ON A METHOD OF
CONTROLLING HÆMORRHAGE IN AMPU-
TATION AT, OR EXCISION OF,
THE HIP-JOINT.¹

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LET me ask my hearers after listening to this paper to judge it, not by the novelty or boldness of the proceeding which has furnished me with a subject, but by the amount of traditional uncertainty and difficulty it may tend to remove. The dread of hæmorrhage felt by a surgeon about to amputate at the hip-joint is no mere fancy. It is a matter of great importance, and the means by which the blood-loss can be safely and completely controlled are questions of supreme moment to him. It does not follow because a problem has been found difficult of solution in the past that it may not at some future time be solved in a simple manner; and it by no means follows that because the forthcoming solution is simple it is also unreliable. The present subject furnishes a case in point. All of us must remember how a few years ago, and indeed even to-day, the anxious surgeon carefully applied the gigantic horseshoe tourniquet to the abdomen of his unfortunate patient, and how gratified he was when it was ascertained that pulsation had stopped in the femoral artery; the admiration and enthusiasm of his onlookers were raised to their highest pitch; the proceeding being regarded as a marvellously skilful and wonderful surgical attainment. Under the plan I have adopted all this glory vanishes; the same end is gained by what may be considered a very commonplace procedure.

On June 17th last I performed amputation through the hip-joint on a boy, ten years old, at the Queen's Hospital, Birmingham. I then employed a method of controlling the hæmorrhage which had not, so far as I am aware, previously been used in this particular operation. The plan is, I think, simpler and safer than any of its predecessors. The amputation was practically bloodless, the hæmorrhage being as completely restrained as in operations through the lower part of the leg. The limb was removed in the manner recommended by my colleague, Mr. Furneaux Jordan. The case was one of hip-joint disease, where excision six months previously had been followed by acute osteo-myelitis of the femur. The boy made a rapid recovery after the amputation, and left the hospital in six weeks.

The method I am about to describe contains no new principle; it is an adaptation of the well-known plan of circular elastic constriction which we owe to Professor Esmarch. The limb about to be operated upon should first be emptied of blood by elevation. This will occupy only a few minutes, and may be executed during the administration of the anæsthetic. Elevation combined with gentle friction towards the trunk renders parts as exsanguineous as the at times undesirable Esmarch's roller. A strip of black indiarubber bandage about two yards long is to be doubled and passed between the thighs, its centre lying between the tuber ischii of the side to be operated on and the anus. A common calico thigh roller must next be laid lengthways over the external iliac artery. The ends of the rubber are now to be firmly and steadily drawn in a direction upwards and outwards, one in front and one behind, to a point above the centre of the iliac crest of the same side. They must be pulled tight enough to check pulsation in the femoral artery. The front part of the band passing across the compress occludes the external iliac and runs parallel to and above Poupart's ligament. The back half of the band runs across the great sacro-sciatic notch, and, by compressing the vessels passing through it, prevents bleeding from the branches of the internal iliac artery. The ends of the bandage thus tightened must be held by the hand of an assistant placed just above the centre of the iliac crest, the back of the hand being against the surface of the patient's body. It is a good plan to pass the elastic over a slip of wood held in the palm of the hand, so as to diminish the pain attending the prolonged pressure of the rubber bandage. In this way an elastic tourniquet is made to encircle one of the innominate

bones; checking the whole blood-supply to the lower extremity. The elastic bandage may be secured above the iliac crest in the usual manner with tapes, and may be prevented from slipping downwards by being held with a common roller tied securely over the opposite shoulder. Experience has shown, however, that no mechanical means answer so well as the hand of a trusty assistant. When the band is once properly adjusted, the assistant has only to take care that it does not slip away from the compress or over the tuber ischii. The former is prevented by securing pad and tourniquet together with a stout safety pin; and the latter by keeping the securing hand well above the iliac crest, or even more safely by looping a tape beneath the elastic near the tuber ischii, passing it behind under the sacrum and having it held in that position. The solid rubber tourniquet may be used instead of this bandage. I prefer, however, the bandage. The soft parts are less damaged by reason of its greater breadth and it is less likely to roll off the compress placed over the external iliac.

