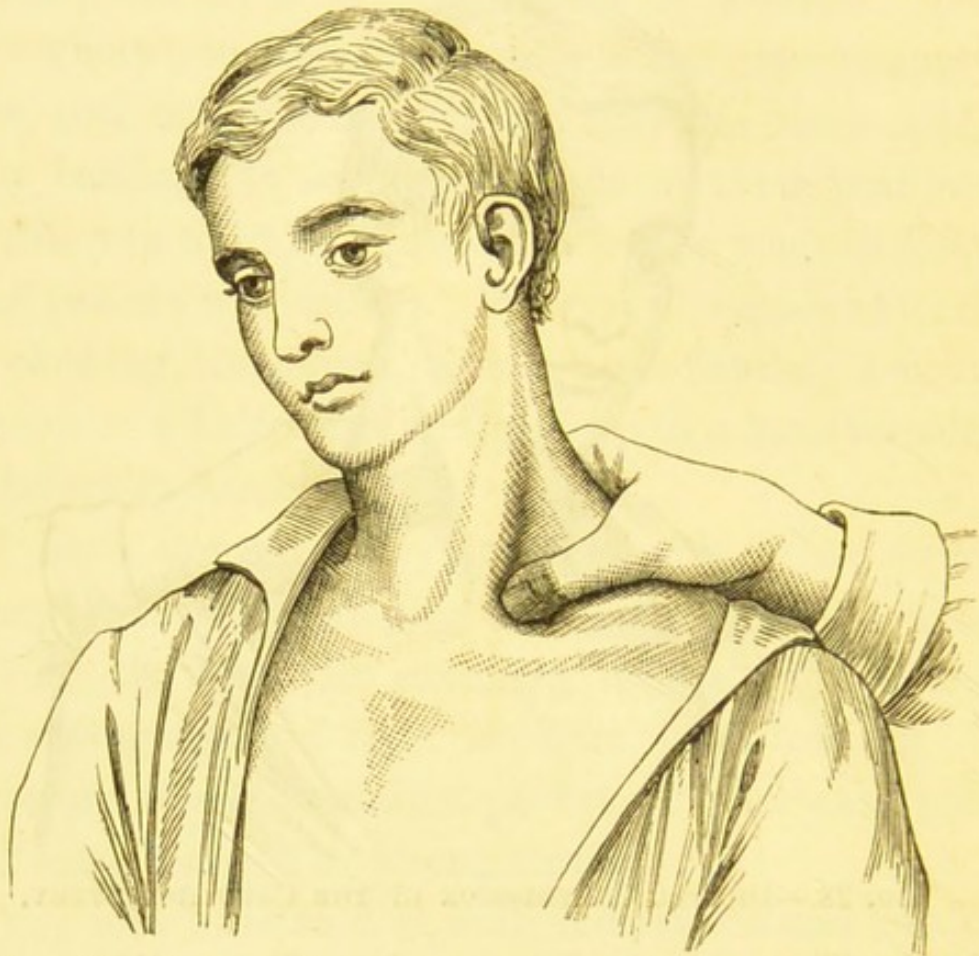


FIG. 24.—DIGITAL COMPRESSION OF THE SUBCLAVIAN ARTERY.

well to get some one to help and control the upper end of the artery as well.

Upper
limb.

Subclavian
artery.

Axillary
artery.

The upper limb is supplied by a large artery which lies behind the collar-bone and crosses over the first rib down into the armpit. You can, by firmly pushing your fingers down behind the middle of the collar-bone, feel the artery pulsating, and you can

also find it lower down by thrusting your fingers well up into the armpit. In its course down the arm, it lies along the inner edge of the large muscle of the arm (the *biceps*) down to the elbow, where it divides into two branches, one extending down the outer side, the other down the inner side of the forearm. They become more superficial near the wrist, and pass on into the hand to form communications with

Brachial artery.

Radial artery.

Ulnar artery.

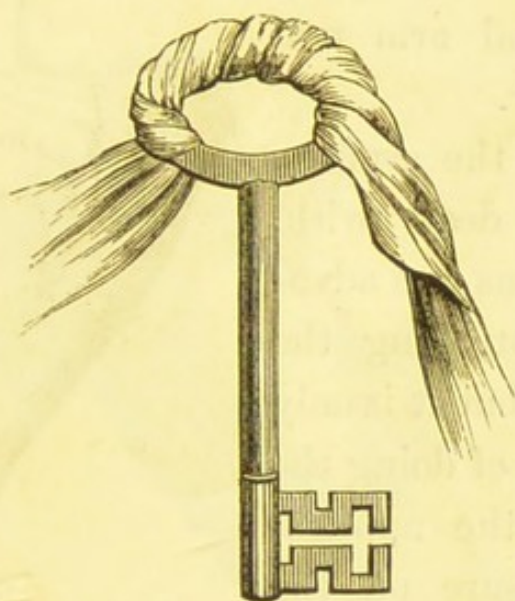


FIG. 25.—HANDLE OF A DOOR KEY, PADDED.

each other in the palm, which are known by the names of superficial and deep palmar arches, and from the convexities of which small branches are sent to supply the fingers.

Wounds of the armpit are always serious. If there is much bleeding, push your thumb well up into the wound and press the vessel firmly against the bone whilst you make out the pulsation of the subclavian where it crosses over the first rib; then

Wounds of the armpit.

squeeze well down. A padded key is recommended, but it takes time to find a key, and yet more to pad it; so make use of your fingers and thumb, and get some person to make you a large pad—say the size of a cricket-ball—push it well up into the armpit, bring the arm to the side of the chest (all the while controlling the subclavian), and apply your triangular bandage round arm and chest together.

Wounds of
the arm.

Wounds of the arm are more easily dealt with. Different means are advocated for controlling the hæmorrhage, but it is only different ways of doing the same thing—the application of pressure on the heart side. The readiest method is to compress the artery against the bone;

you have full control over it, and can use any amount of pressure until the doctor comes; but should one not be at hand, you must use other means. Esmarch's elastic tourniquet is supplied by the Ambulance Association. To fix it on the arm, all you have to do is to bind it round the arm, stretching it out at every turn, taking care that each fold corresponds with the one underneath, finally tying

Esmarch's
elastic
tourniquet.

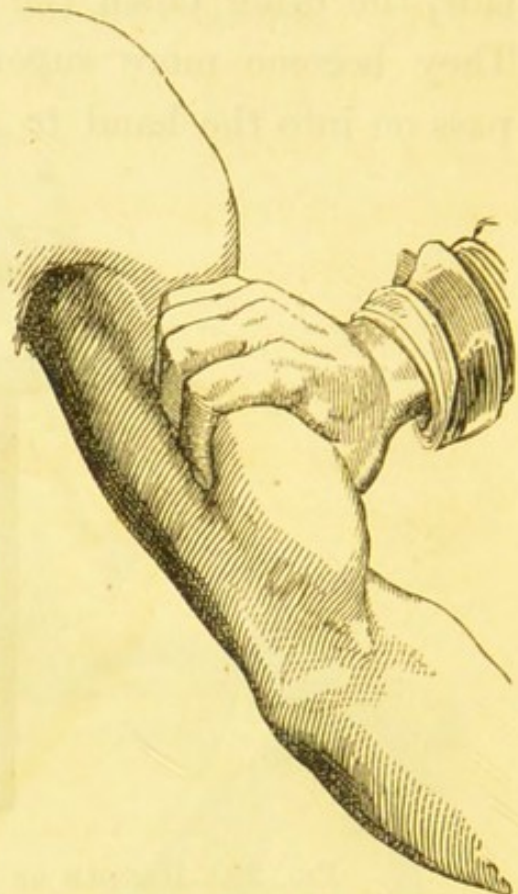


FIG. 26.—DIGITAL COMPRESSION
OF THE BRACHIAL ARTERY.

the tape to prevent its unlapping. Esmarch also recommends that braces should be worn of some elastic material, and showed at the Health Exhibition his "tourniquet braces." These ought to be invaluable in war, as hæmorrhage on the field of battle carries off about one-fifth of those who die on the actual ground.

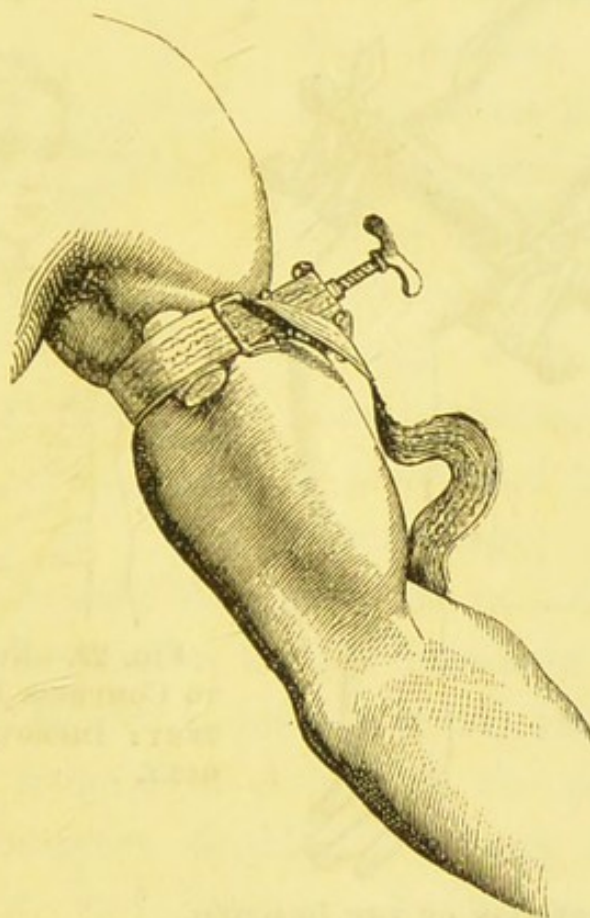


FIG. 27.—SECURING BRACHIAL ARTERY BY PETIT'S TOURNIQUET.

An improvised tourniquet can be made by putting a pad over the artery and applying your triangular bandage tightly; if you have not a pad, knot your bandage in the middle, and use it the same way; it is always useful. Necessity is the mother of invention, so, when needed, pounce upon anything: hand-

Improvised
tourni-
quets.

Völker's
stick-
tourniquet.

kerchiefs, ties, cloth, a stick, worsted, or even a smooth stone may be used as a pad. A form of tourniquet made with two sticks and tied with a strip of cloth or even string is very effective. It is called Völker's stick-tourniquet. A good thick stick or ruler placed in the armpit, and the arm bound

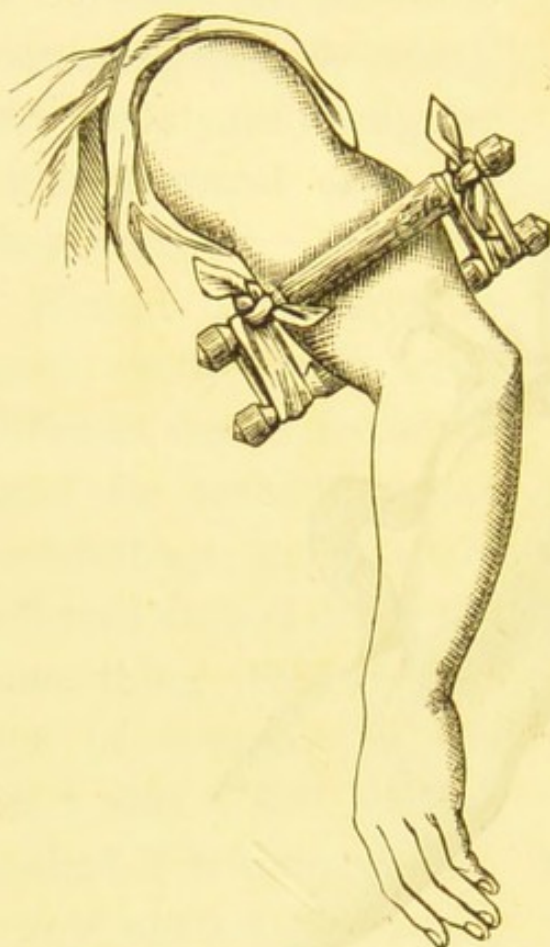


FIG. 28.—COMPRESSION OF THE BRACHIAL ARTERY BY VÖLKER'S STICK-TOURNIQUET.



FIG. 29.—RULER EMPLOYED TO COMPRESS BRACHIAL ARTERY: IMPROVED Tourniquet.

well and tightly to the chest, is another form of improvised tourniquet.

Arterial
bleeding
in forearm.

Arterial bleeding from wounds of the forearm are not infrequent, and are most commonly caused by glass. Sometimes one vessel only is divided; more rarely both. If called on in such an emergency, you

must arrest the bleeding by digital compression to the arteries, or by the use of the different kinds of tourniquet mentioned; search the wound with the finger to ascertain whether there is any glass in or

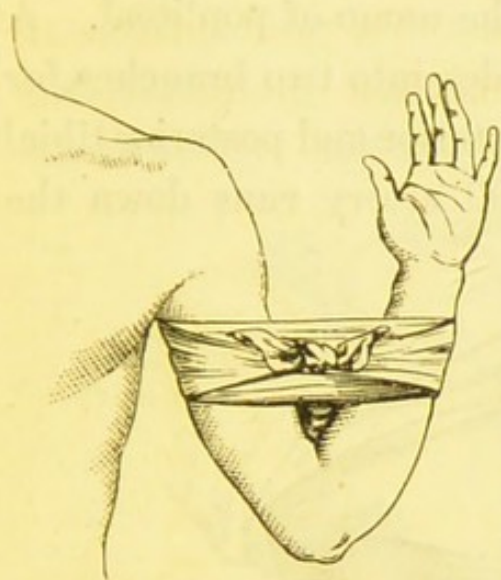


FIG. 30.—COMPRESSION OF ARTERY AT BEND OF ELBOW TO STOP BLEEDING FROM THE FOREARM OR HAND.

not; dress it lightly if there should be, and you cannot extract it; pad, if there is none, and bandage the arm, then place the hand on the opposite shoulder until the surgeon arrives or the patient is conveyed to hospital.

Deep wounds of the palm of the hand give rise to severe and troublesome hæmorrhage. The best

Wounds of the palm of the hand.

method of treatment is to make the patient lie down; you elevate the hand as well as the whole limb, wash thoroughly with cold water. I prefer the cleansing even to the removal of clots; pad the palm with a graduated compress, double the fingers and thumb tightly on it, and bandage—boxing-glove style; then bend the forearm on the upper arm, and let the wounded hand rest as nearly as possible on the same shoulder.

I now come to the lower limb, and you will see that the treatment for restraining arterial bleeding is in effect the same as for the upper. Its blood supply is derived from a large artery—the femoral

Lower limb.

Femoral artery.

Popliteal
artery.

Anterior
tibial
artery.

—which enters the thigh midway at the fold of the groin. For a certain part of its course it is near the surface, and can easily be felt beating; it descends on the inner side of the thigh to the back of the knee-joint, where it takes the name of popliteal. A little below the joint it divides into two branches for the supply of the leg, the anterior and posterior tibial arteries. The anterior tibial artery runs down the

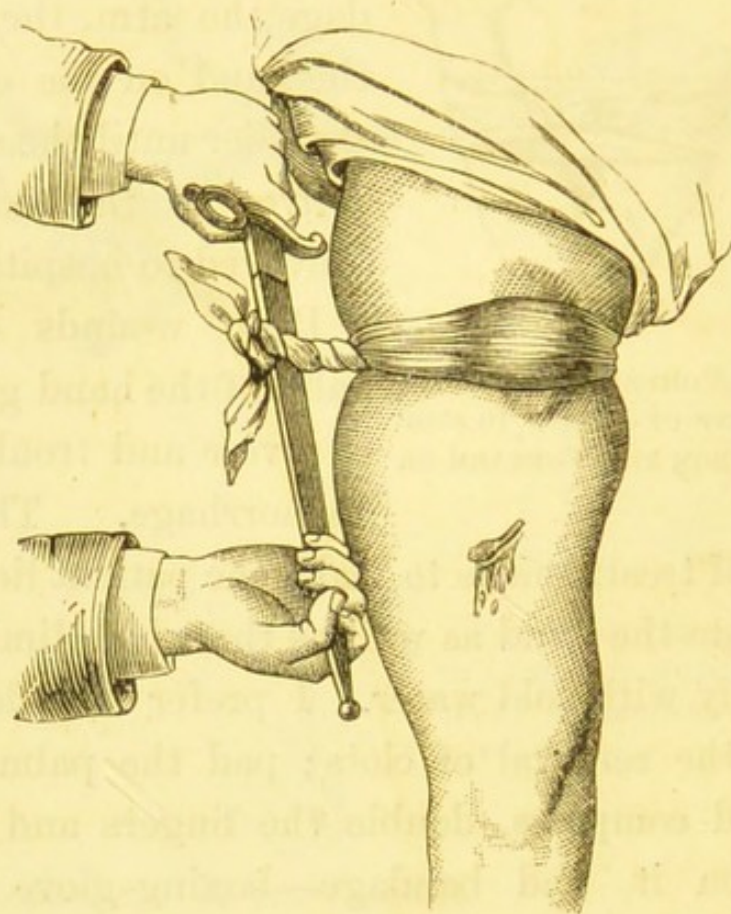


FIG. 31.—COMPRESSION OF FEMORAL ARTERY BY AN IMPROVED TOURNIQUET.

