

New method of amputating the hip-joint / by Mr Newman.

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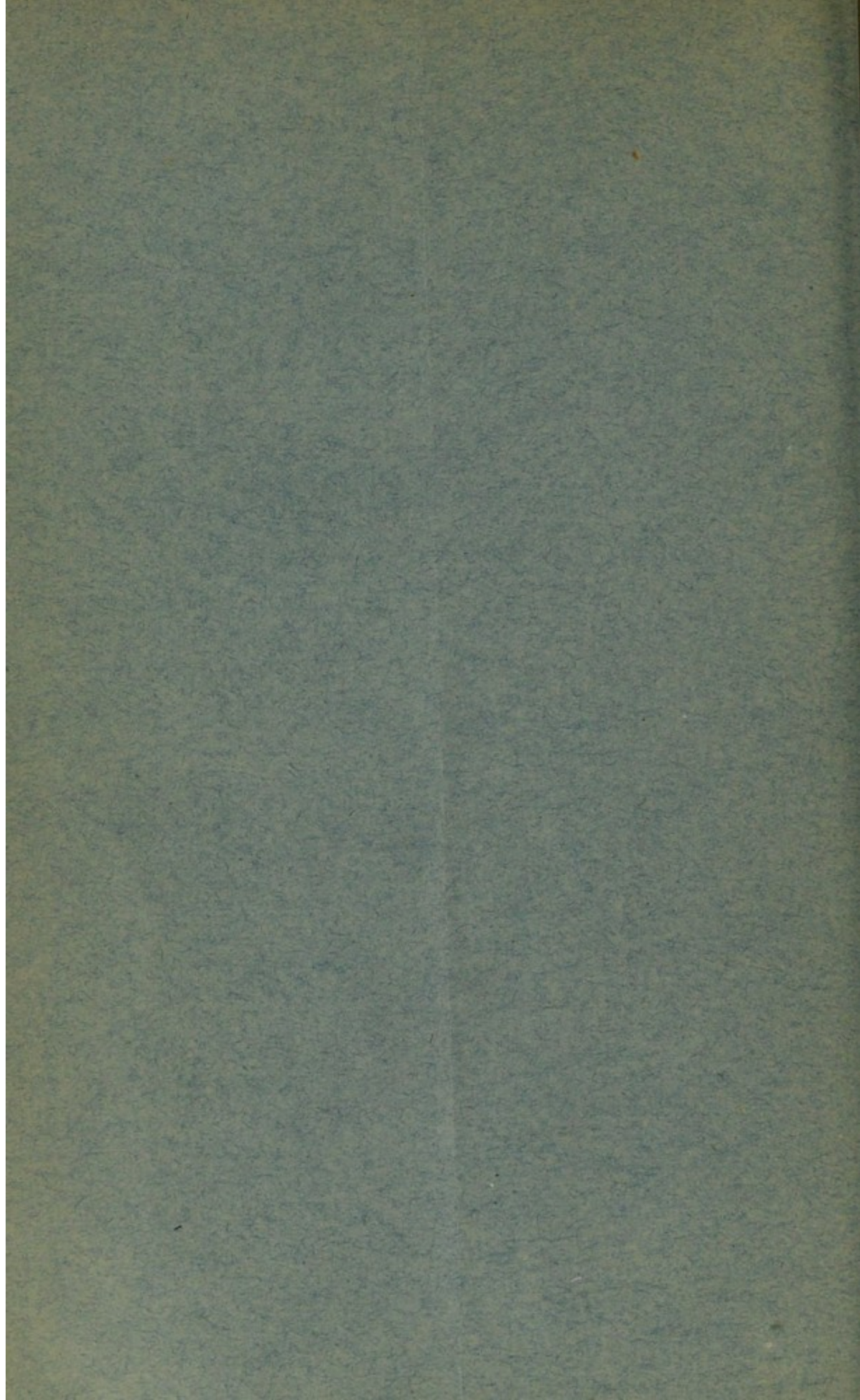
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OF
AMPUTATING THE HIP-JOINT.

BY MR NEWMAN,
House Surgeon, Western Infirmary, Glasgow.