The ligature, being altogether above the limb, is out of the way of the surgeon in any operation at or about the hip-joint. The great trochanter is fully exposed; the hip being free upwards as far as the iliac crest and inwards to the perineum. The plan is equally applicable in amputation by transfixion or in excision of the joint, as in the case above alluded to. All previous operators have controlled the blood flow during hip amputations by an apparatus adapted in some manner to the abdomen, except in the case of the ingenious rectal lever recently introduced to the profession by Davy. Esmarch himself says in his Surgeon's Handbook "aortic pressure must be employed for disarticulation and excision of the hip." He recommends either Pancoast's or his own abdominal tourniquet; both instruments being similar in principle. He describes several methods of compressing the aorta by a circular elastic bandage applied round the loins, and of these Brande's is undoubtedly the best. The latest and probably a better procedure than any of the above is Davy's plan of compressing the common iliac artery by means of a wooden lever introduced into the rectum. The following advantages are claimed for it by its inventor over all apparatus which acts upon the aorta through the abdominal parietes:—1. There is less disturbance of the general circulation, as that of the affected limb only is interfered with. 2. There is no interference with abdominal respiration; a very important gain in patients under anæsthetics. 3. There is less danger of injuring the abdominal contents. 4. Less pressure is required to control the blood stream through the common iliac artery than through the aorta. 5. The instrument is less likely to get displaced. 6. It is more rapidly and easily manipulated. 7. It is cheaper and more durable.

All these advantages hold good in the case of Esmarch's bandage as I apply it, most of them in a greater degree than when the lever is used. The bandage has, however, the following additional claims over the lever:—1. The simplicity and certainty of its application; no previous experience being necessary to compress the vessels there is no possibility of going wrong. 2. The security with which the vessels are controlled, regardless of the movements of the patient or manipulations of the operator. 3. The freedom from danger of injury to the rectum or abdominal contents. (Davy related a case at a recent meeting of the London Clinical Society, in which he himself had wounded the rectum with his lever; the patient dying on the following day of peritonitis.) 4. Its applicability to cases in which the rectal lever could not be employed, as in strictures of the bowel, intra-pelvic growths, and arterial abnormalities. 5. It requires no special apparatus.

I have adopted the method in a case where I stretched the sciatic nerve; the operation, being bloodless, became extremely easy. I have used it with similar advantage in investigating an obscure case attended by the presence of chronic sinuses about the great trochanter; caries of the outer surface of the innominate bone was detected as the cause. I have applied it in a recent case of excision of the hip. Venous hæmorrhage of a trifling amount occurred in this case; it proceeded, however, from the tissues below the ligature, and was due to the limb being imperfectly emptied of blood before the band was adjusted.

My colleague, Mr. Bennett May, kindly gave me an opportunity of employing the method in a case of amputation at the hip-joint on Dec. 17th. The patient was five years old, and was suffering from acute osteo-myelitis of the upper end of the femur. Disease had extended to the joint, and was

¹ A paper read before the Midland Medical Society, March 21st, 1883.

threatening death by the foulness and profusion of the discharge. The limb was thoroughly emptied of blood by elevation and friction. A double layer of Esmarch's bandage was used in the manner above described. About two drachms of blood escaped from the posterior flap only. The band was in position for nearly fifteen minutes, all visible vessels being secured before relaxing it. There was no arterial spurt throughout the operation. The child, already in a desperate condition before amputation was performed, died from shock about ten hours afterwards.

By the kindness of my friend Mr. Spofforth, of Kidderminster, I was afforded an opportunity of trying the plan at the Kidderminster Infirmary on Oct. 8th. The case was one of amputation at the right hip-joint for morbus coxæ. The patient was a man twenty years of age. After Esmarch's bandage had been rolled from toes to groin I applied the elastic in the manner above described. The hip-joint was first explored through a 5-in. incision made above and behind the trochanter, with a view of performing excision if the state of the bones would allow of it. Affairs were so bad, however, that Mr. Spofforth at once proceeded to amputate by Furneaux Jordan's method. The time occupied from the first incision to the ligature of the last vessel was twenty minutes, and the amount of blood lost was about three ounces. This loss, greater than I had previously seen, came entirely from the hinder part of the exploratory incision, and was due to the posterior half of the bandage being insufficiently tight. This was readily remedied by firmer traction, and the bleeding completely restrained. The patient made a rapid recovery, and left the infirmary in five or six weeks. This patient, being a well-built adult, I was led to use the elastic band in three folds instead of two, thinking, perhaps, that the latter would not exert sufficient pressure. It is quite unnecessary, however, to use more than two layers to control any bleeding efficiently; a greater number has the disadvantage of acting extremely painfully upon the hand which is holding them. The circulation throughout the largest vessels may be controlled by slighter pressure than is generally adopted. Esmarch's bandage and tourniquet are, as a rule, put on unnecessarily tightly. Arterial walls are soft elastic tubes, and a very moderate pressure is sufficient to check the current through them.

I submit this method to the profession feeling every confidence in its reliability, having applied it in seven operations—viz., three amputations at the hip-joint, one excision, one nerve-stretching, and one exploratory. Some of these cases were in the practice of my friends; it has pleased them equally with myself.

P.S.—Since writing the above I have had a fourth case of amputation at the hip-joint in a girl aged twelve years. The operation was performed on April 7th. Scarcely any blood was lost, and she is now nearly convalescent.

A CASE OF TUBERCULAR PERICARDITIS.

