Remarks on Emergency Amputations in Military Surgery.

I. A SIMPLE MODIFICATION OF THE GUILLOTINE OR FLAPLESS METHOD OF AMPUTATION.

II. THE FORCEPS TOURNIQUET.

BY

LIEUT.-COLONEL J. LYNN THOMAS, C.B., F.R.C.S.,
CONSULTING SURGEON TO THE WESTERN COMMAND.

I.—The Modified Circular Amputation with Lateral Incisions.

I HAVE had the great privilege of studying carefully the methods introduced by Colonel H. M. W. Gray, C.B., in dealing with septic wounds of the extremities and of other regions. I have also had the advantage of putting them into practice, and am convinced that if they were applied in the first dressings to all cases calling for amputation, whether at the front, at the field ambulances, at the casualty clearing stations or at the base hospitals, the so-called "guillotine" or flapless method of amputation would soon cease to be practised.

It is to be borne in mind in the first place that the term "guillotine" or flapless amputation is not applicable to cases in which there is not sufficient skin to cover the raw surfaces when circumstances demand the removal of an entire limb from the trunk, whether this necessity be due to the severity of the mechanical destruction of the tissues or to the extent of infection. In this condition the surgeon must perform an operation of expediency; he must cut his coat according to his cloth.

It is to be remembered that the apparatus devised, or said to have been devised, by Dr. Joseph Ignace Guillotin (it certainly bears his name) for cutting through all the tissues of the neck at the same level, had the merciful quality of performing its work in one second, or an even shorter time.

The term "guillotine" is most improperly applied to the flapless operation with regard to the aspect of speed of execution; it has no vestige of a claim to be held on this account to be superior to the circular amputation of Celsus, which has enjoyed, or rather has survived, a reputation of some twenty centuries. Both—the guillotine and the Celsus amputations—take a varying number of minutes, the exact duration depending upon the skill, experience, and dexterity of the operator.

The "new" guillotine and the "old" circular amputations have two fundamental points in common: the first is that each takes about the same length of time to perform, and the second is that in both all the tissues are divided at the same level. Therefore there is no good reason for introducing a new nomenclature.

The Celsus circular amputation was modified a long while ago with the definite objective of minimizing the recurring physical pains, which caused the patient to dread the dressing of the stump; the modification also had the further important advantage that it saved the patient the trying ordeal of reamputation.

I feel convinced that one or more of the well-known modifications of the old circular amputation could safely replace the guillotine operation, and the one which appeals to me is that which consists in making two lateral incisions through the apparently healthy soft tissues right down to the bone.

The upper or proximal extensions of the lateral incisions are determined by the point at which sufficient soft tissues can be obtained to give ample covering for the bone. The main indications are speed and simplicity. The above modification of the old circular amputation renders it easy to adopt Colonel Gray's method of packing the wound, as shown in Fig. 4. It is also easier of performance than the "cuff" modification of Celsus operation when the surgeon is single-handed or inexperienced in the art of amputation. Further, the lateral incisions allow of better drainage than the cuff circular incision.

The following are the essential points in carrying out the circular amputation with lateral incisions:

1. The level at which the section of the bone is to be made must first be determined.

2. The proximal ends of the lateral incisions begin at this determined point, and are carried down to the bone and continued towards, or into, the damaged tissues, as shown in Fig. 1.

3. A clean knife must be used for each lateral incision if available; if not, the knife should be thoroughly wiped and sterilized by flame.

4. The soft tissues are then divided by one clean sweep down to the bone after the manner of the old circular method.

5. The two flaps thus produced by the combination of the circular and the lateral incisions are retracted (Fig. 2) and the bone is sawn through at the level previously determined.

FIG. 1.—Diagram showing lateral incisions starting from the level (L) determined on for the section of the bone and continued towards or into the damaged tissues, and showing also the line of the circular incision.

FIG. 2.—Circular incision made and flaps retracted to the determined point.