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AMPUTATING AT THE HIP-JOINT.

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THE various expedients, resorted to for the temporary arrest of hæmorrhage during operation, whether it be the grasp of an assistant, the Petit tourniquet, or Esmarsh's elastic band, are all easily and effectually employed to stop the flow of blood in operations upon the extremities, when the seat of the operation is sufficiently low down to allow of their application, without interfering with the free use of the knife. Thus, in an amputation upon the upper or lower extremity, say at the elbow or knee, the pressure is easily applied above these points. But it is otherwise in amputation at the shoulder or hip; the tourniquet, in whatever form, is inapplicable, the incisions being made so high up that it is impossible to apply it, and digital compression of the artery, in either case, cannot be depended upon; so that fear of incontrollable hæmorrhage always presents itself to the surgeon. So much so was this the case, that at one time it was advised that the femoral artery, in cases of hip-joint amputation, should be ligatured before the operation was begun. Sir A. Cooper, after mentioning several cases of this operation performed by Larry, Guthrie, and others, without previous ligature of the main artery, goes on to say: "Notwithstanding the great respect I entertain for these

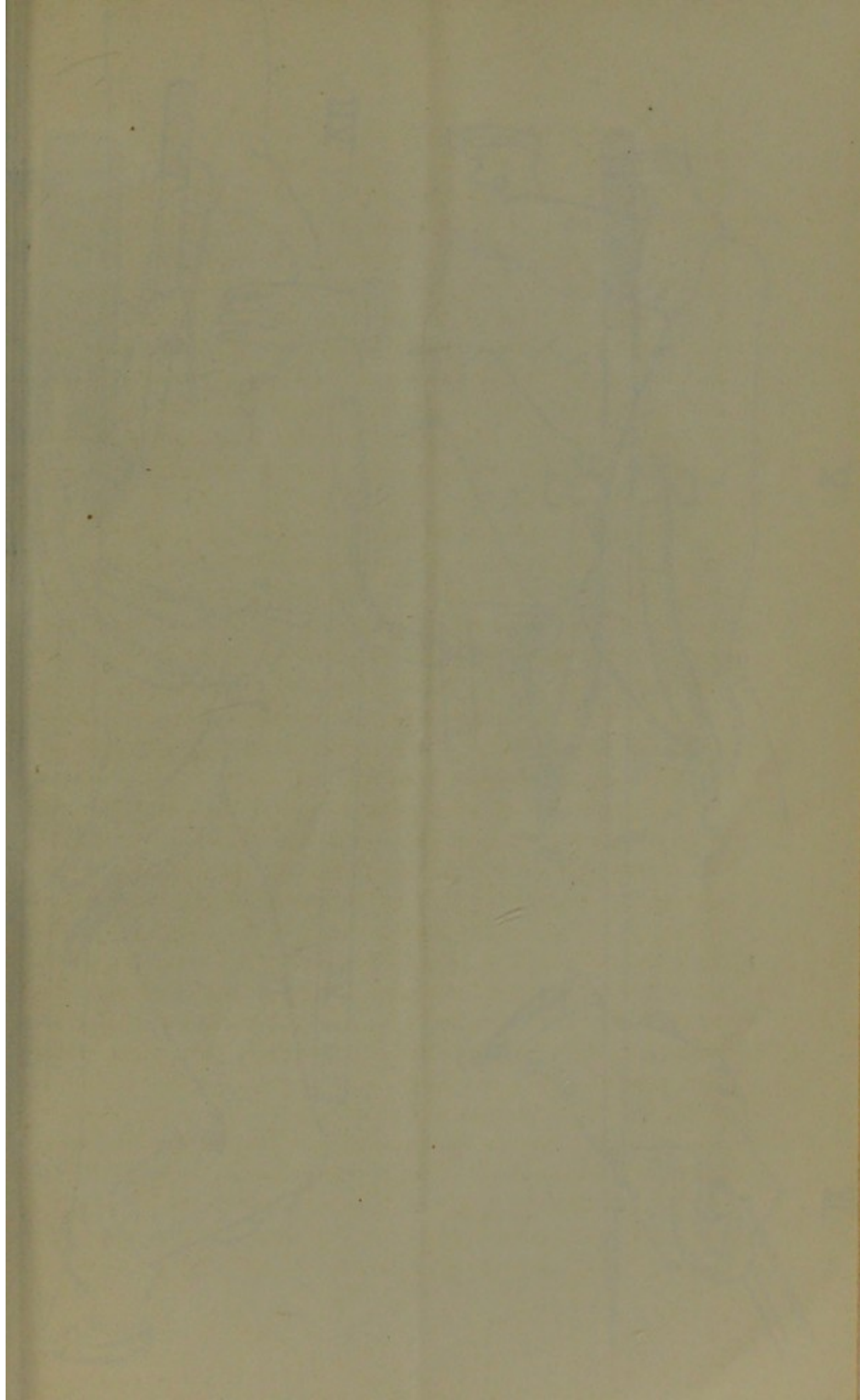
authorities, I am disposed to think that the operation cannot be safely performed without securing the artery in the first instance," thus showing the great dread which this eminent surgeon held in view, and which was one of the principal objections to the operation: for this cause, of all the circumstances taken into consideration to determine the method of operation, the avoidance of hæmorrhage was one of the most important. But amputatiou at the hip-joint, though necessarily a dreadful operation, has become much more frequent since the introduction of chloroform, which, doubtless, deprives it of much of its horror, as well as diminishes the immediate danger of such an extensive wound. But however much chloroform may assist in making the operation less disagreeable to the operator, and, to some extent, safer to the patient, yet it is of but little avail in arresting the flow of blood, the loss of which the patient is ill able to afford. It therefore devolves upon the surgeon to do all in his power to prevent the loss of a fluid which is so precious, and the saving of which may turn the tide in favour of the patient. This he is able to do in all cases of operation upon the extremities, when the seat of the operation is sufficiently low down to allow of the application of pressure, the method advocated by Prof. F. Esmarsh being probably the most effective. But, however easy it may be to apply pressure to a limb in its continuity, it is entirely different when, in order to check the hæmorrhage, the pressure requires to be applied to the artery as it passes over some part of the trunk,—to the aorta, or to the femoral as it passes over the pubis, in cases of hip-joint amputation, and the subclavian in that of the shoulder. It has been the custom in these cases to amputate by transfixion, and as the knife advances it is followed by the fingers of an assistant, which are introduced into the wound behind the knife, so as to command the arteries previous to their division, whilst another assistant is ready, as soon as the first flap is cut, to compress the vessels in the other flap, either by a sponge or with the fingers. But, even with these precautions, together with pressure upon the femoral as it passes