Dorsal
artery.

fore part of the leg; it is deeply seated at first between the muscles, but can be felt low down in front of the ankle-joint; it then becomes the dorsal artery, and sends a branch through the foot to communicate with the plantar arch, and then supplies

the great toe. The posterior tibial artery descends ^{Posterior tibial artery.} the back of the leg, and is also deeply placed at first, but comes to the surface behind the inner ankle. In the sole of the foot it divides into the external and internal plantar arteries. The external receives the ^{External plantar artery.} communicating branch above mentioned (from the dorsal artery), and forms an arch, from the convexity

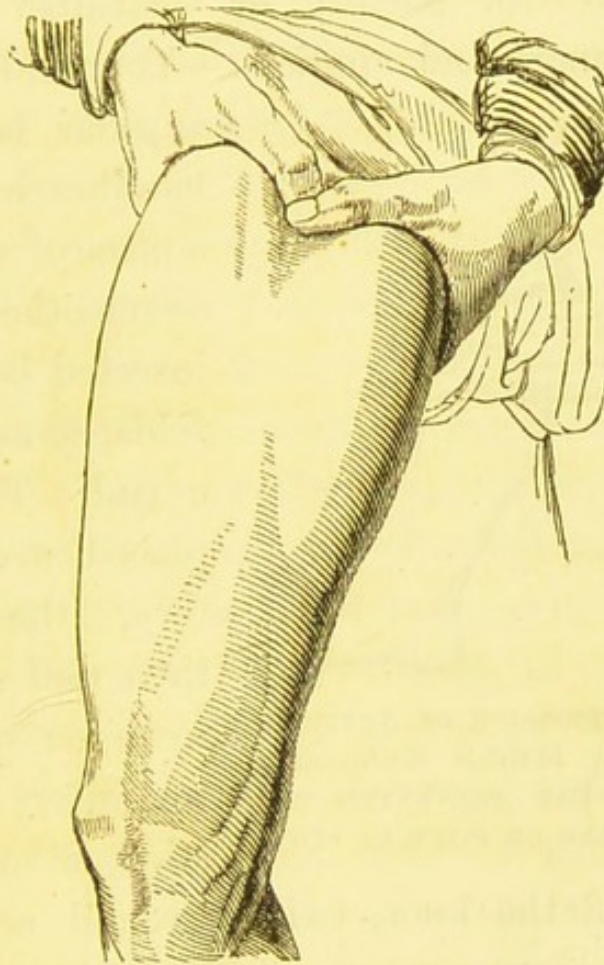


FIG. 32.—DIGITAL COMPRESSION OF THE FEMORAL ARTERY.

of which branches pass off to the toes. The internal ^{Internal plantar artery} is much smaller, and passes along to the inner side of the great toe.

If you compare the distribution of the arteries in the upper and lower limbs, you will observe a similar

plan of arrangement, the only real difference being that there are *two* arches in the palm of the hand, and only *one* in the sole of the foot.

Wounds
of the
thigh.

Arterial wounds of the thigh must be treated at once by digital compression above the wound. If you have not an Esmarch's tourniquet with you, you must improvise one, and the best is that known by the name of "the garrot," or "Spanish windlass." It is thus made and applied:—You fold your tri-

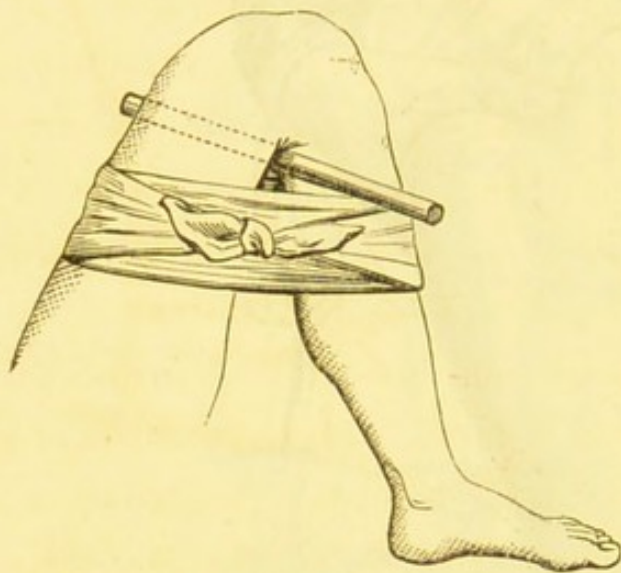


FIG. 33.—COMPRESSION OF ARTERY BY PAD IN HOLLOW BEHIND KNEE-JOINT: BANDAGE AND PAD PREVENTED FROM SLIPPING BY RULER OR PIECE OF STICK.

angular bandage or handkerchief narrow, a piece of wood, cork, or smooth stone being inserted between the folds, so as to act as a pad. The pad is placed over the artery, the bandage then tied sufficiently loose on the outside to insert a ruler, stick, or rod between

the limb and the knot, twisted round and round; the leverage is very great and effectual.

Wounds
behind
knee-joint.

Arterial bleeding from wounds at the back of the knee-joint or ham are to be treated in the same way—by digital compression at once, and the application of a tourniquet—as in wounds of the thigh.

Wounds of
the leg.

Arterial bleeding from wounds in the leg can be arrested by the never-failing finger in the wound

itself, or by compressing the artery by means of a pad in the ham, which I think a much better way than bending the leg backwards on the thigh, as the patient cannot endure that position long. Should you fail in arresting the bleeding by either of these means, you must apply a tourniquet on the artery high up in the thigh. Where an artery is wounded above the instep, you will have no difficulty in stopping the bleeding by a well-placed pad and bandage.

In dealing with wounds of the sole of the foot it is Wounds of the foot. important that a careful cleansing of the wound be made, and that all dirt and any foreign body should, if practicable, be removed, as it might be a source of irritation, and more likely to end in lockjaw and tetanus. Hæmorrhage may be easily controlled by a well-adapted, graduated compress and elevation of the limb. In extensive wounds you may have to pad the posterior tibial and anterior tibial arteries, as well as the peroneal, a branch of the posterior tibial, at the outer ankle. These are the positions in which you should place your pads, inside and outside ankle-joint and then front of instep; do not forget them. It will, however, only be in extreme cases that you will have to use so many.

To show you how important digital compression Importance of digital compression. is when properly applied, I will quote you what Surgeon-General Sir Thomas Longmore relates in his work on "Gunshot Injuries." He says:—

"A young Austrian soldier arrested the bleeding from the injured femoral artery in his own left

thigh for four hours by forcibly thrusting his left thumb into the wound, and so preserved his own life until treated by the surgeon."

Venous
bleeding.

Venous hæmorrhage, although not considered as dangerous as arterial, is nevertheless equally as fatal when large veins, such as the jugulars and other large trunks, are wounded.

Varicose
veins.

In controlling such bleeding, you must raise the wounded part above the level of the body, and apply firm pressure with your pad on the vein *farthest from* the heart. For instance, suppose you are near a person the subject of varicose veins, a very common condition, and one of the enlarged veins happens to give way, what are you to do? Place your patient in the horizontal position, lay him or her flat on the back, raise the bleeding limb, loose any garter or other constriction or obstruction to the flow of blood to the right side of the heart, place your thumb *below* the part from where the blood issues, and you will find it stop, if raising the limb has not already arrested it; then apply your pad and bandage. Where the veins are considerably enlarged the valves are almost useless, so that, as a precaution, it will be as well to place a pad above and below the wound, or even upon it. Where the jugulars are opened, as in the case of wounded carotids, use digital compression until a surgeon arrives. In profuse bleeding from the nose, remove all clothing from the neck and apply cold water to the forehead and nose. A very successful manœuvre is to make

Nose
bleeding,

the patient stand against the wall with the hands elevated above the head. Should these measures fail, plugging the nose is unavoidable. Although hæmorrhage or bleeding from the lungs comes under the treatment of the physician rather than of the surgeon, you ought to know what to do before he arrives. Place the patient on a couch or bed, *raise* and support the head and shoulders; loose *all* tight clothing; apply a handkerchief broadly over the chest wrung out in a mixture of vinegar and water, in the proportion of one of the former to four of the latter. Cold water may be given, and ice to suck. Do not move the patient or give stimulants.

In simple wounds of the abdomen, do not attempt anything more than cleansing and protecting the wound by a compress, and the application of a flannel roller round the body. Should the wound, however, be extensive (and you cannot procure the immediate assistance of a surgeon), permitting the protrusion of some portion of intestine, you must endeavour, by the use of a cloth or clean sponge wrung out in warm water, to return the bowel and close the wound by a broad strip of plaster, on the top of which place a sheet of cotton wadding, finally completing the dressing by a broad flannel roller bandage.

Bleeding may occur from the spontaneous or accidental rupture of an internal artery or vein, and we call it internal hæmorrhage. It may only be surmised by the sudden faintness and pallor of the

Wounds
of the
abdomen.

Internal
hæmor-
rhage.

patient, or it may be more clearly indicated by its passage through mouth or rectum, or be voided with the urine. Your duty will be to see that the patient lies down, is kept perfectly quiet, and nothing administered to him but cold water, or brandy and cold water, until the doctor has seen him.

General instructions in cases of hæmorrhage, &c.

In all cases of bleeding, from whatever source except the lungs, make the patient lie down flat; don't wait until fainting comes on—do it at once, if not on a sofa, get something to put under him if you like, but let him down on the floor or anywhere. Having stopped the bleeding by digital compression in the first instance, now see that all obstructions to the circulation are removed, and treat in the manner instructed.

When you are compelled, through inability to get a surgeon, to dress wounds, thoroughly cleanse them with cold water, and if there is a little carbolic acid in it, all the better. The lips or edges should be drawn together and retained by plaster as best you can; in its absence, by the careful application of your pad and bandage. Cotton-wool, thickly and evenly applied over your plaster or pad, serves to keep out dust and dirt, and the air, which is loaded with germs; so that in healthy constitutions, with proper rest, you may expect Dame Nature to effect a speedy cure.

NOTE TO LECTURE III.

The Lecturer will require :—

Three Society's Diagrams.

Splints, Padding, Newspapers, &c.

Bandages.

Diagrams of Fractured Arm in splints ; Fractured Thigh put up with broom-handle ; Fractured Leg in splints ; Straw splint.

Pillow.

Umbrella.

Thick cardboard.

LECTURE III.

ON FRACTURES.

FRACTURED or broken bones are common enough, and you may be of the greatest service to those so unfortunate as to meet with such injuries, by timely aid in securing the broken limbs by suitable apparatus, and restraining them from further damage during the journey home or to hospital.

A bone may be broken by *direct* or *indirect violence*—*i.e.*, where the injury results at the place of Direct and indirect violence. infliction, or, indirectly, where it is at a distance; thus, a broken collar-bone may occur by falling on the shoulder, or a fractured skull by falling on the feet, the upper vertebræ being driven through the large hole at the base of the skull called the foramen magnum, enlarging and thus fissuring the occipital bone. Sometimes a rib gives way by being squeezed in a crowd or crushed against a wall. *Irregular muscular action* is capable of breaking a bone, and the patella is frequently fractured in this way; more rarely, the thigh-bone, or femur.

Fractures are said to be simple when the bone Different kinds of fractures. only is broken; compound, when in addition there is a wound which leads down to the broken end or

ends, communicating with the external air; comminuted, when the bone is broken in more than one place; complicated, when accompanied by bleeding from a wounded vessel, or the penetration of any organ by a sharp fragment. The pleura and lungs are frequently opened and injured by a broken rib when driven inwards.

First aid. Having ascertained that a fracture has taken place, secure it by some means from being moved about, and thus prevent what is simple from becoming compound or complicated, before the removal of the patient from the scene of the accident. You must understand that my teaching of the methods of giving first aid, which I demonstrate, however well you may comprehend them, do not justify you in attempting to reduce fractures, or "set" broken bones, as it is called. Your duty is simply to apply splints, improvised or otherwise, as restraining agents.

Never attempt to tear off the clothing; always cut it off, or slit up with knife or scissors. In fractured arms, if there is any objection to this proceeding, always take the clothing off first from the opposite side to the injury.

Signs of a fracture.

What are the signs of fracture?

First—Loss of power in the limb, and shortening.

Second—Pain and swelling, sometimes very great.

Third—Deformity, that is, change of shape on comparing it with the other limb.

Fourth—On reducing, or putting the bone in its natural position or condition, which may be done by

gentle extension and then leaving go ; it immediately resumes the old position.

Fifth—On handling gently, you can feel, and sometimes even hear, the grating of one end of the bone against the other : this is called crepitus.

All manipulation should be conducted with great care ; the less the better. If you can make out a bone is broken without the removal of the clothing, put it up temporarily as it is ; the clothing will help to make padding for your splints.

What are the signs of dislocation, and how do they differ from those of fracture ? Signs of
dislocation.

A dislocation means the displacement of a bone, either partial or complete, from its socket ; therefore :

First—The injury must necessarily be at a joint.

Second—The limb is fixed or moved with great difficulty and great pain.

Third—As a general rule, gentle manipulation or extension will not bring it into its natural position, but, should it do so, it will stop there.

Fourth—There is no grating or crepitus.

Temporary aid in such cases is best given by supporting the upper limb in a broad sling, and by applying a splint to the lower limb to prevent its being shaken or jolted.

If the fracture be on the vault of the skull, there will most likely be a wound, so it will be a compound fracture, and the bone may be seen or felt at the bottom of it on placing the finger in to restrain the Fractured
skull.

hæmorrhage. If the fracture is severe, and communicates with the interior, and has injured the brain, the patient will most probably be quite unconscious.



FIG. 34.—CHIN-SLING OF
HANDKERCHIEFS FOR A
BROKEN LOWER JAW.

If the base of the skull be the seat of fracture, blood gushes out from the mouth, nose, or ears; or sometimes only a thin, sticky, and bloody discharge comes from the ears, the patient being quite unconscious. Place him in the re-

cumbent position, with the head and shoulders slightly raised; cover him with a blanket, and apply a wet hand-

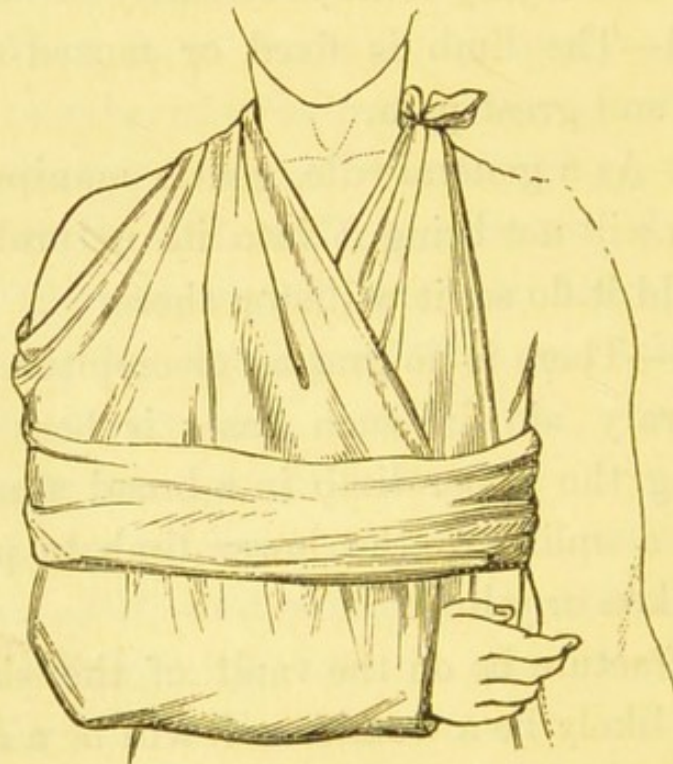


FIG. 35.—BANDAGE FOR BROKEN COLLAR-BONE SHOWING OUTSIDE
POSITION OF ROLLER.

kerchief all over the head, after having dressed any wound.

Fractured jaw is characterized by the open mouth, ^{Fractured jaw.} inability to speak properly; the teeth will be uneven, and blood most likely coming from the gums; you can safely put your finger in and tell the patient to bite. Let him wash the mouth out copiously with cold water, to be ejected and not swallowed. Raise the jaw into its natural position, apply your bandage or two handkerchiefs, as in figure 34.

Fracture of the collar-bone, or clavicle, is a com- ^{Fractured collar-bone.} mon hunting or football occurrence. The patient will complain he cannot raise the arm above the shoulder, and of pain on *attempting* to do so; the head has an inclination *to* the injured side; on feeling along the *bone*, you will feel the inequality and grating; and, if the fracture be in the middle, the bone can be seen sticking up.