FIG. 3.—A, Skin pulled in direction of arrows and forming funnel-shaped cavity; B, bone; M, muscle; S, skin.

FIG. 4.—Flap brought over cavity (G) packed with gauze.

6. The vessels are ligatured with silkworm-gut or catgut, not thread or silk, for fear of sepsis in the wound.

7. The flaps are then forcibly pulled down, forming a funnel-shaped cavity (Fig. 3) in which the muscles are not in apposition, as shown in longitudinal section in Fig. 4.

8. This cavity is firmly packed with sufficient gauze wrung out of Wright's hypertonic salt solution or Dakin's fluid so as just to allow the flaps to meet firmly over the packing (Fig. 4).

FIG. 5.—End of stump ready for application of gauze dressing. S, Strapping; G, gauze.

The flaps are secured in position by three strips of self-adhesive strapping and the ends of the gauze are allowed to project at each corner through

the lateral incisions, in the manner shown in Fig. 5, so as to ensure drainage. The stump is then covered with a dressing of sterile gauze and a bandage.

The ordinary rubber drainage tubes, whether large or small, must not be used.

In some cases, but only rarely, a few interrupted sutures of silkworm-gut may be inserted to reinforce the strapping, but they should be quite slack.

It is a matter of observation that the dirty grey "diphtheritic" infections of the flaps of stumps, which not infrequently supervene upon the insertion of rubber tubes and the use of tight stitches, are usually rapidly overcome by laying open the flaps and packing with gauze and salt tablets. How much easier, then, would be the prevention of such infections if the surgeon would holdly in the first instance pack the whole of the raw surface. A tube, 5 mm. in diameter, may be put into the gauze; it should project on each side and be tied at its centre; holes should be made in it on each side of the point at which it is tied, so that Dakin's fluid, if that preparation be preferred, may be injected from each side into the pack. Personally I consider Gray's salt pack more suitable for the military emergencies existing between the front and the base.

II.—The Forceps Tourniquet in Military Surgery.

During the last eighteen years I have not used the rubber or any other tourniquet for any amputations of the thigh, nor for aneurysms in that situation.

Many of those who have seen the forceps tourniquet in use have adopted it, but as practical knowledge has the

FIG. 6.—Diagram of forceps tourniquet modified for use in military surgery. It shows the probe-pointed blade. The ring at the point of the other blade is shown half scale at the side. The ratchet is of the Girard pattern, self-releasing. The instrument was originally introduced for controlling the femoral vessels (*Lancet*, 1898, vol. i, p. 1112). Later on, in the Boer war, it was used for this purpose, and for controlling other vessels (*BRITISH MEDICAL JOURNAL*, 1904, vol. ii, p. 835; also *Transactions of the International Surgical Congress*, Brussels, 1905). It is made by Messrs. Weiss and Son, London.

peculiarity of slow diffusion, I venture at this moment to draw attention to it again, as the field for its employment in war is very great. Binnie, Jacobson, Kocher, Charles Mayo, and Tuffier have all spoken with enthusiasm of its usefulness.

One blade is smooth and probe-pointed for underrunning the blood vessels to be controlled, the other is roughened and has an expanded ring-shaped end to prevent its slipping over the skin. A stab puncture of the skin is made at a point suitably placed in relation to the vessels to be controlled, and through it the probe-pointed blade is driven forcibly behind the large blood vessels (femoral artery and vein). When the forceps is closed the other blade firmly grasps the skin, and, owing to its roughened edge and the expanded ring end, does not slip. The forceps is securely closed by means of the ratchet on the handles. The time occupied in applying the forceps is not more than a second; the arteries and veins are simultaneously controlled, no assistant is required, and the instrument is always reliable; it is sterilized with the other instruments. The stab puncture in the skin is dressed with iodine and a pad of sterilized gauze, $\frac{1}{4}$ in. in diameter, fixed on with strapping. In military surgery the nature and situation of the wound will often render it unnecessary to make a stab puncture for the probe-pointed blade; I have found, when recently using the instrument in France, that it is necessary, on account of the muscle destruction, to modify the forceps so as to bring the blades closer together. The parts to be compressed are in these conditions considerably thinned. The application of the forceps tourniquet to the thigh has been described, but it will be seen that it can be used also in amputations of the arm or at the shoulder. It has, in fact, been used with success in these situations.