over the brim of the pelvis, or compression of the aorta, as recommended by Professors Lister and Pancoast, the operation requires to be performed with rapidity, in order that dangerous hæmorrhage may be prevented. The arteries, as they are uncovered one by one by the assistants in order to be secured, pour forth part of their contents, which in each individual vessel may not be very large, but, when taken collectively, the amount of blood lost is considerable, and well worth trying to preserve. No doubt the use of the aortic tourniquet, if properly employed, will, to some extent, decrease the flow of blood through the vessels below the point of application, but the difficulty of applying this instrument, and of keeping it in proper position, is so great, that its adoption is by no means general, besides the danger of applying it too forcibly, or in such a manner as to impede the venous return through the vena cava, are points not altogether unworthy of consideration. Lister, instead of using the aortic tourniquet, adopts Esmarsh's elastic band, wound tightly round the waist three or four times, a towel having been interposed between it and the skin, and a pad placed over the aorta on a level with the bodies of the lower lumbar vertebræ. Esmarsh also employs a similar method. When we consider the unavoidable dangers of anæsthetics, of which we have only too frequent evidence, as shown by the number of deaths during their administration, it is the duty of the surgeon to be extremely careful not to interpose any agency, which might increase the risk of interference with the circulation or respiration. It cannot, I think, but be admitted that the application of a tourniquet to the aorta, which may also compress the vena cava, particularly Esmarsh's elastic band round the waist, must interfere, to a great extent, both with the circulation and respiration. The employment of Esmarsh's band must, by its pressure upon the abdominal muscles, and the abdominal contents, which, in their turn, press upon the diaphragm, interfere with respiration, because in this way two sets of muscles, inspiratory and expiratory, are, as it were, to a