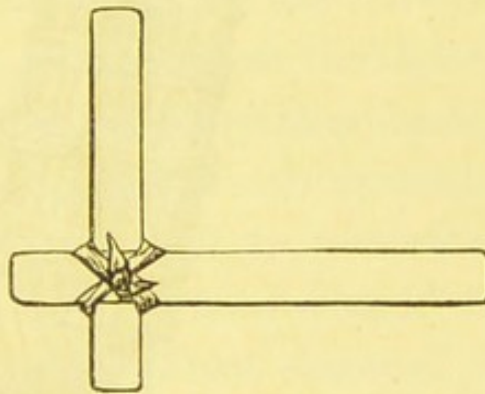


FIG. 36.—CANTLIE'S IMPROVED ANGULAR SPLINT.

Treatment. — Make a large soft pad, and put it in the armpit; it must be large, or it will not be of any use; bandage with a broad roller, the arm being well brought to the side, and then sling the forearm. No deformity results if you can keep the patient on his back for ten days or so.

Fracture of the arm-bone, or humerus, is charac- ^{Fractured arm-bone.}

terized by pain, swelling, and inability to move the arm; deformity, and grating.

Treatment.—Make three or four short, broadish splints, and pad them well; book-backs are suitable; place one inside and the other outside the arm; if you have four, place one at the back and another in

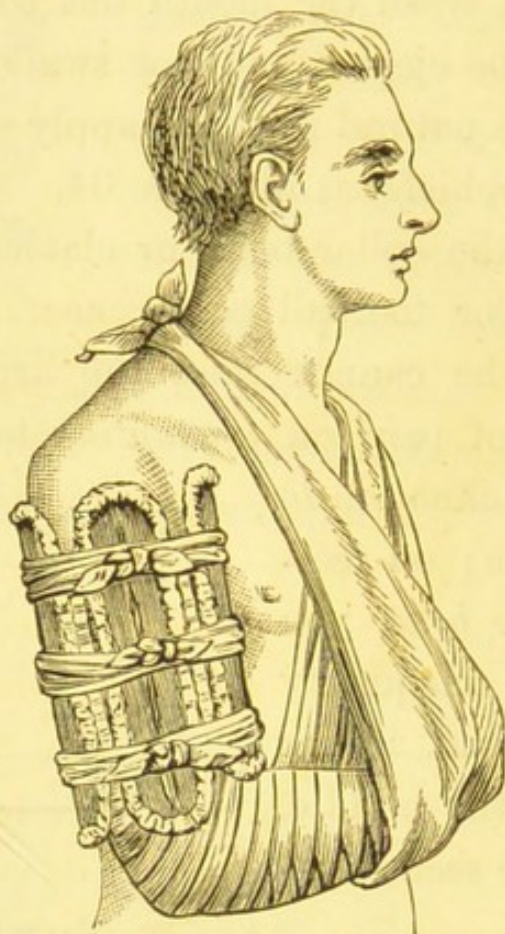


FIG. 37.—SPLINTS FOR A BROKEN ARM.

front. This is the order of procedure. Next secure them in position by bandages or straps; a roller bandage should be applied from the fingers upwards; then sling the forearm.

Fracture
of elbow-
joint.

Fracture of the elbow-joint is characterized by inability to lift the arm, pain, swelling, and grating or crepitus. Make an angular splint by

crossing and securing two pieces of wood or strong cardboard at right angles ; pad well ; place the arm on the splint with the thumb upwards, and secure carefully with your triangular bandages ; then place it in a broad sling.

In fracture of the forearm, one or both bones may be broken ; where both are broken, you will have no difficulty in recognizing the fractures, but where only one is broken there is sometimes a doubt. Pass your finger gently down the bone, and you will find some inequality ; by turning the hand round whilst your finger is on the suspected spot, you will get the grating.

Fractured forearm.

Treatment.—Make or procure two well-padded splints, one for the inside, the other for the outside, and let them reach from the elbow to near the tips of the fingers ; apply your bandage or anything handy to secure them in position with the thumb upwards, and use the broad sling. It is well to remember that when you sling the forearm the hand should be slightly higher than the elbow. Treat fracture of the wrist in the same manner as that indicated for fractures of the forearm.

Fracture of the fingers is accompanied by a good deal of pain and swelling ; grating is not easily felt. If you have any doubt, treat suspected injuries as fractures ; then you cannot get wrong.

Fractured fingers.

Treatment.—Put the whole hand on a well-padded splint, and secure it with your triangular bandage ; or make a pad with a small pocket-handkerchief,

close the fist on it, and apply your bandage boxing-glove fashion.

Fractured
ribs.

In fracture of the ribs, the patient will complain of a sharp pain in the side over the seat of fracture, relieved considerably by pressure. Cough causes great distress. On placing the hand flat on the chest over the injured part and telling the patient to take a deep breath, grating will be felt.

Treatment.—Apply a good broad flannel roller tightly round the chest to restrain its movements, and secure it with safety-pins. The triangular bandage may be used, but it will require two. Sling the arm of the injured side.

Fractured
thigh.

Fractured thigh is a very serious accident, and keeps a person in bed at the least six weeks. The patient cannot stand, much less walk: the foot is turned outwards and the leg shortened; in addition, there will be great deformity, swelling, &c., and, on gently manipulating, you will have considerable crepitus, or grating.

Treatment.—Place the patient on his back, get some one to extend and steady the leg (demonstrate), procure a long splint—handle of broom, clothes-prop, two billiard cues, a rifle, or single-barrelled gun would do—a girder, in fact. Well pad, and place the splint on the outside of the limb so that it extends from the armpit to the foot; use a broad roller round the chest and hips, and a narrower bandage above and one below the fracture; secure the splint down the leg by bandages, straps, hand-

kerchiefs, or whatever is to hand ; then fix the legs together and place your patient on a stretcher. For

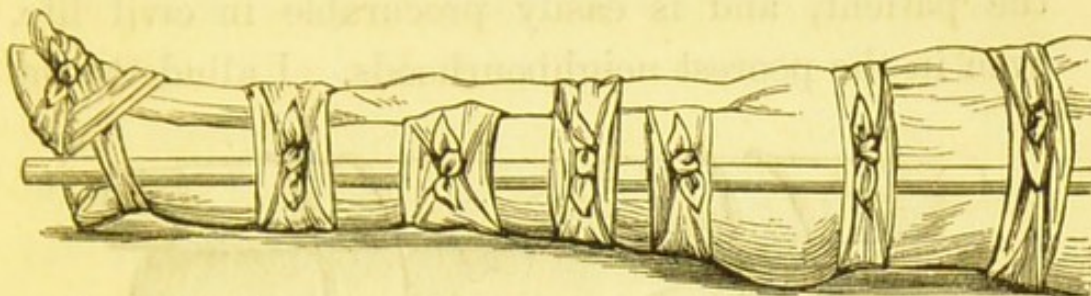


FIG. 38.—BROOM-HANDLE APPLIED FOR FRACTURED THIGH.

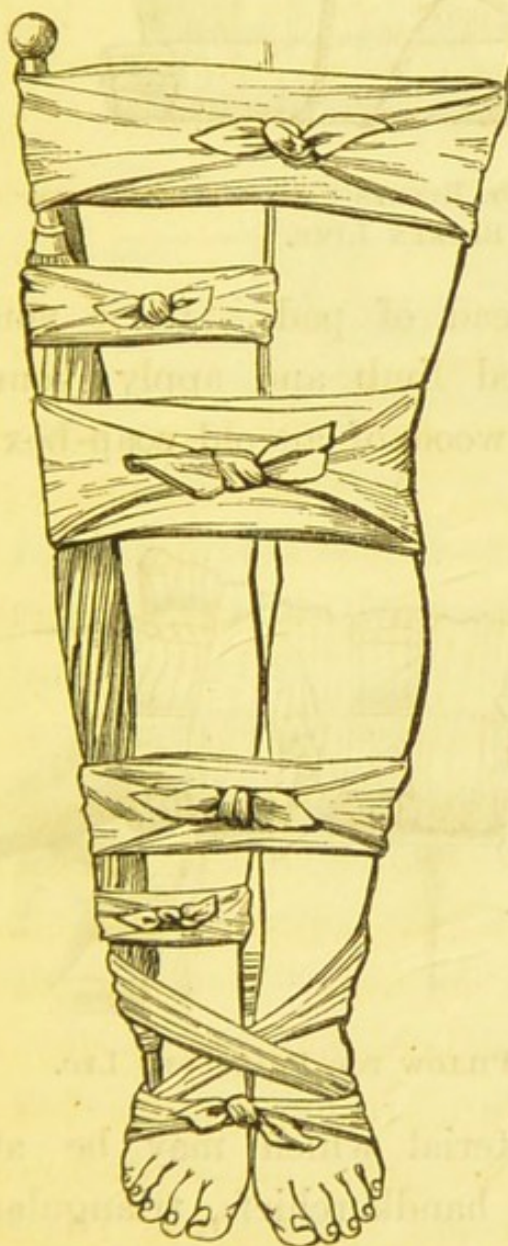


FIG. 39.—UMBRELLA EMPLOYED AS AN IMPROVISED SPLINT IN BROKEN LEG OR THIGH.

greater security, many place a splint on the inside as well.

Fracture of the leg will be accompanied by the usual signs, and in whatever part of the leg it may be, whether near knee joint or ankle, your object and treatment must be the same—*i.e.*, to reduce it as far as you are able, then maintain it in position by the application of splints and bandages. As before mentioned, sticks, straw rolled up, the scabbard of a bayonet, or anything accessible may be used

Fractured leg.

There is one form of treating such fractures,

at any rate temporarily, which I have never seen in print, but which I have used with great comfort to the patient, and is easily procurable in civil life, even in the poorest neighbourhoods. I allude to the

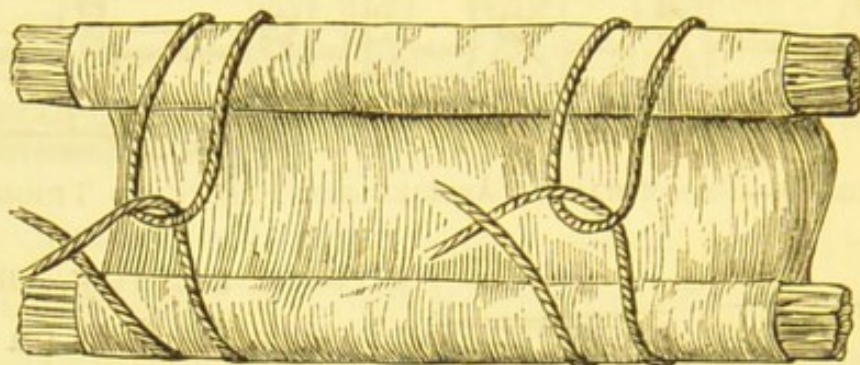


FIG. 40.--BUNDLES OF STRAW OR RUSHES USED WITH A CLOTH TO SUPPORT A BROKEN LIMB.

use of a soft pillow instead of pads. In it you gently place the fractured limb and apply your splints—made out of the wood of an old soap-box,

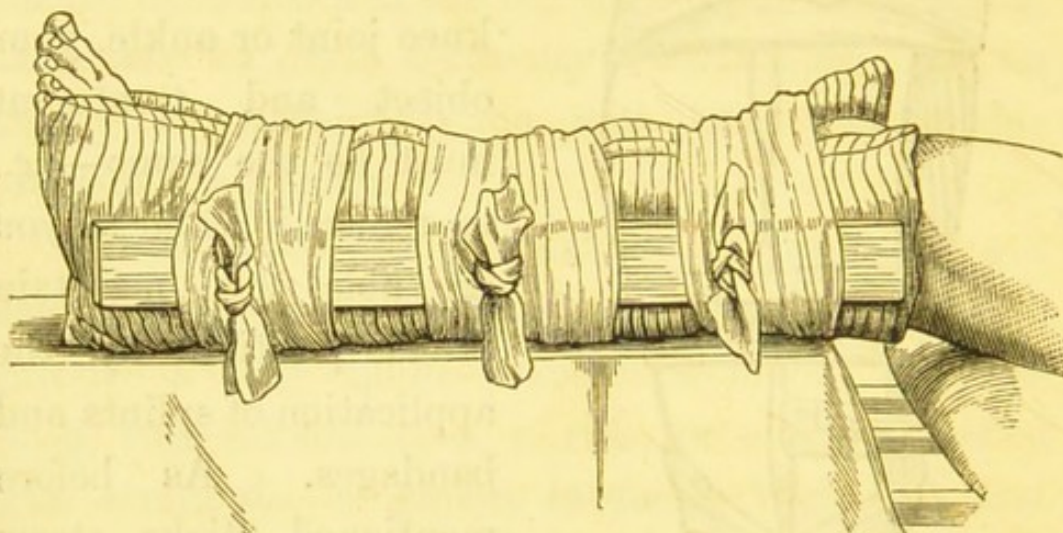


FIG. 41.—METHOD OF USING PILLOW FOR FRACTURED LEG.

or any other similar material which may be at hand; then apply straps, handkerchiefs, triangular bandages, or broad tape to secure them.

The knee-cap, or patella, is frequently fractured, ^{Fractured patella, or knee-cap.} either from direct injury or the result of muscular contraction in attempting to recover oneself after slipping. The limb is perfectly useless, the patient being unable to stand up on it or to raise it. The leg is *not* shortened, but the two fragments of bone can be readily felt, and, on the knee being bent, are

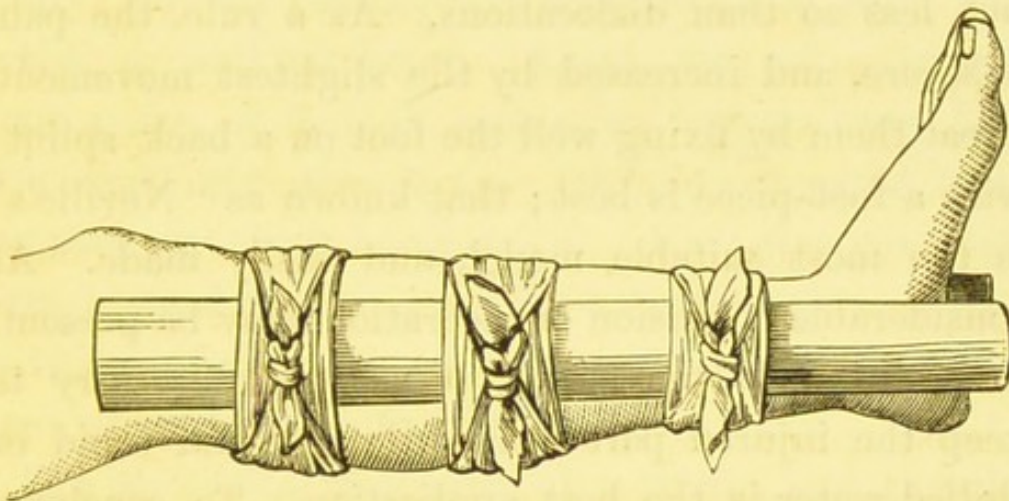


FIG. 42.—WOODEN SPLINTS FOR A BROKEN LEG.

further separated. You must avoid increasing the separation of the fragments. This will best be done by a strong *back* splint of umbrellas, boarding, &c., running the whole length of the thigh and leg, tied on firmly with triangular bandages or handkerchiefs, &c. You may attempt to bring the fragments together by a figure-of-8 bandage. Keep the limb as straight as possible, and well raised.

In fractures of the tip of the elbow, or olecranon ^{Fractured elbow, or olecranon process.} process, the power of extension is completely lost. If you should come across such a case—and they occur occasionally from falls, blows, or muscular action—you will find a piece of bone drawn up the

back of the arm. Try to bring it down to the elbow and secure it there, at the same time applying an anterior splint from shoulder to tip of fingers.

These two accidents require considerable skill in dealing with, and not infrequently turn out badly, bony union not taking place.

Fractured
foot.

Fractures of the foot produce great deformity, but less so than dislocations. As a rule, the pain is severe, and increased by the slightest movement. Treat them by fixing well the foot on a back splint; with a foot-piece is best; that known as "Neville's" is the most suitable model, and easily made. As considerable contusion or laceration may be present, in addition to the fixing, it may be necessary to keep the injured part constantly wet, and tepid or chilled water is the best application. To conclude, remember that you must handle a broken limb firmly but gently, by placing one hand above, and the other below the fracture, at the same time supporting it so that no more displacement of the broken ends takes place.

Strains, or
wrenches.