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ON account of the rarity of tubercular pericarditis, the particulars of a case not long ago under my care may possess some interest. My remarks refer more especially to the pathological aspect of the subject. THE LANCET, in one of its leading articles, has dealt with a few of the points involved.

By some it has been held that in pericarditis with tubercle the tubercles were the result of the inflammation, and were situated in the inflammatory false membranes. On the other hand, Sir G. Burrows long ago maintained that the tubercles were the cause of the inflammation, and were primarily situated in or under the serous layers of the pericardial sac. Cases actually observed appear to show that the affection may be tubercular from the onset; and, on the contrary, in other cases, that what was originally a simple pericarditis may subsequently become associated with tubercular growth. Nevertheless, it is not unlikely that the former of these is the usual condition in order of time. Cases are on record of tuberculosis of the pericardium, as well as others of tuberculosis of the heart muscle, without inflammation; and the possibility of the existence of pericardial tuberculosis before any pericarditis has made its appearance is also confirmed by examples of acute miliary

tuberculosis of the pericardium in cases of acute miliary tuberculosis more or less generalised in character, and affecting the serous membranes more particularly. The tubercles in tubercular pericarditis have been written of by some as if always found in the false membranes, as well as in the pericardial layers themselves. This, however, is not a universal rule; in some examples no tubercles exist in the false membrane, while they are well marked in the layers of the serous membrane itself, as in a case by Dr. T. B. Peacock. It seems probable that tubercles most frequently form at first in or beneath the pericardium, especially its visceral layer, and occasionally associated with these are tubercles in the muscular substance of the heart itself. There are indubitable examples of this on record. May not the miliary granulations of the pericardium in some of these cases have been secondary to the caseous masses in the heart muscle? Then, again, with reference to some of the cases of so-called tubercle of the heart, reported now a long time ago, the suggestion will intrude itself that the masses described as tubercular were perhaps syphilitic nodules in reality. The true tubercles, however, sometimes attain considerable size, as in a case reported by Dr. Bristowe. Although rare in those who have no tubercle elsewhere, tubercle of the heart or pericardium is not exclusively limited to cases with tubercle in other parts, as has been erroneously asserted. Thus in one of Dr. Peacock's cases no tubercle was found in any other organ, and in another none was found save in the bronchial glands. Other observers have reported a few similar facts. Tubercle being thus occasionally found nowhere except in the heart or pericardium and bronchial and mediastinal glands, Cruveilhier held that in some examples of this kind tubercle of the heart was probably primary, and the affection of the bronchial or mediastinal glands secondary thereto. This view has been opposed on what, with due deference, I think to be inadequate grounds. By Bauer tubercular pericarditis is said to be accompanied with more or less abundant exudation into the pericardial cavity, referring apparently to liquid exudation; yet Dr. Vaillard, whose case was summarised in THE LANCET and accompanied with some general observations, speaks of the pericarditis as being dry in the large majority of cases. More knowledge is also desirable as to the few examples of undoubted liquid effusion, inasmuch as one observer makes it a diagnostic element in examples of tubercular pericarditis of this kind that the effusion is not of very large amount, whereas, on the contrary, in the view of others, an abundant effusion, by its very abundance, favours a conclusion as to a tubercular origin of the pericarditis.

In the case I will mention the age was greater than that more usual to patients with tubercular pericarditis, the great majority of these being under the age of forty, although examples have been observed even in somewhat advanced life. The patient, D. P.—, an old soldier, died at the age of fifty-four, mainly of bronchitis, after having been for many years insane, hemiplegic, and aphasic. Death was preceded by occasional vomiting, a general convulsion, and coma. The seats of tubercle were the pericardium and the pericarditic pseudo-membranes, the right lung, and very slightly, especially on the right side, the bronchial glands. The first-named of these parts suffered the most severely; for the layers of the pericardium were universally and closely conjoined, and adherent by thick intervening dry false membranes, and both of the serous layers, but especially the neo-membranous formation, were thickly strewn with numerous embedded tubercular nodules of dirty-whitish hue. The cardiac valves were healthy; the left coronary artery was highly atheromatous, the right slightly so, the aorta not. The left ventricle was contracted and empty; the other cardiac chambers were gorged with dark fluid blood. The weight of the heart, with pericardium, was 10½ oz. In the left lung was general bronchitis, and it was entirely covered by old close pleuritic adhesions, and posteriorly by old inflammatory thickening of the visceral pleura. The right lung exhibited adhesions posteriorly, and patches of pleuritic thickening capping the apex, and situated over the lower part of the posterior and the middle part of the external surface. At the summit were minute greyish subpleural granulations, at the inner side of the apex a partly putty-like, partly cretaceous nodule, surrounded by dark cicatricial fibroid growth, and in the pulmonary tissue a few small nodules or granulations. Some bronchitis and pulmonary congestion were noted. The other lesions need not be described in detail, as they have been