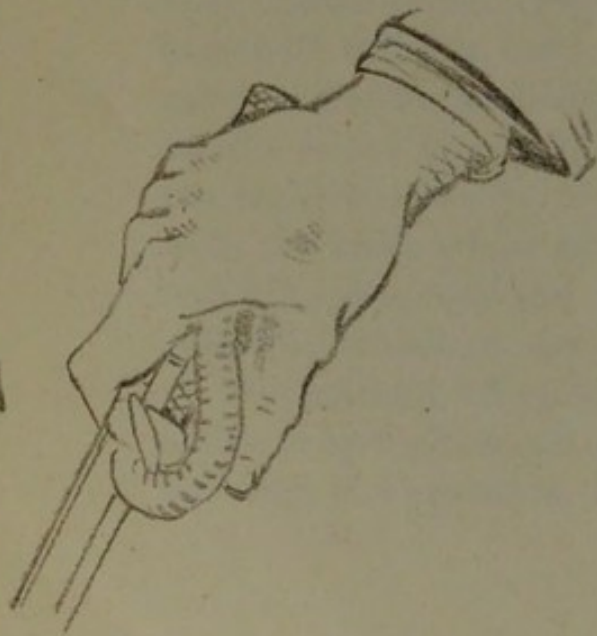
certain extent withdrawn, and no longer lend their aid in carrying on a function so necessary to life; besides the injurious effects which might result from such powerful and continuous pressure upon the sympathetic ganglia and nerves, and upon the viscera. In the method which I propose, the pressure is neither applied to the aorta, nor to the femoral as it passes over the brim of the pelvis, but is brought to bear upon the base of the flaps. In order to accomplish this, however, it is necessary that certain modifications, both in the instrument and the mode of operating, should be adopted. I shall first describe the appliances, and then go on to consider the necessary alterations in the operation.

The instrument may be described as follows:—It consists of a knife, the blade (*a*) of which is twelve and a-half inches long, and one inch broad. It is shaped as shown in the drawing (Fig. I). Measuring from the handle, the first nine inches is half-an-inch broad, and the remaining three-and-a-half inches, an inch broad, and tapering to a point. Into the space thus left in the back of the blade, two steel slips (Fig. II. *b*) are fitted, nine inches long, two-fifths of an inch broad, and one-tenth of an inch thick. At the point end of each slip, a small oblong hole (Figs I. and II. *c*) is made, with a pin passing across it. To the handle end of each slip, an elastic band (Figs. I., II., and III. *e*) is attached, in such a way as to allow of the band being elongated or shortened as the case may be. To the end of the elastic band, (Figs. I., II., and III.) a hook (*d*) is attached, which is used to connect the elastic band with the other end of the steel slip. The back (*f*) is stretched from the handle to the broader portion of the blade. The parts, when put together, are perfectly flush, and in no way interfere with the knife when used in cutting. The handle (Figs. I. and III., *g*) is four-and-a-half inches long, and has two small snibs (*h*), which are used to keep the steel slips in position.

The method of performing the operation most conveniently is by making antero-posterior flaps. Before proceeding with the operation the limb should be tightly bandaged