You all know what a sprained ankle means. Well, the wrench or strain of any other joint is followed by the same symptoms and the same results—viz., inflammation, which you may know by the pain, heat, and swelling. Movement is impaired and accompanied by great pain. On account of their seeming simplicity in the first instance, most people make light of such accidents, finding out, when it is too late, that they may be lame for life,

and it would actually have been better to break a leg, for then they would have been compelled to attend to it. I believe that in 99 per cent. of strains, more especially of the ankle or knee-joint, more harm is done by foolhardiness after the injury than the original injury first produced. For instance, you are walking or running, and your ankle gives way badly; you are conscious of a good deal of pain, but insist on walking home. Again, you are enjoying your game of football, and wrench your knee, but you could not give it up. Oh! no; it would look (as they say about here) so *soft*. Next day you find that, instead of giving up like a sensible person, you have been foolish for not doing so, and without great care you may be quite crippled.

The *immediate* treatment of a sprain, and that is what you are most concerned with, whether severe or otherwise, consists in the careful application of a roller bandage and absolute rest, with the limb elevated, preferably on a back splint for ankle or knee-joint, side splints and a sling for wrist or elbow; cold water ought to be applied over the seat of injury, but without disturbing the bandages.

A very common strain amongst labourers, colliers, and people engaged in lifting heavy weights, domestics hanging out clothes or hanging up pictures, &c., is strain of the lumbar, or back, muscles. It gives rise to great suffering when standing, walking, or attempting to turn over in bed, and in rheumatic subjects is very difficult to cure. If you

Strain of
the back.

should have to deal with such a case, send the patient at once to bed, and see that hot fomentations and bran poultices are unremittingly applied; later, a good flannel roller or belt will be of the greatest service.

Fracture or
dislocation
of the
vertebræ.

Fracture of one or more of the vertebræ, or spine, commonly known as a broken back, may or may not be serious. It depends greatly upon the extent of injury and its situation. In the severe form, pressure on the spinal cord takes place—whether from partial dislocation or not is immaterial—and, as a consequence, paralysis of the parts below the seat of injury. Your duty where such an accident happens is to consider it of the worst form of this injury. See that the patient is laid flat on his back and conveyed immediately to hospital on a stretcher; no other means of conveyance ought to be used, and the greatest care and gentleness should be exercised in the transit.

Contu-
sions.

Contusions or bruises are injuries caused by blows, falls, or squeezes, and vary in degree and danger, from the simple black eye to the fatal injury to an internal organ, such as the stomach, liver, spleen, or bowels. In these latter injuries the skin is not broken, the mischief is underneath, and the blood-vessels are torn and lacerated, and blood effused without its being able to make its way out of the body.

I remember a remarkable case of effusion of blood in a collier who came under my care. A large

quantity of *stuff*, as they call it, fell on him whilst he was in a bent attitude, and, without breaking the skin, ruptured a blood-vessel underneath. On examining him, his back felt like a water-cushion not quite full, from his shoulder-blade to the lower part of his back. Hot fomentations and scalded bran poultices give the most relief, at the same time promoting the absorption of effused blood.

The St. John Ambulance Association does not approve of other than a medical man reducing dislocations, therefore a detailed description of them is purposely omitted. The only one I wish to show you how to reduce is dislocation of the jaw, most frequently the result of yawning. You may recognize it by the open mouth; inability to articulate distinctly; the flow of saliva; when you examine it, contrary to what you find in fracture, *it is fixed*. Reduce it thus:—Guard your thumbs with a handkerchief, and place one on each side the teeth of the lower jaw as far back as possible, and *press* in a downward direction; you will then have the satisfaction of feeling it go back into its place if you execute the manœuvre properly.

Foreign bodies in the eye, pieces of grit, however minute, iron filings, and sand, give great pain, and cause the eye to inflame and *water*; this is in reality a good thing, as the tears may wash out the offending substance. A plan advocated by Dr. Ardavon Raye is to pull the upper eyelid well down over the lower, at the same time closing the nostril of the

Dislocated
jaw.

Foreign
bodies in
the eye.

opposite side with the finger or thumb, and then for the patient to forcibly blow the nose. If this does not succeed, turn the upper lid over a narrow pencil or probe by seizing the eyelashes, and the lid is then turned inside out ; then take a soft feather or camel's-hair brush and sweep it over ; the lower lid is easily managed by drawing it down and brushing in the same manner. If a particle is embedded in the clear portion of the eye, drop in some olive or castor oil, put on a bandage, and seek medical aid. In all injuries to the eye you can give great relief by fomenting with simple warm water or new milk, and you are sure of doing no harm. Lime, mortar, or acids in the eye are best treated in this manner, but if you use vinegar or alkalies be careful to use a very weak solution.

In the ear. Foreign bodies in the ear may in most cases be got rid of by gently syringing the ear, and I must caution you against any other form of interference ; poking at the foreign body, or trying to extract it by pins or wire, only pushes it farther in, and may cause permanent deafness.

In the nose. Foreign bodies in the nose are in most cases ejected by forcibly blowing that organ ; and such efforts may be excited by the use of snuff or smelling-salts ; if not successful, you must apply to the surgeon, who will most probably use the nasal douche.

Frostbite. Frostbite is of such rare occurrence in this country that you may never see such a thing ; however, in your travels you may be called upon to give

assistance. Such an accident may be recognized by the pallor of the part, its extreme coldness, and loss of sensation. Rub vigorously with fresh snow in the first instance; *when* the circulation has returned, wrap the extremity lightly in cotton-wool or wadding, your object being the *slow* restoration of the circulation.

The lecturer should carefully show his pupils how to apply the splints—improvised or otherwise—and the different methods of securing them; while the pupils must use every opportunity of practising, so as to become proficient in their practical application.

NOTE TO LECTURE IV.

The Lecturer should have:—

Three Society's Diagrams.

*Two Diagrams of Sylvester's method of restoring
the apparently drowned.*

Two Diagrams of Marshall Hall's method.

Table of the varieties of Insensibility.

LECTURE IV.

SHOCK, OR COLLAPSE.

WHEN a person meets with an accident, whether a severe knock-down blow, such as being run over, without having bones broken, or shaken in a railway collision, or whether he has received a cut, stab, or compound fracture, the system is subject to shock over and above the pain and local injury. His face has an ashen hue, or a frightened, anxious expression; his features generally look pinched; he is faint and sick, and cold drops of perspiration stand on his brow; the pulse can be felt at the wrist, even though it be scarcely perceptible; the skin is cold and clammy; and, although so prostrate, he is restless, and wants to toss about; the breathing is shallow, and he has all the appearance of death. This is what we call collapse, or shock, and varies in degree from the extreme condition I have depicted to a passing faint feeling. Temperament, condition, and habit of life bear a certain relation to the capability of resisting shock. Trivial accidents in some people produce alarming symptoms, whilst in severe ones to others there is a remarkable absence of it. Women bear accidents better than men, and rally sooner. Collapse

may end in death even when the injury is quite insufficient to account for it. Death from lightning stroke is said to be by shock. Injuries to internal organs are always accompanied by extreme collapse.

Your duty in such cases will be to place the sufferer on his back, to administer stimulants, and promote the warmth of the body by blankets and a hot-water bottle or hot brick, wrapped in flannel, applied to the feet, at the same time cheering the patient up as well as you can.

Stunning.

Concussion of the brain, or stunning, is the result of blows on the head, and may be slight or severe, varying from momentary confusion to prolonged insensibility when the brain has received a great shake. It may end in death, the patient never rallying; or, after a prolonged period of unconsciousness and slow convalescence, in return to perfect health; more frequently, to impaired faculties of mind. When it is severe, the patient lies motionless; the skin feels cold; the pupils of his eyes are contracted; if you succeed in rousing him, he answers peevishly, and at once falls back into the old condition. When he gets uneasy and vomits, it is a good sign, and recovery quickly follows.

You must treat such a case by the lying-down position, with the head slightly raised; apply cold water all over the head, and warmth to the body.

Compression of the brain.

Compression of the brain from injury is caused by blows on the head driving in pieces or fragments of bones, or rupturing a blood-vessel, so that the brain

is unduly pressed upon, and its functions either destroyed or arrested. A wound of the head accompanied by insensibility, with one or both pupils dilated, will make you at once suspect what you have to deal with; it is a most dangerous condition, though not hopeless; lose no time in getting a surgeon; in the meantime, you may dress the wound as before instructed.

There are other states associated with insensibility without wounds, such as are known to you by the names of strokes, fits, faints, and certain forms of poisoning; and it is as well for you to know something about them.

Apoplexy, apoplectic fit, or stroke, is common to people advanced in years. A man is found, after a heavy meal or great excitement, insensible, with the face flushed and the mouth drawn to one side; if he attempts to speak, he fails to make you understand; the arm and leg of one side of the body are helpless, and perhaps devoid of sensation: if you lift them, they fall a dead weight, and there is no power of movement whatever. This constitutes a stroke; a vessel, from disease or inherent weakness, has given way, the blood effused cannot make its way out of the skull, accumulates and presses on the brain, thus causing the symptoms described. In bad cases the pupils are unequal in size, there is snoring, complete insensibility, and puffing of the cheeks with every breath.

Apoplexy,
or a stroke

Treatment.—As the patient will already be lying

down, you must raise the head slightly, and do not permit, if possible, of his removal, as thereby you increase the internal bleeding and lessen the chance of recovery. Apply cold to the head, and loosen all clothing about the body and neck wherever it feels tight. Stimulants must *not* be given.

Epilepsy. Epilepsy, fits, or falling sickness, is unfortunately a common disease, and, if once you see it, its horrible convulsions are not easily forgotten. Its peculiar characteristics are that, wherever the person may be, whether near the fire or on the brink of a precipice, with a cry or scream he falls like one shot (as a consequence, epileptics frequently bear marks of severe injuries), and is quite insensible; his limbs are convulsed; his face becomes livid, and the pupils are dilated; there is working of the mouth, and the tongue gets between the teeth, whilst foam and froth issue from the mouth; the breathing is laboured, and the head is turned to one side as if he were trying to look over his shoulder.

Treatment.—You cannot stop the fit; therefore the first thing you have to do is to save the tongue from being bitten. This is best done by rolling your handkerchief up so as to make it into a wedge, then place it between the teeth. Unloose the collar; in this you may have some difficulty, as the neck is so swollen, but nevertheless do it; do not restrain the convulsive movements roughly, only prevent the patient from hurting himself. When you think he is at death's door, a deep inspiration takes place, the

breathing becomes more natural, and the convulsive movements cease. After a fit, the patient is somewhat confused and stupid, and should rest quietly for some hours.

Hysteria has been well described as a mimicry of Hysteria. disease. It chiefly attacks weak women and nervous girls, and it is rarely indeed that injuries are received during an attack, as it hardly ever occurs except in the presence of witnesses. Excitement, laughing, and crying finally lead up to a semblance of a fit, and the patient flops down in a comfortable sort of way. A good douching with cold water is the most effectual treatment.

Syncope, or fainting, is the result of an insufficient Fainting. supply of blood to the brain. Such may be caused by loss of blood, by excitement, or failure of the heart's action. Giddiness is complained of; singing in the ears; loss of consciousness takes place, and the patient falls; the face is *pale* and the body motionless. Keep the patient on his back, rub the chest vigorously with the hand, and, as soon as he is able to swallow, administer stimulants.

Insensibility from strong drink is sometimes taken Inebria-
for apoplexy. It is always a dangerous condition. tion.
When a man is insensible from drink, his face is flushed; he will smell strongly of liquor; his pupils, although dilated, will be equal in size; breathing slow, pulse soft and quick, and the body cool; all the limbs equally motionless. In such a case, you must wrap him in blankets, douche the face and

head with cold water, tickle the throat with a feather to excite vomiting, and, if he can swallow, administer an emetic of mustard and water. Should it be necessary to remove the inebriate on a stretcher, see that the head and shoulders are well raised, as an insensible person, lying flat, might easily choke whilst vomiting, the latter being not unlikely to occur in such a subject. In the intoxication produced by drink, the body heat is lowered, according to Dr. Richardson, and elevated in apoplexy; but the latter statement remains doubtful at the onset of the attack, and at the time you would most likely be called upon to distinguish, so do not place too much reliance upon it.

TABLE OF THE DIFFERENT VARIETIES OF INSENSIBILITY.

1. Injuries of any kind . . .	Shock, or collapse.
2. Injuries to head . . .	{ Stunning, or concussion; Compression of brain.
3. Diseases of brain . . .	{ Apoplexy; Epilepsy; Hysteria.
4. Fatigue; Fright; Hæmorrhage; Debility; Failure of heart's action . . .	{ Fainting.
5. Poisoning . . .	{ Intoxication; Opium poisoning.

Poisoning
by opium
or laudanum.

In poisoning by opium, or laudanum, the patient becomes drowsy, *will* sleep, and gradually passes into a state of insensibility. The pupils are contracted to the size of a pin's point, the breathing becomes slower and slower, and the insensibility deeper and deeper. Until a medical man arrives,

you must keep the patient awake, walk him up and down, dash cold water in his face, make him drink strong coffee, and, if possible, make him vomit by administering a mustard emetic.

The bites of rabid animals and the stings of Bites, insects may require your attention. When a person is bitten by a rabid animal, at once suck it; then ligature the limb above the wound nearest the heart, and make it bleed; next suck again, and this you may do with perfect impunity, provided you have no wound on lips or tongue. It is a good precaution, however, to wash the mouth out with brandy before attempting the operation. Cleanse the wound afterwards with warm water. If a doctor is not easily procured, burn the bitten part thoroughly with a red-hot wire or nitric acid. In India they place a little gunpowder on the wound and then fire it. This treatment is also applicable to snake-bites, but you are not likely to meet with them in this country.

Stings of insects are sometimes severe, and cause Stings, a good deal of faintness from shock. Extract the sting if possible. In the case of stings from bees and wasps, a good plan is to use a watch-key. Apply sal volatile or vinegar and water; the latter is very soothing and always handy. Administer stimulants if necessary.

The following directions for restoring persons Drowning. apparently drowned are recommended by the Royal Humane Society:—Send for medical assistance,

Artificial
respira-
tion.

blankets, and dry clothing, but proceed to treat the patient *instantly*. The points to be aimed at are, *first* and immediately, the restoration of breathing; and, *secondly*, after breathing is restored, the promotion of warmth and circulation. The efforts to restore life must be persevered in until the arrival of the doctor, or until the pulse and breathing have ceased for *an hour*. Turn the patient on his face,

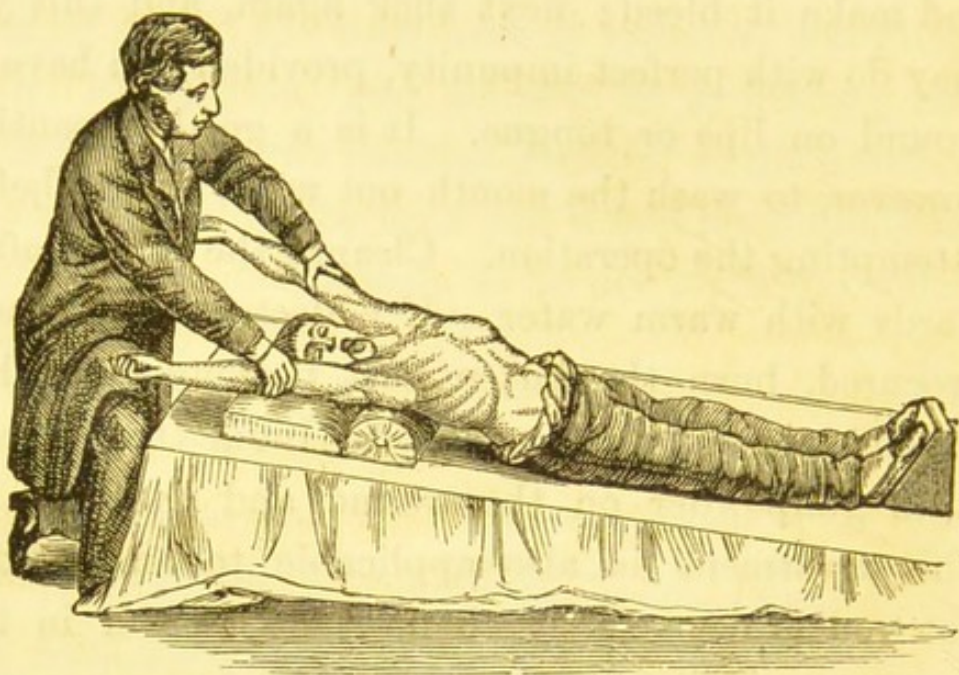


FIG. 43.—INDUCING INSPIRATION.

to let the water run out of the mouth and air-passages.

Sylvester
method for
restoring
the natural
breathing.

The following is the Sylvester method of restoring natural breathing:—

Rule 1.—To adjust the patient's position: Place him on his back or on a flat surface inclined a little from the feet upwards; raise and support the head and shoulders on a small firm cushion or folded article of dress placed under the shoulder-blades.

Remove all tight clothing from about the neck and chest.