THE INTRASPINAL TREATMENT OF SYPHILIS OF THE CENTRAL NERVOUS SYSTEM; WITH THE REPORT OF CASES.

BY

A. ROCKE ROBERTSON, CAPTAIN C.A.M.C.,
IN CHARGE OF LABORATORIES AND WARD FOR TERTIARY SYPHILIS,
THE GRANVILLE CANADIAN SPECIAL HOSPITAL, RAMSGATE.

It is only within the last few years that a vigorous attempt has been made to treat this disease by the introduction of a powerful antisyphilitic remedy into the spinal canal.

After a brief localization within the primary sore, the *Spirochaeta pallida* very rapidly reaches the systemic circulation—probably within a few days after, or, some hold, even before the first appearance of the chancre. At this stage the spirochaete has been successfully isolated and cultivated from lesions and the blood in the human being, and in experimentally induced syphilis in rabbits and monkeys. The exceedingly fine, spiral, thread-like character and motility of the organism, together with its apparent preference for connective tissue and lymph spaces, cause it early to migrate into the vessel walls, or to pass through the latter into the surrounding connective tissue.

In infants dead of congenital syphilis the organisms are commonly found in vast numbers in the walls of the sinusoids of the liver and spleen, and also within the intermuscular lymph spaces in the wall of the heart. The toxin produced is apparently mild, and the tissues which chiefly respond to this irritation are connective tissue and endothelial cells. When the organism is present in great numbers within the circulating blood and in the connective tissue of the intima—that is, in the secondary stage—the consequent toxæmia is marked by the presence of fever, malaise, anaemia, vague nervous disturbances, general glandular enlargement, etc. Somewhat later the organisms have practically disappeared from the blood, many having perished, while others have penetrated deeply within, or passed beyond the vessel walls in certain localities, where they eventually give rise in the main to the formation of connective tissue lesions. Such lesions are found chiefly in the intima and adventitia of small vessels where the connective tissue, in particular, proliferates enormously. The intima may become so thickened that the lumen of the vessel is partly or totally occluded, and it is owing to this fact that tissues supplied by such vessels are rendered anaemic and in consequence eventually perish, only to be replaced by scar tissue. The organisms lie within or between connective tissue or endothelial cells, and thrive in these granulomata, which, being relatively avascular, are therefore anaemic. Thus, it can readily be seen that in the late secondary or tertiary stages of syphilis the organisms are located deep within these anaemic tissues, are relatively shut off from the blood and lymph stream, and also from antagonistic agents which the blood may contain. It is apparently owing to these facts that the tertiary manifestations of syphilis are often so resistant to treatment.

There are no accurate data to show what percentage of syphilitics in the secondary stage have actual involvement of the central nervous system, but, since the cerebro-spinal fluid has often been found to show changes, it is reasonable to suppose that many of the nervous manifestations of this stage are directly due to the action of the spirochaete upon the meninges, probably of the nature of a miliary syphilitic meningitis. In 1903 Ravaut, examining spinal fluid in secondary syphilis, found abnormal changes in 70 per cent. of all cases. Plant found changes in 66 per cent. Nonne and Montoux, as a result of their own investigations of spinal fluid, found that 40 per cent. of all cases of syphilis eventually exhibit some evidence of involvement of the nervous system. Gennerich thinks that all early constitutional cases (Wassermann positive) will, after salvarsan or mercury, develop an increase of lymphocytes and globulin—that is, a provocative reaction will be obtained in the spinal fluid. It seems, therefore, that nervous tissues and the membranes covering them are particularly susceptible to invasion