IV



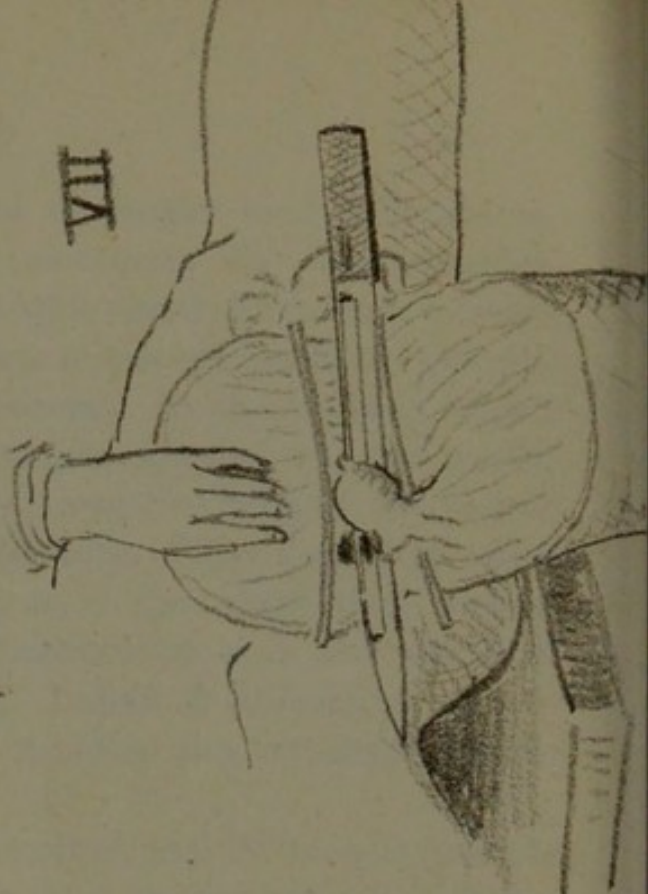
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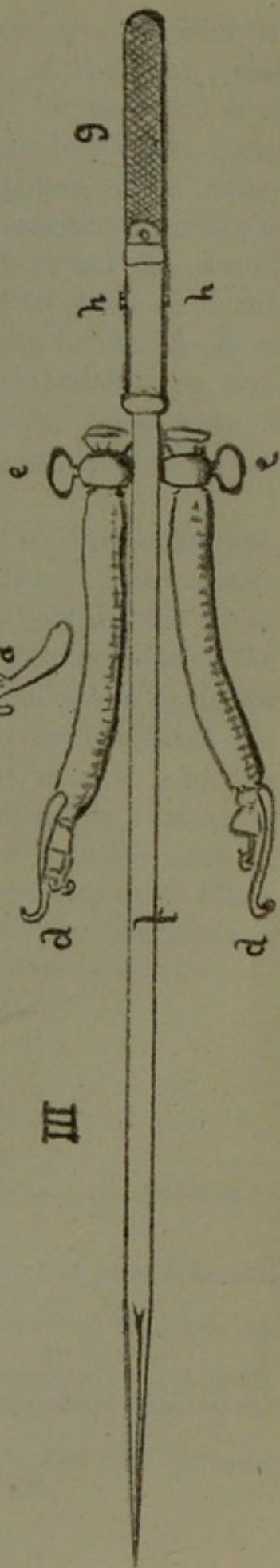
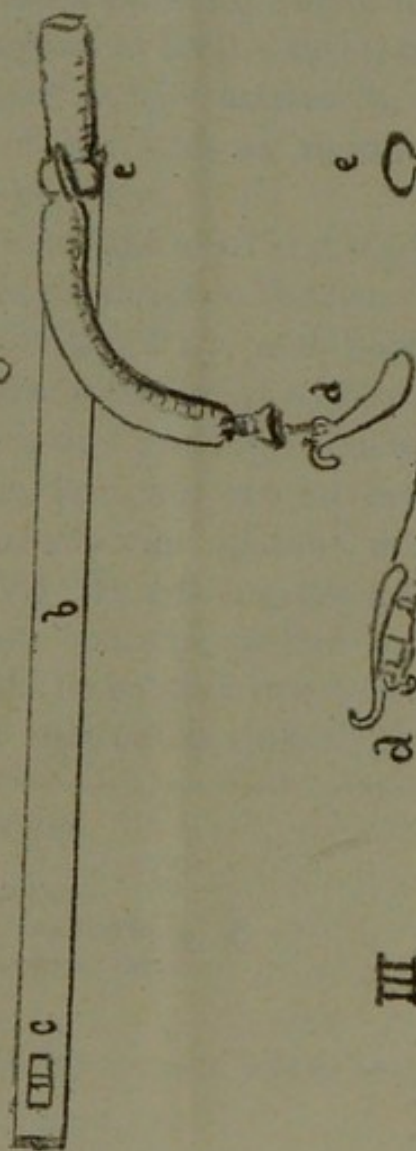
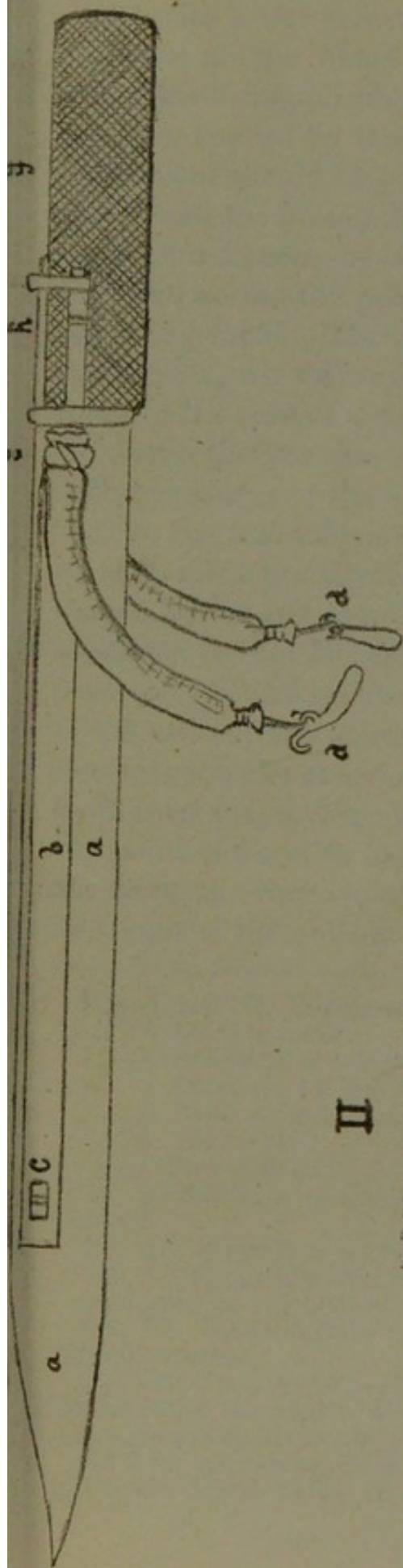