Rule 2.—To maintain a free entrance of air into the windpipe: Cleanse mouth and nostrils; open the mouth; draw the tongue forward, and keep it forward. An elastic band over the tongue and under the chin will answer this purpose; or, better still, hold the tongue out with your handkerchief.

Rule 3.—To imitate the movements of breathing: First, induce inspiration. Place yourself at the

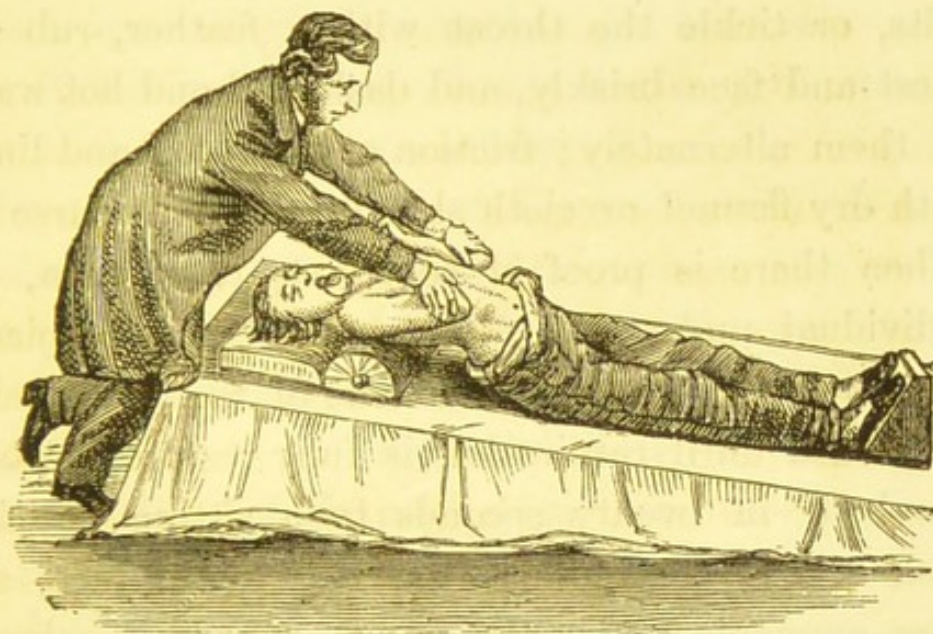


FIG. 44.—INDUCING EXPIRATION.

head of the patient; grasp his arms; raise them upwards by the sides of his head; stretch them steadily but gently upwards for two seconds (by this means fresh air is drawn into the lungs by raising the ribs). Secondly, induce expiration. Immediately turn down the patient's arms, and press them firmly but gently downwards against the sides of his chest for two seconds (by this means

foul air is expelled from the lungs by depressing the ribs). Thirdly, continue these movements.

Repeat these measures alternately, deliberately, and perseveringly fifteen times in a minute, until a spontaneous effort to respire be perceived (by these means an exchange of air is produced in the lungs similar to that effected by natural respiration).

Rule 4.—To excite respiration: During the employment of the above method, get some bystander to excite the nostrils with snuff or smelling-salts, or tickle the throat with a feather, rub the chest and face briskly, and dash cold and hot water on them alternately; friction of the body and limbs with dry flannel or cloth should be had recourse to. When there is proof of returning respiration, the individual, under medical supervision, may be placed in a warm bath, the movements of the arms being continued until respiration is fully restored. Raise the body in twenty seconds to a sitting position, dash cold water against the chest and face, and pass ammonia under the nose. Should a galvanic apparatus be at hand, apply the sponges to the region of the diaphragm and heart.

Treatment after natural breathing has been restored.—To induce circulation and warmth: Wrap the patient in dry blankets and rub the limbs upwards energetically. Promote the warmth of the body by hot flannels, bottles of hot water, heated bricks, &c.

When the power of swallowing has returned, a

little warm water, wine, brandy, or coffee should be given. Keep the patient in bed, and encourage sleep.

Should breathing be distressed, apply large mustard plasters to the chest and between the shoulders.

There are other methods of performing artificial respiration, *notably* that of Dr. Marshall Hall, which, if there is time, I will show you, but the object is the same—viz., to imitate the movements of natural breathing as closely as possible. Dr. Sylvester's plan is sufficient for the purpose, and has the great advantage that one person can perform it.

In cases of hanging, cut down the body at once Hanging. while you support it as well as you can to prevent injury by the fall; *do not* run off for some one to give you assistance; loosen the noose round the neck as well as anything tight, such as the collar, necktie, &c.; dash cold water on the face and chest; let the patient have as much fresh air as possible; rub the limbs with your hands or a dry flannel; if you have any snuff, ammonia, or smelling-salts, apply it to the nostrils; if the patient seems very bad, after having loosened the noose and clothing, resort to artificial respiration at once.

Persons may be suffocated by "choke-damp" in Suffoca-
tion. mines, charcoal vapour, the escape of coal gas, sewer gas, chemical vapours, foul air at the bottom of wells, the smoke in a burning house, chloroform, or carbonic acid gas in close and overcrowded rooms. Your duty

will be to remove the patient as expeditiously as possible into the open air. Unfasten the clothing; douche the head and face with cold water; if the breathing has stopped or is very laboured, perform artificial respiration.

Choking. Many people, instead of masticating their food properly, bolt it, and are always in danger of a piece sticking in the throat and blocking up the windpipe. Children put all sorts of things into their mouths—coins are usually favourites. In simple cases there is only irritation, and the patient tells you there is something sticking; but in bad ones the patient suddenly goes dark in the face, throws his arms about, clutches his throat, and falls down insensible. You must open the mouth, push your finger right back in the throat, and hook away the obstruction; if you cannot do so, or this manœuvre fails to excite vomiting and the expulsion of the offending morsel, push it well down out of the way of the windpipe, or rather the opening to it. In children, the old way of slapping the back whilst the stomach is pressed against the edge of the table is often successful.

**Burns and
scalds.**

Burns and scalds are injuries caused by excessive heat, or chemical agents. We recognize three different degrees according to intensity:

1. Mere painful redness (inflammation).
2. The formation of blisters.
3. Charring.

As I have mentioned in my first lecture, where

the action of three-fourths of the skin is in abeyance on account of its destruction, the patient is in the greatest danger.

Besides the fires at theatres and hotels, which claim so many victims, there are explosions of gas, gunpowder; falls into fireplaces; burning by petroleum from the careless handling of lamps; scalds from boiler explosions, the upsetting of the kettle, or heated liquids; chemical agents coming in contact with the skin, either purposely or accidentally, such as caustic potash or oil of vitriol. Women are more careless than men about fire, and their light clothes are easily set on fire.

When burns have been inflicted, in the first place you must be very careful how you remove the clothes; *always cut them away* in such a manner that they fall off themselves. Should any adhere to the skin, leave it, only cutting round it, and, if possible, never break blisters.

The best treatment for severe burns in the first instance is to use what is near at hand, for it is absolutely necessary that the air should be excluded from a burn as quickly as possible. Fatal damage may be done in a few moments by exposing a badly burnt chest, or abdomen, to the air before anything is ready to cover it with. Oil, flour, powdered whitening, or cotton-wool may be readily applied, poured on or dredged thickly, and the whole covered with cotton wadding or some light non-conducting material. Lime water and olive or boiled linseed oil,

in equal parts, has always had a great reputation, and goes by the name of carron oil. Where wounds are not very extensive, warm-water dressings are most soothing and efficacious. The patient's condition must be looked to, and treated for shock or collapse. Burns from strong chemicals require buckets of water pouring over them, or the patient may even be doused in the nearest pool of water. Acid burns should be counteracted by weak solutions of bicarbonate of soda; caustic potash or alkaline burns, by weak solutions of vinegar; then treat as above.*

Poisoning
by acids.

I have described opium and alcoholic poisoning to you under the head of insensibility, and now have to describe to you certain irritants and corrosive acids.

Of the irritants, caustic soda, caustic potash, and lime produce symptoms of burning; metallic taste in the mouth and throat, pain in the chest, followed by increasing general abdominal pain; the legs are drawn up; vomiting is invariably present, and violent purging. Administer weak vinegar and water, lime juice, or orange juice, in large quantities, and keep the patient warm.

Antidotes

Irritant and corrosive acids comprise sulphuric, nitric, hydrochloric (oil of vitriol, aquafortis, spirit of salt), carbolic, and oxalic acids. In *all*, as soon as the acid nature of the poison is recognized (by litmus), saccharated lime water should be given

* Weak solutions may be used in the following proportions: of carbonate of soda, not more than two table-spoonfuls to a tumblerful of water; of vinegar, one part to four of water for internal administration—one part to three, for external.

freely—in its absence, common whitening, chalk, or magnesia mixed with water—to neutralize the poison; afterwards, copious draughts of milk, white of egg, oil, or linseed tea. Common washing soda, potash, and ammonia should not be given in poisoning by oxalic acid. For carbolic acid, salad oil should be largely given. Of all acids this is the most painful, and oxalic acid the most quickly fatal.

With these acids, in addition to the symptoms of an irritant poison, the corners of the mouth will be marked, and the tongue and palate covered with a whitish coat of slough (like a coat of paint) if sulphuric, hydrochloric acid, or corrosive sublimate has been used; or with a yellow stain in the case of nitric acid.

Corrosive sublimate requires the administration of copious draughts of warm water, a mustard emetic, and the white of egg given freely.

In all other forms of poisoning, if you do not find stains on the lips, give an emetic at once—a table-^{All other forms of poison.}spoonful of mustard in water, or the same amount of salt with warm water. If there is any ipecacuanha at hand, a table-spoonful in half a tumbler of warm water acts powerfully. Tickle the throat with your finger or a feather. Thirty grains of sulphate of zinc may be sent for if a druggist lives near, and given with warm water. If you find stains on the lips, and do not know what the poison is, do not give an emetic, but administer olive oil, linseed oil, or salad oil and barley-water copiously.

Phos-
phorus.

As soon as the stomach has been relieved of the poison, the white of raw eggs, milk, barley-water, arrowroot, or whatever mucilaginous fluid can be most readily procured, is to be administered. Salad oil may generally be given, except in phosphorus poisoning, for which half a teaspoonful of French turpentine should be administered every half-hour after a sulphate-of-zinc emetic has acted freely.

In conclusion, let me impress upon you the necessity of sending for medical aid whilst you are using the measures indicated.

N.B.—The lecturer should explain in a popular manner what is meant by contraction and dilatation of the pupils.

NOTE TO LECTURE V.

The Lecturer should have, if possible:—

A Hand Stretcher ;

A Wheeled Stretcher ;

*Two Long Poles, and Appliances for Impro-
vising Stretchers, &c.*

LECTURE V.

ON METHODS OF LIFTING AND CARRYING THE SICK AND INJURED: TRANSPORT.

WHEN accident or sudden illness occurs, and you have rendered the necessary first aid, whether in country or town, the next thing to be done is to convey the patient home, to his doctor, or to the nearest hospital.

In cases of severe injury—as when a leg or thigh is broken, or the head, chest, or bowels badly wounded—the patient should *always* be carried off in the lying-down position, and for this purpose a stretcher or some other similar conveyance is required.

In less serious cases, where the injuries are comparatively slight, the lying-down position is not absolutely requisite.

Giving aid by means of one helper.—(1) The helper may put one arm round the patient's waist while the patient puts his arm round his helper's neck, the patient's hand being grasped by the disengaged hand of the helper. (2) If the helper be sufficiently strong, he may carry the patient in his arms like a child. (3) He may carry him on his

One person, unassisted.

back, holding and supporting the thighs with his arms. In both of these methods the patient must put his arms round his bearer's neck.

For carrying by oneself, unaided, an insensible man, the plan advocated by the chief officer of the Metropolitan Fire Brigade is—first, to turn the person face downwards, and take hold close up



FIG. 45.—TWO BEARERS CARRYING A PATIENT, IN A SITTING-UP POSITION, ON A TWO-HANDED SEAT.



FIG. 46.—PLAN BY WHICH TWO BEARERS MAY CARRY A PATIENT, IN A LYING-BACK POSITION, ON A TWO-HANDED SEAT.

under each armpit; then raise the body as high as it can be lifted in that position, and allow it to rest on one of the knees; then shift the arms round the waist, and, after interlocking the hands, lift the person in an upright position. After this, take hold of one of the wrists with one hand and drop

into a stooping posture; at the same time pass the arm that is free between or round the legs, and the person will then fall across the shoulders; then rise in an upright position, and balance the body well on both shoulders.

If a strap, band, or scarf is available, seat the subject with the legs flexed on the thighs and



FIG. 47.—TWO BEARERS CARRYING A PATIENT ON A FOUR-HANDED SEAT.



FIG. 48.—THREE-HANDED SEAT AND BACK SUPPORT.

these flexed on the trunk; the head will then rest on the knees. Pass a broad continuous band behind the thighs at the popliteal spaces and under the arms. Crouch down behind him, back to back; pass the strap over your forehead and raise yourself; the head may drop backwards, but, if so, it only falls on the top of yours, the strap, being under the arms,

preventing any falling through. Both your arms are comparatively free.

Two
helpers.

Two helpers may carry a patient by joining two of their hands under his thighs and clasping him round the loins with their disengaged arms. The patient, thus in sitting position, may support himself by putting one or both arms round the helpers' necks.

A patient may be carried in the recumbent position by the helpers joining hands tightly under the thighs

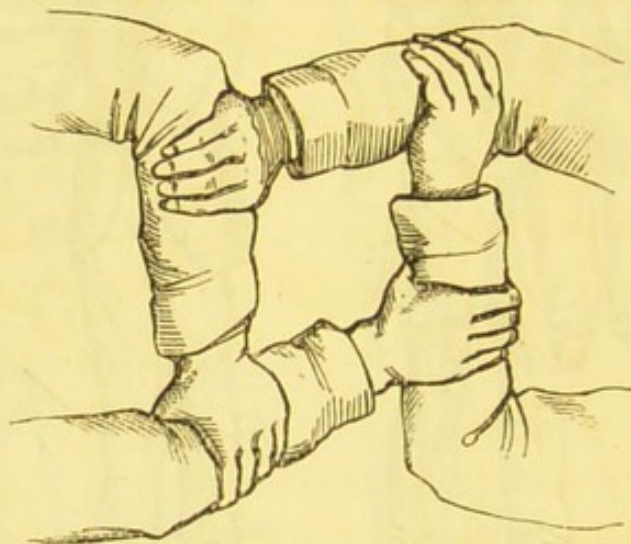


FIG. 49.—FOUR-HANDED SEAT, MADE WITH THE ARMS UNCROSSED, SOMETIMES CALLED THE SEDAN-CHAIR OR DANDY-CHAIR.

and placing their hands on, and grasping firmly, each other's shoulders.

The four-handed seat known as the "sedan-chair" or "dandy-chair" can easily be made as follows:—Let the two bearers stand face to face, each grasping the middle of his right forearm with his left hand, the backs of the hands upwards; then let each bearer grasp the middle of the other's left forearm with his

right hand. The patient can secure himself by putting his arms round the bearers' necks.

The three-handed seat is made as follows:—Let one bearer grasp his left forearm with his right hand and bearer No. 2's left arm with his left hand; at the same time bearer No. 2 grasps No. 1's right forearm with his left hand and puts his right hand on No. 1's left shoulder. This method secures a

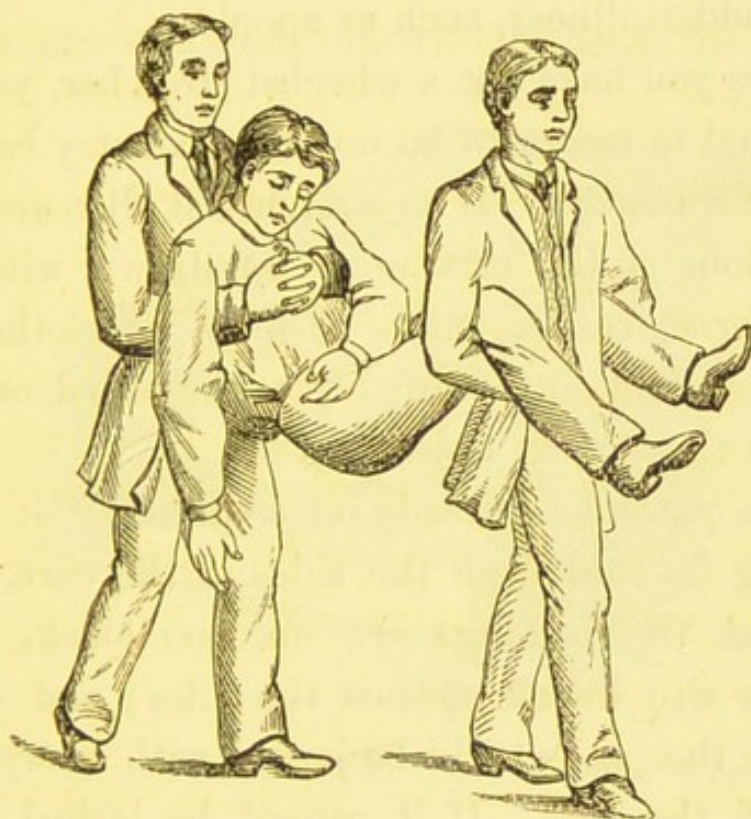


FIG. 50.—METHOD OF CARRYING IN ALMOST HORIZONTAL POSITION.

comfortable triangular seat as well as a cross support behind.