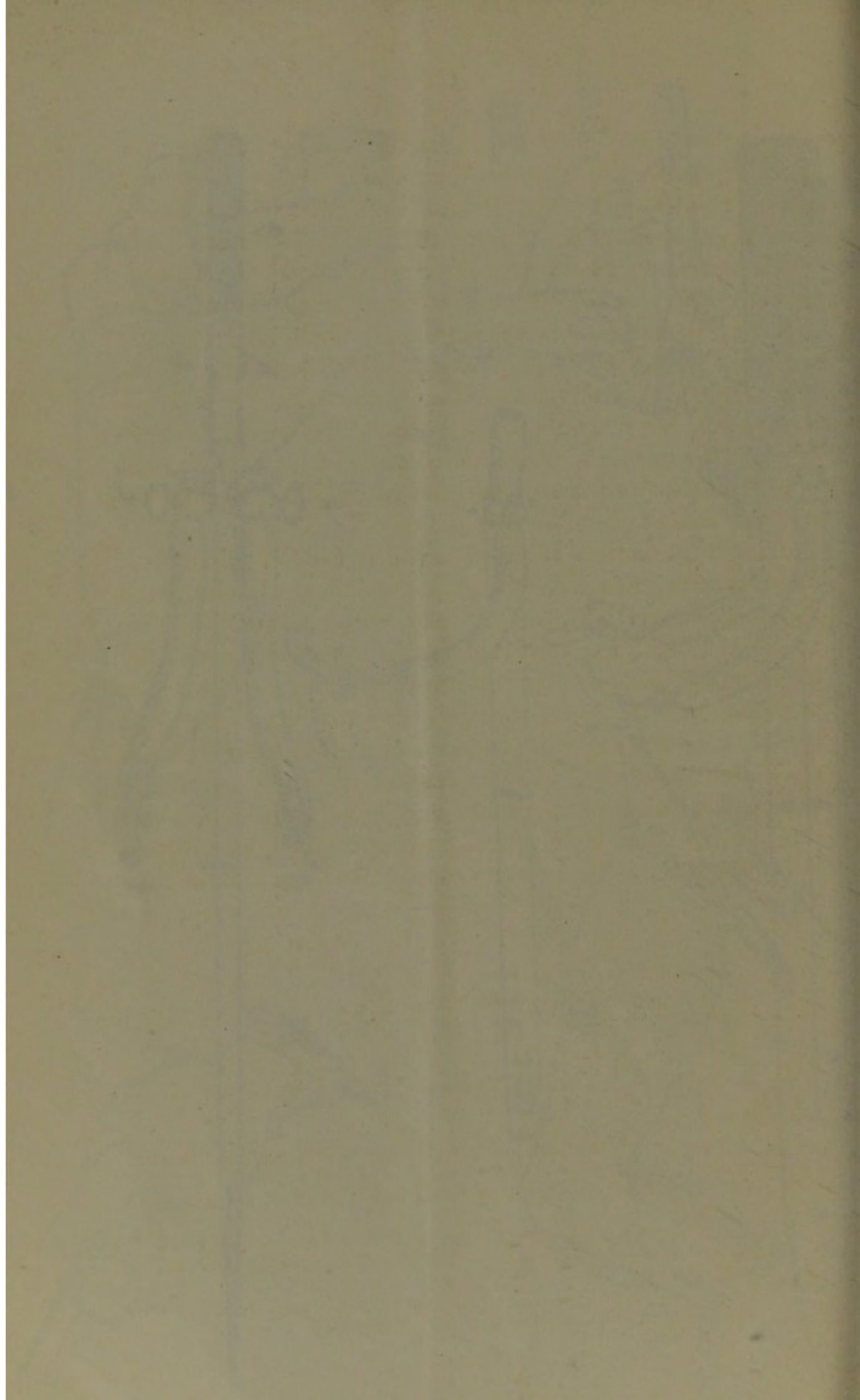
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VII







either with a wet calico, or an elastic bandage, in order to press out all the blood from the vessels of the limb; and when this is inapplicable, the limb should be elevated and pressure applied by the hand. After this has been done, the patient should be put under the influence of an anæsthetic, and the breech drawn down to the margin of the table, and secured there by a bandage passed round the sound limb and across the pelvis, and made fast to the leg of the operating table. The diseased limb, which, for the sake of description, we will suppose to be the right, should be confided to the care of a trustworthy assistant, whose duty it is to alter the position of the limb as required during the different stages of the operation.

The thigh should now be adducted and slightly extended, so as to relax the tissues posterior to the bone. The surgeon stands on the left side of the limb, and holding the knife as shown in Fig. IV., inserts the point a little in front of the tuberosity of the ischium, and passing it outwards posterior to the neck of the femur, brings it out an inch behind the line between the anterior superior spinous process and the trochanter major (Fig. V.) In passing the knife, as soon as the point is found to have come in contact with the neck of the bone, the limb should be rotated inwards, so as to allow the point of the knife to pass out as close to the line between

Figs. I. and III. Knife complete.

„ *a.* Blade of knife.

„ *b.* Steel slips in side of knife.

„ *c.* Small pin for fastening the hook, *d.*

„ *d.* Hook at the end of elastic band.

„ *e.* Elastic band.

„ *f.* Back of knife.

„ *g.* Handle, with a snib (*h*) on each side to keep the steel slips in position.

Fig. IV. Shows how the knife is held.

Fig. V. The knife passed posterior to the bone; the limb being adducted, rotated inwards, and slightly extended.

Fig. VI. The knife passed anterior to the bone; the limb abducted, and rotated outwards.

Fig. VII. The anterior flap formed; the joint disarticulated; and the knife passed round the head of the bone; both flaps compressed between the steel slips and elastic bands.