An insensible person may be conveyed by two bearers, one walking in front carrying a leg under each arm, the other behind supporting the upper part of the body. This plan should only be adopted when no stretcher can be procured.

A seat can be improvised by carrying horizontally between two bearers a pole, rifle, planking, bar of a gate, or anything handy.

These methods of carrying are *only* for slight injuries; a stretcher must *invariably* be used in fractures of the lower limbs, severe wounds of the head, chest, or abdomen, where there is much shock, faintness, or tendency to hæmorrhage, and cases of grave sudden illness, such as apoplexy.

Convey-
ance in
country
carts.

Where you have not a wheeled stretcher, you will be obliged to resort to an ordinary country cart as a means of transport. If no stretcher at all is available, the bottom of the cart must be strewn with hay, straw, ferns, rushes, mats, cushions, or clothes, and the patient laid on the soft bed thus formed, one man being in the cart to assist.

If the patient is already on a stretcher, it should be slung in, and from the sides of the cart, taking care that the lashings are not too slack, or the stretcher will knock against the sides; and not too tight, or the patient will be jerked with every movement of the cart. If it cannot be lashed to the sides, let it rest on the floor of the cart, and secure it from movement.

The regulation stretcher of the British Army has four small rollers, so is easily pushed along the floor of a cart or ambulance waggon.

Railway
trains.

In conveying a patient by train, the greatest care is necessary in taking the stretcher in and out of the carriages. Always select a large second or third

class; and by putting two strong wooden cross supports on the opposite seats of the carriage, each about a foot from the door, you have more control over the stretcher, and may even put two in if necessary.

A stretcher may be described as a light, strong Stretchers. frame, oblong in shape, and provided with handles, telescopic or otherwise, which ought to have canvas stretched tightly on it so as to afford an elastic support to any one lying on it. It should be provided

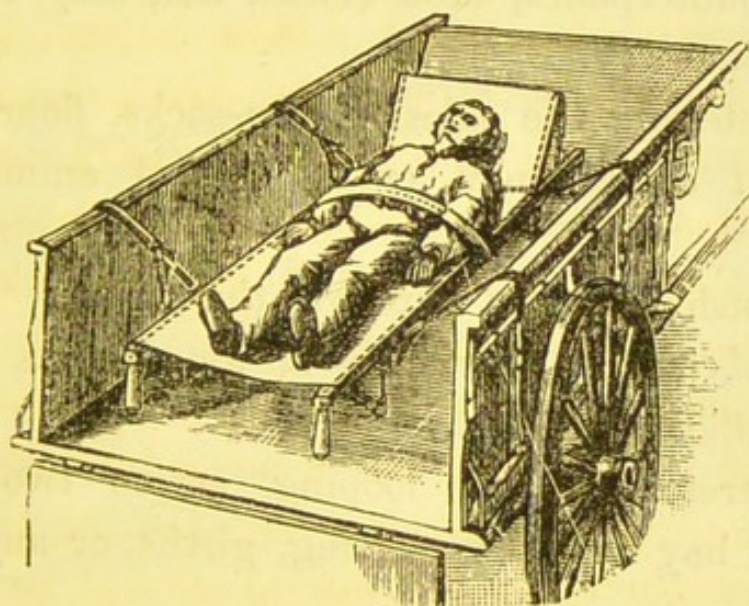


FIG. 51.—PECK'S STRETCHER LASHED IN CART.

with four foot-pieces, which prevent the patient being exposed to wet or to pressure from stones on rough ground when it is laid down. A cushion should be provided, on which to lay the head.

The regulation stretcher of the British Army is made of a piece of canvas 6 ft. 6 in. long and 1 ft. 11 in. wide, nailed to two side-poles 7 ft. 9½ in. long, with two hinged cross-bars; four foot-pieces, to which small rollers are attached. It is raised by

means of its foot-pieces 6 inches from the surface on which it rests.

You may improvise stretchers by making use of shutters, doors, forms, boards, short ladders, window-frames, bed-frames, or benches. They should always be covered with something soft.

By fastening loops to the four corners of a blanket, and then passing a pole through them and rolling up a little. Holes may be made instead of loops. Rugs, counterpanes, table-cloths, &c., may be used in the same way.

By fastening the sides of corn-sacks, flour-sacks, pieces of canvas, nay, even skins of animals, to poles.

By pushing poles through the sleeves, turned inside, of jackets previously buttoned—two, if one is not sufficiently long.

By stretching and looping across two poles ropes of hay or straw, netting, girths, or any such material.

By nailing or tying cross-pieces to the poles, and then putting upon them some soft material.

On carry-
ing
stretchers.

The following rules should be observed in carrying a stretcher :—

1. It should be carried with the hands, or suspended by straps over the bearers' shoulders; *never* placed on the shoulders.

2. The bearers should *not* keep step; the pace should be short, the knees bent, and the hips moved as little as possible.

3. All jolting, hurried movements, the crossing of fences, &c., are to be avoided. Look out for gaps, gates, &c., and go through them.

4. If possible, choose bearers of the same height.

5. In ascending, the patient's head must be in front; in descending, behind, *except* in the case of fractured lower limbs.

6. Remove the patient in the same way from the stretcher as he was placed upon it.

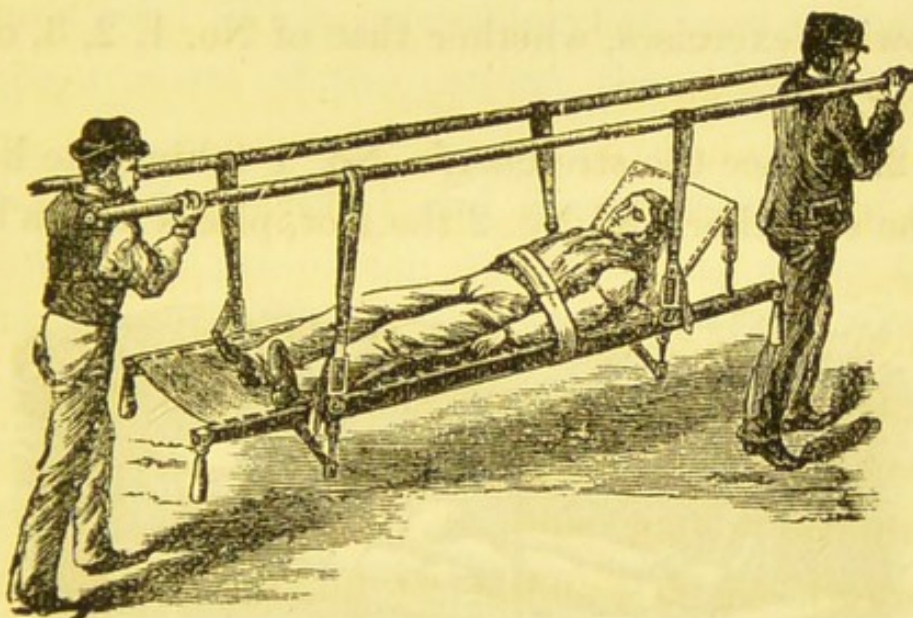


FIG. 52.—PECK'S STRETCHER CARRIED BY POLES ON SHOULDERS.

Figs. 51-54 are illustrations of Peck's stretcher, of Wigan, which has been some time in use, and has proved extremely serviceable.

The following is the St. John Ambulance Association revised system of "Stretcher Exercises":—

"Stretcher exercise No. 1: for three bearers.—To be used when space will allow.

"1. The instructor selects the bearers, and numbers them 1, 2, and 3 at his discretion. Should one man

Stretcher
exercise,
No. 1: for
three
bearers.

be taller and stronger than the others, he should be styled No. 1, as he will have to bear the heavier part of the burden.

All orders will be given by No. 3. (Bearers should be taught to take any of the positions named in the

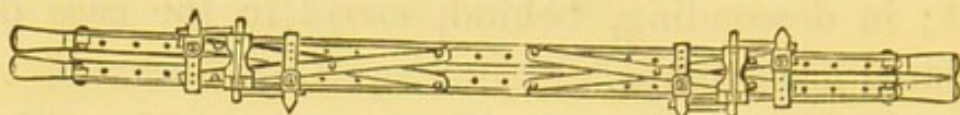


FIG. 53.—PECK'S STRETCHER FOLDED.

following exercises, whether that of No. 1, 2, 3, or 4 bearer.)

“2. ‘Place the stretcher.’—No. 1 taking the head of the stretcher, and No. 2 the foot, places it in a line

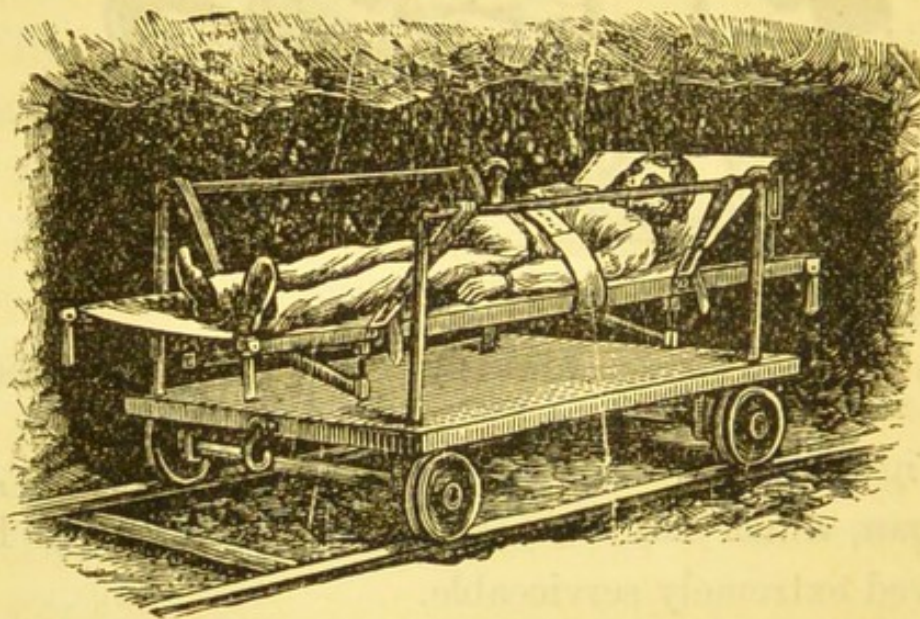


FIG. 54.—PECK'S STRETCHER LASHED TO WAGGON IN COAL MINE.

with the patient's body, the foot of the stretcher being close to his head.

“No. 3 attends to the patient, assisted by Nos. 1 and 2 when necessary.

“3. ‘Fall in.’—At this order, No. 1 places himself at the patient’s right side, No. 2 at his left side, and both bearers face each other. No. 3 takes position on the injured side in a line with the patient’s knees. *Note:* The duty of No. 3 will be entirely to look after the injured part of the patient’s body or limbs, to see that no bandages or splints become displaced, and also that No. 2 bearer, in lifting or carrying, does not in any way touch the patient’s feet. When everything has been arranged for the removal of the patient, the order will be given:

“4. ‘Ready.’—Nos. 1 and 2 now sink down on one knee and grasp each other’s hands under the shoulders and thighs of the patient, whilst No. 3 places his hands underneath the lower limbs, always taking care, in case of a fracture, to have one hand on each side of the seat of injury.

“5. ‘Lift.’—All three bearers rise together to their feet, keeping the patient in a horizontal position.

“6. ‘March.’—All take short side paces until the patient’s head is over the pillow of the stretcher.

“7. ‘Halt.’—All three bearers remain steady, and wait for the next order.

“8. ‘Lower.’—The patient is placed gently on the stretcher, and the bearers then stand up.

“9. ‘Fall in.’—On this order being given, No. 1 places himself at the head of the stretcher, with his face towards the patient; No. 2 at the foot, with his

back to the patient; and No. 3 places himself at the side of the patient.

"10. 'Ready.'—Nos. 1 and 2 stoop down and grasp the handles of the stretcher, having previously adjusted their shoulder-straps, in case they are used. No. 3, as soon as he sees all is right, gives the word:

"11. 'Lift.'—The stretcher is now raised to position ready for moving off.

"12. 'March.'—On this word being given, No. 1 steps off with the left foot, and No. 2 with the right. The step should be a short one of 20 inches, and taken with bent knees just from the hips.

"13. 'Halt.'—The place of destination being reached, on the word 'Halt' being given, the bearers remain steady in position.

"14. 'Lower.'—At this order, the bearers place the stretcher on the ground, and then stand up.

"15. 'Unload stretcher, ready.'—The bearers prepare to take the patient off the stretcher.

"16. 'Lift.'—The bearers raise up the patient as before instructed.

"17. 'Lower.'—The patient is carefully lowered upon the vehicle, bed, or other place to which it has been designed to carry him.

Stretcher
exercise,
No. 2: for
four
bearers.

"Stretcher exercise No. 2: for four bearers.—To be used when there is not sufficient space for carrying out exercise No. 1.

"1. The instructor numbers the bearers—1, 2, 3, 4. All orders will be given by No. 4.

“2. ‘Fall in.’—At the words ‘Fall in,’ Nos. 1, 2, and 3 take position on one side of the patient. No. 1 places himself at the patient’s shoulder, No. 2 near the middle of the body, No. 3 near the feet. At the same time No. 4 places the stretcher on the ground by the other side of the patient, and remains standing near its centre facing the other bearers.

“3. ‘Ready.’—Nos. 1, 2, and 3 stoop down, and kneel on the left knee if they are on the left side of the patient, on the right knee if they are on the right side of the patient. They then proceed to take hold of the patient, No. 1 passing one of his arms beneath the patient’s neck and the other under his shoulder-blades; No. 2 passing both arms under the middle of his body, one above, the other below the buttocks; No. 3 passing both arms under the lower extremities, excepting in case of fracture, when he must place one hand on each side of the broken bone so as to steady it. No. 4, when the word ‘Ready’ is given, grasps the near pole of the stretcher with his left hand, and the opposite pole with his right hand, near the centre.

“4. ‘Lift.’—On the word ‘Lift’ being given, Nos. 1, 2, and 3 raise the patient up, each at the same time placing on the knee which is not touching the ground his elbow of the same side. While Nos. 1, 2, and 3 are thus raising the patient, No. 4 moves the stretcher into proper position under him, and kneels down on one knee by its side.

"5. 'Lower.'—At the word 'Lower,' Nos. 1, 2, and 3 carefully lower the patient down to the stretcher, while No. 4 at the same time assists in supporting and placing him upon it.

"6. 'Stand to stretcher.'—On this order being given, each bearer stands up. No. 1 goes to the head of the stretcher, with his face towards the head of the patient; No. 2 to the foot, with his back to the patient; while Nos. 3 and 4 remain in position on each side of the stretcher.

"7. 'Ready.'—Nos. 1 and 2 grasp the handles of the stretcher, having previously adjusted their shoulder-straps, in case they are using them.

"8. 'Lift.'—At this word, Nos. 1 and 2 bearers raise the stretcher steadily together and stand up.

"9. 'March.'—All being ascertained to be in order, on the word 'March' being given, Nos. 1 and 2 bearers move off, No. 1 stepping off with his left foot, and No. 2 with his right foot; Nos. 3 and 4 march on either side of the stretcher. On arriving at the place of destination, the following orders are successively given:—

"10. 'Halt.'

"11. 'Lower.'

"12. 'Unload stretcher ready.'

"13. 'Lift.'

"14. 'Lower.'

"N.B.—These orders (viz., Nos. 10 to 14 inclusive) are to be carried out in a similar manner to orders Nos. 13 to 17 in exercise No. 1.

“Stretcher exercise No. 3.—When only three bearers are available, and the space is limited as before, the following alterations must be made in the foregoing (No. 2) exercise:—

Stretcher
exercise,
No. 3: for
three
bearers.

“1. The instructor numbers the bearers—1, 2, 3. All orders will be given by No. 3.

“2. ‘Place stretcher.’—No. 1 bearer places the stretcher on the ground by the side of the patient, and as close to him as practicable.

“3. ‘Fall in.’—The three bearers take the same positions on one side of the patient as laid down in exercise No. 2.

“4. ‘Ready.’—Nos. 1, 2, and 3 kneel down, placing themselves as close to the patient as they conveniently can, and then take hold of him as directed in exercise No. 2.

“5. ‘Lift.’—Nos. 1, 2, and 3 raise the patient as directed in exercise No. 2.

“6. ‘Lower.’—At the word ‘Lower,’ Nos. 1, 2, and 3 lean forward so as to carry the patient over the stretcher, and then carefully lower him down upon it.