* * * The instrument, as described above, may be had from the only maker, Mr Archd. Young, 58 North Bridge, Edinburgh.

the anterior superior spinous process and the great trochanter as possible. The knife is now lying posterior to the neck of the femur, and almost parallel to Poupart's ligament. The posterior slip should then be removed from the side of the knife. The knife is now withdrawn, so far as to allow the point to be passed anterior to the neck of the femur. The limb is abducted and rotated outwards, so as to allow the point of the knife to emerge from the same wound as it did in introducing the posterior slip. The next part of the operation is to extend the elastic band and hook it, in order to compress the posterior flap, which having been done, the vessels of this flap are so compressed between the elastic band and the steel slip that bleeding from them is impossible. The elastic band of the anterior slip is now stretched and fastened, and the slip is disengaged from the side of the knife. The position of matters is now as follows:—The posterior slip is compressing the posterior flap, the anterior slip compressing the anterior flap, and the knife lying in front of the neck of the bone close to the anterior slip. The knife is now carried downwards, and made to perform a sawing movement, so as to form the anterior flap. The thigh, which, during this stage of the operation, has been flexed, is now extended, abducted, and rotated outwards, so as to allow the surgeon to open the joint by cutting upon the head of the bone in front. As soon as this has been done the femur is depressed, causing the head of the bone to start forwards; the round ligament and the remainder of the capsule are now cut, the knife brought round the head of the bone (Fig. VII.), and the posterior flap is formed by cutting between the posterior slip and the bone, and then downwards and backwards through the tissues at the back of the thigh.

The amputation having been completed, it will be seen that both the anterior and posterior flaps are compressed between the slips and the elastic bands, so that the escape of blood from the vessels of either flap is impossible (Fig. VII.) The surgeon should now direct his attention to the femoral artery, and the vessels of the anterior flap, that require

to be secured, after which the band may be removed and the vessels of the posterior flap tied in turn, and the slip and band compressing it may be detached.

I have described the method of operating on the right side, after which it is quite unnecessary to enter into a detailed description of the operation when the left limb has to be removed, the only difference being that the knife is entered between the anterior superior spinous process and trochanter major, and brought out in front of the tuberosity of the ischium, instead of *vice versa*, as it is on the right side. The way in which the limb is moved during the different stages of the operation is also different, as will be evident; the object, however, being, in the first instance, to bring the point of the knife out by the same wound, both in passing the anterior and posterior slip, and after the anterior flap has been cut, to disarticulate the head of the bone.

The advantages which are associated with the above method of amputating at the hip-joint, appear to me to be numerous. One of the first, a not inconsiderable one, is that the operation may be performed without the fear of serious hæmorrhage, and without interfering with the respiration or circulation during the administration of anæsthetics, no pressure being applied round the waist, or to the aorta.

The bands and slips so grasp the flaps, that bleeding from the vessels is very slight indeed. I tested this on the dead subject, by having fluid injected into the common iliac artery whilst I was removing the limb. The force used in injecting the fluid, was considerably greater than that exerted by the blood column during life, and the result was very satisfactory, the amount of pressure required to obliterate the artery being much less than I imagined.

Another advantage is, that the surgeon may take his time in operating. The object of performing the operation rapidly, viz., the fear of serious hæmorrhage, being removed, he does not require to hurry over the operation in order to secure the vessels. As long as the bands and slips are in position he may have perfect confidence that the amount of blood lost will be but trifling.

The assistants required to assist the surgeon are fewer than those required to perform the ordinary operation. Thus, the number usually required is as follows:—(1) One to administer chloroform; (2) another to keep the aortic tourniquet, when it is used, in position; (3) another assistant is required to compress the femoral; (4) to hold and rotate the limb, as required, during the different stages of the operation; (5) one to hold the anterior, and (6) another the posterior flap when cut; (7) to pass the instruments, sponges, &c., to the surgeon. This may be all very well when proper assistance can be procured, as in hospital or city practice; but it is otherwise when a country surgeon is called upon to perform the operation with one or two assistants, on whom he cannot always rely. Besides, even when a proper number of good assistants can be had, they are of necessity standing so close to one another, that the movements of the surgeon are much embarrassed.

When the mode of operating, above described, is adopted, the assistance required is much less. Those necessary are (1), one to administer the anæsthetic; (2) one to hold and rotate the limb; (3) another to hold the anterior flap when cut, the posterior being allowed to hang down, compressed at its base by the steel slip and elastic band; (4) an assistant to hand the instruments, &c., to the operator.