“7. ‘Stand to stretcher.’—At this direction No. 1 goes to the head of the stretcher, No. 2 to the foot, and No. 3 remains in position at the side of the stretcher.

“The remainder of this exercise will be precisely the same as is given in exercise No. 2 from orders 7 to 14, both included, the instruction for No. 4 bearer to walk by the side of the stretcher being alone omitted.

Stretcher
exercise,
No. 4:
for two
bearers, in
mines, &c.

“Stretcher exercise No. 4.—For use in mines and narrow cuttings where two men only can be engaged.

“Necessary first aid having been given, Nos. 1 and 2 will carefully place the stretcher in a line with the injured man’s body, the foot of the stretcher being, if possible, close to his head. (It is not advisable to be too particular as to the head or foot of a stretcher in a mine, as it would probably be quite impossible to reverse it, and it is always competent for the bearers to lower the pillow.)

“No. 1 will give the word ‘Ready,’ when both get into position, as follows:—

“No. 1 places his feet one on each side of the patient between his body and arms, the toe of each foot as near the armpits as possible, standing over the man. He then stoops down and passes his hands between the sides of the chest and the arms underneath the shoulders, and locks the fingers.

“If the patient’s arms be uninjured, he may put them round the neck of No. 1, and by this means greatly assist him in lifting.

“No. 2 at the same time places his right foot between the calves of the injured man’s legs as close to the knees as possible, and his left foot at the injured man’s right side close to the crest of the hip (when the patient’s legs are in splints and tied together, the feet of No. 2 must necessarily be placed outside); he then kneels down and passes his arms round the outside of the patient’s thighs at the lowest

part, and locks his fingers behind just at the bend of the knees.

“When both are ready, No. 1 will give the order ‘Lift, and move forward.’ The patient is then to be slowly lifted just sufficient to allow his body to clear the stretcher. Both bearers will slowly and gradually move forward, No. 1 by very short steps, and No. 2 by bending his body forward over his left thigh, by

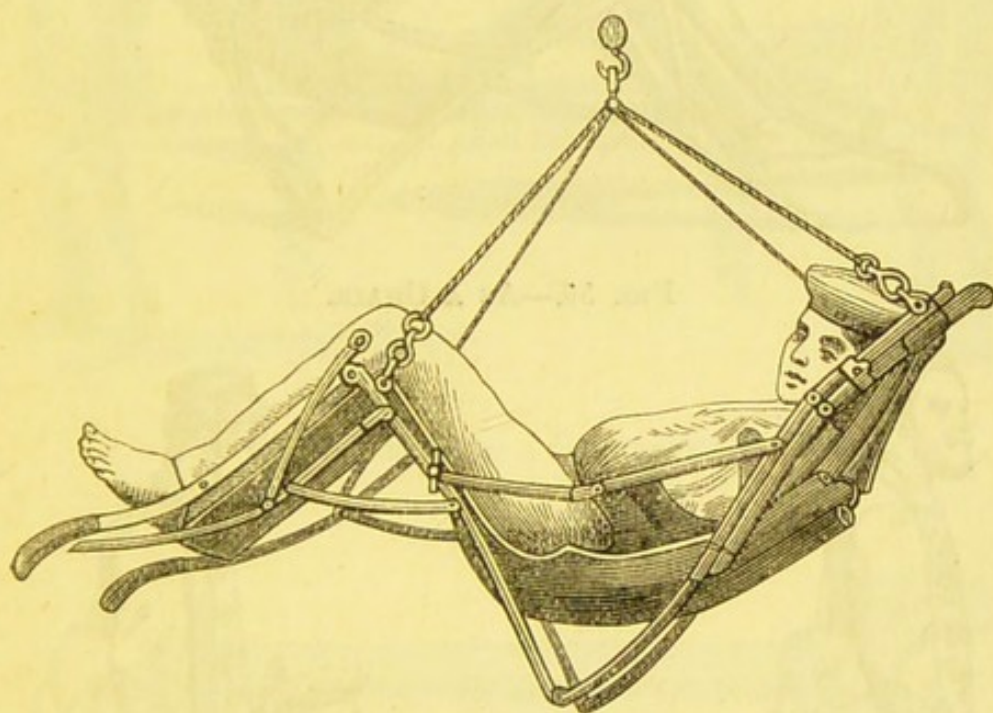


FIG. 55.—SLUNG READY FOR HOISTING OR LOWERING.

which means he exercises a pushing movement which very greatly assists No. 1. No. 2, when he has bent his body forward as much as he can without moving his feet, advances his left foot and bends his body forward. This movement is to be repeated until the patient is laid on the stretcher.

“The bearers will then act in the ordinary manner as far as the nature of the locality will permit.”

A notice of Dr. R. A. Mowll's new ambulance stretcher appeared in the *Lancet* the week before

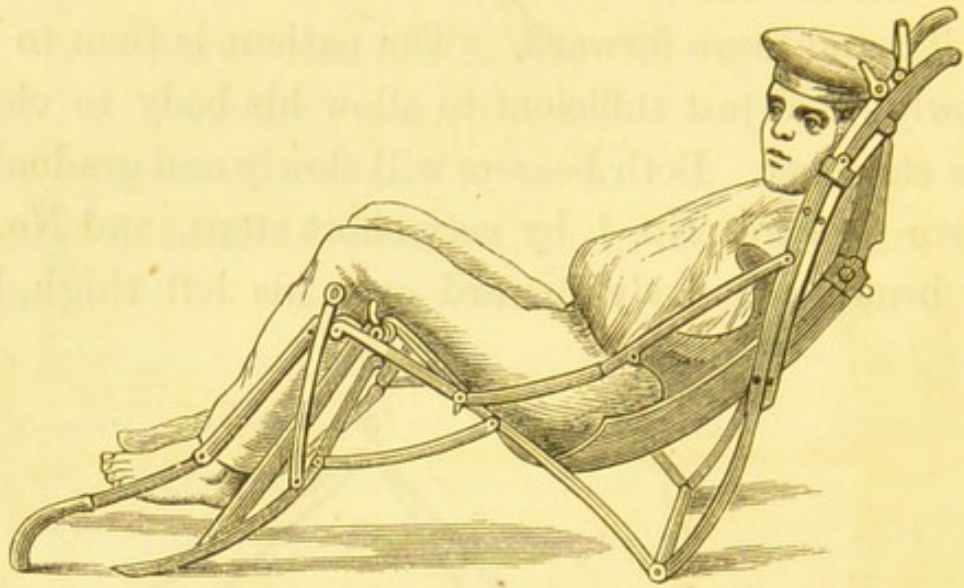


FIG. 56.—AS A CHAIR.

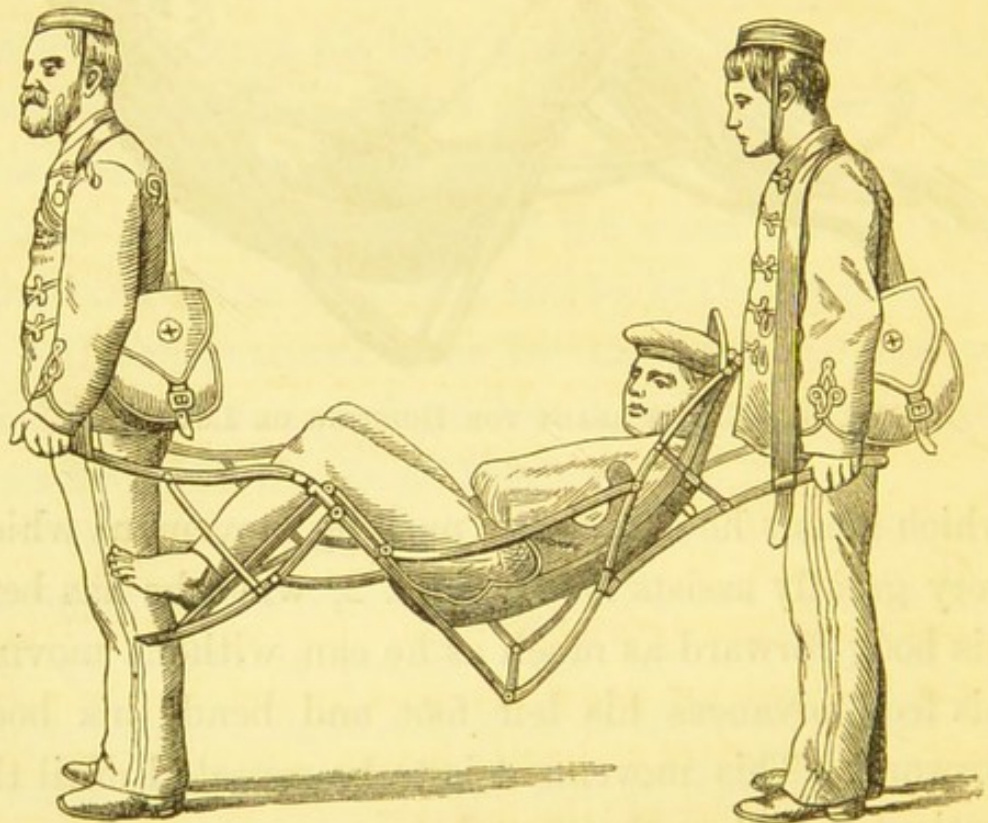


FIG. 57.—AS A STRETCHER.

this lecture was given. I took the opportunity of

showing my pupils the illustrations, so reproduce them here (Figs. 55-57), believing that they need only to be seen to be appreciated.

The accompanying illustrations (Figs. 58 and 59)

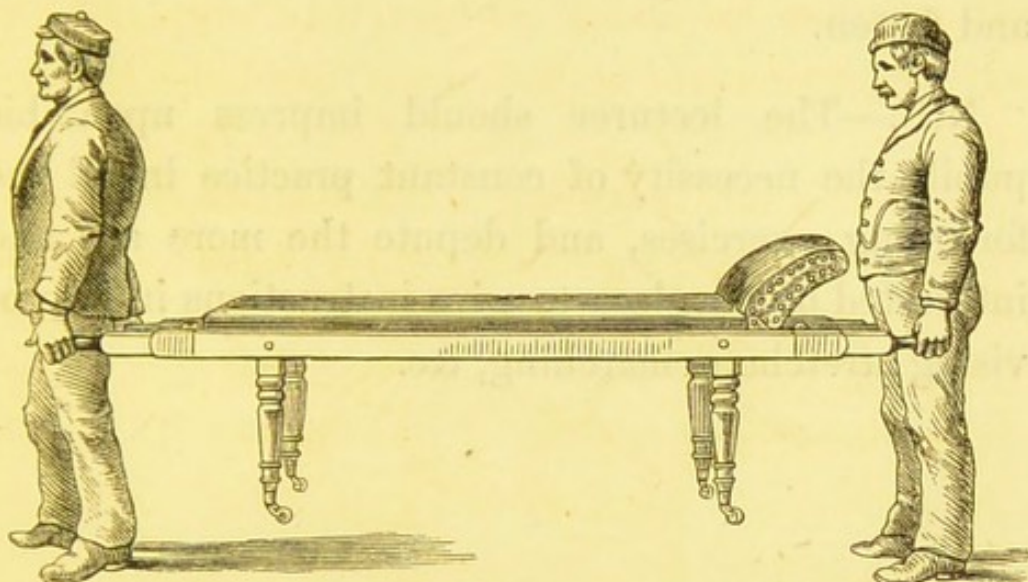


FIG. 58.—AS A STRETCHER.

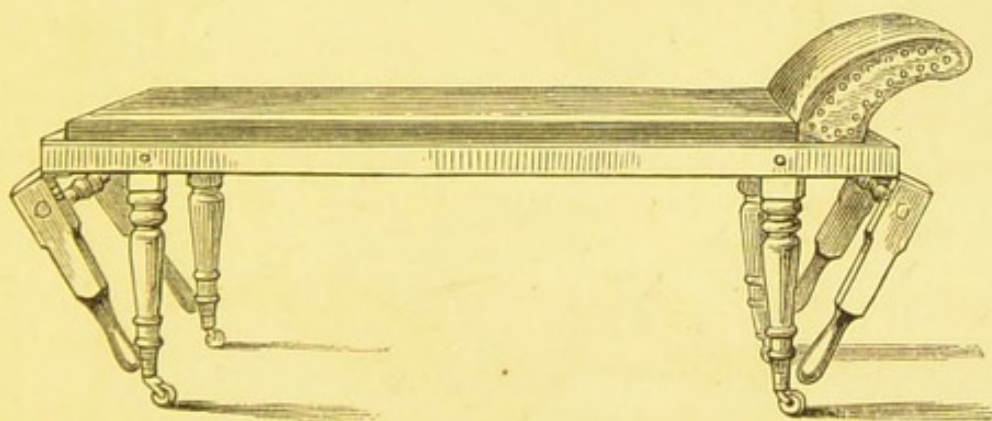


FIG. 59.—AS A COUCH.

show accurately a couch I have designed. It runs on castors shod with india-rubber, and can be immediately converted into a stretcher by merely raising

the handles from the hanging position by the legs to the horizontal one. It is suitable for hospital porticoes, railway stations, &c. Although not intended for carrying up and down stairs, if used in such a way the legs should be made to turn up and fasten.

N.B.—The lecturer should impress upon his pupils the necessity of constant practice in all the foregoing exercises, and depute the more apt and interested of the class to give instructions in improvising stretchers, marching, &c.

WORK TO BE DONE

The following will require attention:

1. General Inspection.

2. The following will require attention:

3.

4.

5.

6. The following will require attention:

7. The following will require attention:

8. The following will require attention:

9. The following will require attention:

NOTE TO LECTURE VI.

The Lecturer will require—

A Clinical Thermometer.

A Bath Thermometer, with Dr. Forbes' Specifications.

Two Sheets.

Linseed Meal.

N.B.—The Lecturer will be amply rewarded in taking the trouble to show at least how a poultice ought to be made. I have selected the linseed as being the most commonly ordered.

LECTURE VI.

ON NURSING.

THE chief recommendations of a nurse, in a medical man's estimation, are implicit obedience and discretion. Absolute cleanliness in person as well as surroundings is indispensable; a cheerful but subdued manner and pleasant voice under sometimes the most trying vagaries of a fretful patient should be maintained, and withal kindness combined with firmness and decision.

Chattering is objectionable; but some patients are better for a little cheerful conversation, so its indulgence must be left to the tact and discrimination of the nurse. We are not all born nurses, and sometimes those least expected, under necessity, develop the vocation in a most striking manner.

As so very much depends upon a nurse, the faculty of *observation* is one that should be *cultivated* in those possessed of it: if any of you, however, know that you are wanting in this particular, do not attempt other than the most simple duties in connection with the sick. Keep your eyes open, and use them. Note *posture* as indicating pain or comfort;—for instance, pain in the bowels is to a certain extent

relieved by drawing up the knees. In spasmodic asthma and other cases of difficulty of breathing, a return to the horizontal position is a favourable sign; as is also that of a patient, after lying for weeks on the back, turning on the side and resting contentedly. The countenance is said to be the index of the mind. Whether this is so or not I will not pretend to say, but at least it may be studied to advantage.

The most important points for special observation, beyond what I have stated, are the occurrence of rigor, or shivering: pain, intermittent or continuous, and the seat of it: duration and quality of sleep: whether the skin be dry, moist, cold, or clammy, or with the appearance of any eruption: appetite wanting, ravenous, or capricious, and particularly to note what diet agrees or *disagrees*. The action of the kidneys and bowels requires constant watching. Never make light of any symptom, trouble, or sensation a patient complains of; and endeavour to give a truthful account of *facts* (not inferences) to the medical man in attendance, concealing nothing, and adding nothing thereto.

Choice and
preparation
of sick-
room.

If possible, in preparing a room for a sick person, choose a thoroughly dry and airy one, the larger the better, with a south-west aspect. We do not get too much sunlight, and how it gladdens the heart of the convalescent! You can always keep it out with blinds and sunshades, but if it does not put in an appearance, you have not the chance. All rooms

with east and northerly aspects are cold, gloomy, and sad, and unfitted for nursing the sick.

The walls should be cleaned and the woodwork ^{Walls and furniture.} wiped with a cloth wrung out of warm water containing a little Condyl's fluid or carbolic acid. The less furniture the better, but do not let the room look cheerless or bare.

The fire-grate should be large and *throw out heat*, ^{Fire-place.} not consume it; and the chimney should not be allowed to smoke.

A temperature of 60° Fahr., in the majority of <sup>Tempera-
ture.</sup> cases, should be maintained—64° Fahr. in acute affections of the air-passages or chest—especially in the early morning, as then the vital power of invalids is at the lowest. This fact was so well known to the ancients that they named from 4 to 5 A.M. the "*Horæ Fatae*," or hours of fate.

Windows are made to open, doors are made to <sup>Ventila-
tion.</sup> shut; therefore, ventilate your room by opening the windows at the top. Do not be afraid of plenty of fresh air, short of chilling your patient. There is a plan of placing a piece of wood under the lower sash of the window, so that the air gets in without draught at the middle. A friend of mine has had all the lower framework of his windows permanently heightened so that he may raise them to ventilate in this manner. It is a good thing in smoky, dirty districts to have wire gauze placed over ventilators in order to prevent the entrance of smuts, &c.

Strips of carpet are the best, that they may be ^{Carpets.}

taken up easily and thoroughly shaken. Some people consider they should not have a place in the sick-room, but they serve to deaden sound, to which we are all so sensitive when ill. Goloshes are worn by many French servants, and I see no reason why those in attendance on the sick should not make use of them; all that is necessary is to ensure their ventilation, and this is secured by wearing them sufficiently large.

Bed and
bedding.

There is no doubt the narrow bedstead, such as we have in hospitals, is the best, both for the sick and injured; it is made of iron, 3 to $3\frac{1}{2}$ feet wide, and $6\frac{1}{2}$ feet long; the full length is required to enable the patient to be easily lifted or moved to allow of the sheets being changed, &c. Re-arranging the pillows is not then done at arm's length, and there is no necessity for kneeling on the bed, which disturbs the patient.

Feather beds are bad for the healthy, but on no account should they be used for the sick; they sink into it, and it is quite impossible to arrange it properly without getting the invalid up. A hair mattress is the best possible bed, but an evenly packed straw or chaff one is almost as good, perhaps even better in cases of wounds, where it is likely to get soiled by the discharges, as it can be renewed at very little cost. It is better that no paillasse should be used underneath; and on no account should there be valances or curtains.

The bed-clothes should be warm and light; fine

cotton sheets and new blankets are best; heavy cotton counterpanes keep in the perspiration, and are not as warm—weight for weight—as blankets. In cases permitting, and where economy is desirable, a clean sheet may be first used as a counterpane, next changed to the top sheet, and finally to the lower one. An under blanket need not be used except in winter; it must be kept smooth and free from creases; otherwise it may be a cause of bed-sores. This applies equally to all under bed-linen.

If possible, the bed should be between the door and fireplace, that the air may pass over and purify it. Where the room does not admit of this arrangement, the bed should stand between the fireplace and window, the nurse keeping principally at the window side—the best position for seeing the patient and avoiding unnecessary risk in infectious cases. Neither side of the bed should be against the wall, both for the convenience of the attendants and for the sake of ventilation. In long-continued illness it may be well to allow even the head of the bed to stand away from the wall, as the head is the easiest position from which to help a much enfeebled patient to sit up, lie down, or turn over. The foot of the bed should *not* be towards the window, as the light shining directly on the face is sometimes annoying.

It is also useful to have a long flat couch in the room, to use as a second bed, on which the patient may be laid whilst his own is being aired or changed.

Coals.

A comfortable chair and footstool should always be provided for any one who has to sit up at night. A pair of gloves should be used to put coals on the fire (for they should never be thrown on), and a piece of hard wood makes an almost noiseless poker. Small paper bags containing coals may be used, but care should be taken that the coals are neither moist nor wet; otherwise they will fall through and rattle in the fireplace, making the very noise one is so wishful to avoid.

Thermometer.

A thermometer should hang on the wall of the sick-room at the level of the patient's head, but neither too close to the window nor over the fireplace. It should be consulted frequently, as it is the only true guide by which you can regulate the heat of the room.

Purity of the air important.

If purity of air is essential in health, how much more so in sickness—a point frequently overlooked, and the importance of which cannot be overrated. The sick-room, you must remember, is occupied the whole day and night, and the emanations of the body require immediate dilution, so as to facilitate speedy removal. Wherever breathing is going on, a supply of oxygen is continually taken in, and poisonous carbonic acid given off in its stead. Therefore it is necessary that the carbonic acid should be removed and oxygen supplied.

I will give you a few figures to show you how necessary is good ventilation. The average amount of carbonic acid in *pure* air is 4 parts in 10,000; in

the air we expire, 400 parts in 10,000. In the air of a room, 150 parts in 10,000 may cause severe headache; and from 500 parts in 10,000 upwards is sufficient to produce fatal results.

The usefulness of the chimney in removing bad air is incontestable, and depends upon the fact that heated air is lighter than cold. Every chimney contains a column of air. When the lower part of this column becomes heated, and consequently lighter, it ascends the chimney and out at the top, its place below being taken by fresh air; and this in turn is heated and passes up. Thus a continuous stream of air circulates from the bottom to the top. If there is a down draught, open the top of the window; it is the best inlet for pure air.

Articles of dress and the bed-linen should be *well aired*. I cannot impress upon you this fact too much. Warming is not sufficient. Not only should there be no suspicion of dampness, but there must be *absolute dryness*. Airing
clothes.

To change the upper sheet, the best method is to loosen the bed-clothes all round, then slip the end of the clean sheet in under them at the foot of the bed. One person then stands on each side, and, taking the upper end of the clean sheet in one hand and the lower end of the bed-clothes in the other, slips the sheet up in its place. Changing
the sheets,
&c.

The under sheet is best changed by turning the patient gently on the side, and the soiled sheet, having been loosened all round, is rolled up length-

ways until half of it reaches the patient's back. A similar roll is made of the clean sheet, and is placed against the other one at the patient's back. The bed is then in this condition: one half is covered by the clean sheet, the other by the soiled one. Now the patient is to be again moved, first on to his back, then to his other side. During this movement he crosses the two rolls, and so lies on the clean sheet. It is now only necessary to draw away the soiled, and unroll and arrange the clean one. The same manoeuvre may be accomplished from head to foot, instead of from side to side, and this is the plan usually adopted in severe surgical cases.

Draw
sheets.

Draw sheets are used whilst dressing wounds, and sometimes to prevent the bed getting wet when washing patients; they are best made of a sheet folded into four thicknesses, or by inserting a mackintosh between the folds of a sheet and placing it under the patient from shoulder to knee, or wherever required.

Dressing
patient.

The utmost care must be taken in changing the patient's clothes; no soiled body-linen should be allowed to remain on, and, when the clothing gets saturated with perspiration, it should be changed at the first opportunity—*i.e.*, when the patient's skin is dry, or nearly so. Where little movement is desirable, as in rheumatic fever, and with helpless patients, suitable clothing should be provided; the nightshirt may be slit down the back from top to toe, and secured only by tapes. Never raise a debilitated

patient too quickly from the lying to the sitting posture, otherwise a fatal faint might supervene.

A helpless patient can be lifted by two people ^{Moving the patients, &c.} joining hands under the shoulders and hips. If there is any injury, the injured part should be supported and attended to by a third person. If a limb is broken, it must not be held in a timid manner, but grasped by the palms of the hands and firmly supported by placing one hand above and the other below the seat of fracture.

To air the bed, or where the patient requires to be changed from bed to couch, or vice versâ, a good plan is to wheel the couch up to the bed and lift the patient bodily in the under sheet.

Bed-rests are often of great assistance, especially ^{Bed-rests.} when taking food. Those with canvas backs and rack arrangement are best, but a very good one can be improvised by turning a chair upside down and making it comfortable with pillows.

Cradles are contrivances for removing the weight ^{Cradles.} of the bed-clothes off the patient. They are made of hoops of iron attached to side bars; a strong bandbox with holes cut in it like the entrance to a dog-kennel will do if nothing better can be procured.

In surgical cases, or in medical ones of long dura- ^{Lifts.} tion, a lift is a great comfort. It is made of strong rope, suspended from the ceiling, to the end of which a horizontal and rounded piece of wood is attached. When not required, it may be hooked on one side, but within reach of the patient. The double cord

and bar, trapeze fashion, I think a great improvement on the single rope.

Food. As regards the food of the invalid, I cannot fully enter into it; it would take up too much time. I will, however, give you a few simple rules.

Never make too much of anything.

Something should always be in readiness.

Food must not be left in a sick-room.

Never cook in a sick-room.

In raising a patient to drink, the hand should be passed behind the pillow to support both the head and shoulders.

A most refreshing and nutritious drink is made by mixing an equal quantity of boiling milk and soda or seltzer water together. It may be taken hot, warm, or cold.

Where the stomach is unable to digest food, excellent results have been obtained by peptonizing or artificially digesting it. This process, mind you, is only partial, but none the less effectual. You may peptonize all gruels, milks, and farinaceous foods. First, make your fluid food in the ordinary way; then let it cool down to 130° Fahr.; place it in a covered jug; add a good teaspoonful of bicarbonate of soda and two teaspoonfuls of Benger's liquor pancreaticus to each pint of milk, gruel, or beef-tea, as the case may be; cover with a cosy, and allow it to keep warm and stand for an hour and a half; then boil for a minute or two. By so doing you stop the fermentation, and the food is ready for use.

Many patients object to the bitter taste, and, although so valuable a method of assisting digestion is so easy of attainment, prefer their more solid and tasty food, as well as the pains attending its digestion.

All medicines should be given at the time and in Medicine. the quantity specified. Always wash the medicine glass out after use ; then turn it upside down.

The effects of remedies should be carefully watched and the results recorded: such as—pain relieved; cough decidedly easier; acted efficiently or severely on the bowels; failed to check diarrhœa, &c. &c.

I do not approve of medicine bottles remaining within reach of the invalid, for many reasons, so put them at some distance. Always remember to keep poisons, such as liniments, lotions, and all applications for external use, quite separate and apart from those medicines intended for internal use.

To measure the exact temperature of the body, Body temperature. Clinical thermometer. use a clinical thermometer: all other methods are fallacious. The body temperature in health averages 98·4° Fahr., and is pretty much the same whether we live in hot or cold climates. If there is a rise or fall of even 1° for any length of time, it is a sure sign of disease.

Clinical thermometers are now made self-registering. I will instruct you how to use one. You perceive the small column of mercury, the index; shake it down below the normal temperature *fully* 2°. Wipe out the armpit with a soft pocket-handkerchief; place and keep the thermometer there for ten

minutes, taking great care that the bulb is surrounded on all sides by skin, and the arm gently pressed to the side; make your observation, and then record it in writing. To use and read the clinical thermometer requires some practice, but it is well worth acquiring the knowledge.

Baths.

I need not dwell upon the importance of the bath—it is well known to you—but will just give you the various temperatures.

Baths are cold when below 85° Fahr.; tepid, between 85° and 95°; warm, between 96° and 102°; hot, or I may say *very* hot, from 102° to 110°.

So hot a bath as comes under the last heading requires the presence of a skilled nurse.

There are two hints I must give you about baths, and that is, never depend upon your feeling as to the gauge of heat; invariably use a thermometer. In the preparation of the bath turn the *cold* water on *first* and the hot after. If you adhere to this rule you will never scald any one. It is very sad to hear of children being so often severely, if not fatally, scalded by the omission of this simple rule.

Sponging.

Sponging patients with vinegar and water (in the proportion of 1 of the former to 20 of the latter) is extremely refreshing; it assists the action of the skin, and may be used daily with great benefit to invalids when sanctioned by the physician. But the rule is never to sponge when the skin is acting; only when it is dry and hot.

Fomentations form a quick and convenient method of applying moist heat to a part, and are often useful in affording relief to pain. The best way to get your flannels sufficiently hot without scalding your fingers, and to prevent them getting cold before application, is to place your flannel in a towel, pour on the boiling water, then wrap it up in the towel, and twist flannel and towel together so that you wring well, and thus free it from as much water as possible; then carry it to the bedside, open the towel, and take the flannel out; apply to the part affected, first trying with the back of your hand to feel that it is not too hot. A piece of mackintosh or several folds of dry flannel on the top will assist in keeping the heat in; such fomentations should be repeated every half-hour or so, according to orders. Either spirit of turpentine or laudanum may be sprinkled on flannels such as I have described, when necessary. Poppy-head water may be used instead of plain water: to prepare such, take whole poppy-heads, bruise them without losing the seeds, which are oily and emulsive, and assist the anodyne action; put about ten poppy-heads to two quarts of boiling water; place the infusion near the fire, but do not boil it.

Poultices give relief in inflammatory affections by affording continuous warmth and moisture, and so lessening the tension of the tissues. They also serve to quicken the local circulation wherever applied; consequently, assist in the removal of inflammatory and effused products.

Linseed-meal, bread, and bran are the most common poultices in use.

Linseed-meal
poultices.

To make a linseed-meal poultice, scald a basin out, then put a little boiling water in, and quickly add, little by little, a sufficient quantity of linseed meal to make a mass of firm consistence, stirring well the whole time. When thoroughly mixed, spread it thickly by means of a broad knife upon a piece of tow, cotton, or old flannel, leaving a margin to be turned in over the edge; then put a little hog's lard or olive oil on the surface which is to be applied to the skin; try the heat by the back of the hand, or by bringing it close to the cheek; it then should be applied as hot as it can be borne, always remembering that some people's skins are much more tender than others', and children's more so than adults'; apply closely to prevent the admission of air, and over all place a mackintosh, or, what is nicer, a single layer of cotton wadding, and secure it by a triangular bandage or tapes. They should be changed every two hours; the oftener the better, as the case demands.

Bread
poultice.

A bread poultice is made by gradually adding coarse crumbs of bread to a little boiling water that has been prepared in the manner described for a linseed-meal poultice; stir them well; cover the basin with a plate, and let it stand in front of the fire for five minutes or so; then complete its making, and apply as instructed—that is, spread well and evenly, put your hog's lard on, take precautions as to heat, and see it securely put on.

To prepare a bran poultice, first make a bag of ^{Bran poultice.} flannel the suitable size; then scald your bran in a basin; put it into the bag, taking care not to fill it too full; then sew up the open end securely, and quickly wring out in a towel; carry to the bedside as you did your flannels for fomentations. If there is any necessity to keep such poultices continuously applied, you must have two bags; but there is no necessity for taking a fresh supply of bran—the old will do again properly scalded, at any rate for several poultices.

You must remember, in changing the poultices I have just described to you, that you ought always to have a fresh one at the patient's side ready to put on before you take the old one off.

A mustard plaster, or sinapism, is a valuable ^{Mustard plaster.} counter-irritant, and is best made by mixing mustard with warm (not hot, or cold) water until all the lumps have disappeared; then spread carefully and neatly on a piece of old calico, and place a very old, thin piece of muslin on the top between the mustard and skin. A mustard plaster must not be allowed to remain on too long, or you may produce a blister. After it comes off, dress with a little vaseline, olive oil, or hog's lard free from salt, and on the top place a single layer of cotton wadding.

Mustard leaves may be bought at any chemist's, and are clean substitutes for mustard plasters, but I much doubt whether they are as efficacious. To prepare them for use, all you have to do is to dip

one in warm water, apply directly to the skin, and secure by a bandage or handkerchief. The after-treatment is to be the same as that ordered in the case of the home-made mustard plaster.

Mustard
poultice.

A mustard poultice is made in exactly the same way as a linseed-meal one, only the ingredients must be equal parts of mustard and linseed.

In conclusion, I give you a list of things necessary for every household, and to treat the emergencies with which you have become acquainted in these lectures:—

Lint; gutta-percha tissue, or oil-silk; cotton-wool and tow; adhesive plaster; triangular and roller bandages; a waterproof sheet; linseed and olive oil; hog's lard without salt in, or goose grease; linseed meal; mustard; turpentine; ipecacuanha wine; brandy; sal volatile; castor oil; vaseline; carbolic acid, and carbolic-acid powder; Condyl's fluid; spongio-piline; carbolic-acid or coal-tar soap; invalid's drinking cup; measure glass; clinical and bath thermometer; wood for splints $\frac{1}{8}$ inch thick and $2\frac{1}{2}$ to 3 inches wide, in lengths of about 3 feet; safety-pins (the "Unique" are the best); and a good sharp pair of scissors.

APPENDIX.

ROLLER BANDAGING.

STAND with your face to the patient, and see that the part to bandage is in the position it will afterwards have to occupy.

Keep to one way of bandaging. If a limb, begin on the *inside*, whether bandaging next the skin or over splints, and begin just above ankle or wrist taking a turn or two round to fix the bandage, and end as a rule at the top; pin on the *outside*. Do not tie unless unavoidable.

On commencing to bandage the body, head, &c., start with the bandage in the *right* hand.

Have the *outside* of the roller next the skin, and always carry the bandage over the front of a limb, not round the back of it. In bandaging splints, have the end well on the splint.

Reverse only when necessary. Reverses should form a line one above another, usually on *outside* of a limb. Reverse with the disengaged thumb, and complete the reverse before continuing. Do not reverse over a bone or tender surface.

The turns of a bandage should overlap about one-third or one-half, and should always lie evenly and flat. Each turn must be firmly applied, lest it slip or become uncomfortable. It must be neither too tight nor too slack.

There are exceptional cases, as in wounds on the head or hand, where a compress may be needful, in which the most convenient method of bandaging must be chosen; begin on side farthest from the wound, and let the first turn cover it.

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