MODERN OPERATIONS FOR VARICOSE VEINS.¹

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In the great majority of cases the potentiality for varix formation has existed from birth. The ordinary varicose vein is an example of true hypertrophy, shown not only in the circumference and thickness of the vein wall, but also in the length of the vein. The vein frequently assumes a very tortuous course in order that the increase in its length may be accommodated. This hypertrophy manifests itself soon after puberty. At first no subjective symptoms are noticeable. Sooner or later the valves become incompetent because they do not share equally in the hypertrophy which affects the rest of the vein. Thereafter the patient suffers, to a usually slowly increasing extent, from the complications of varicose veins, such as aching, easily tired limbs, pruritis, dermatitis, ulcer, phlebitis, and so on.

All these symptoms are due to venous stasis and back pressure, either directly or indirectly. This is proved by the fact that when such stasis and back pressure are prevented by postural treatment, the complicating symptoms vanish. It is readily understood that anything which mechanically causes obstruction to the venous return, such as pregnancy, tumour, &c., will aid the development of varicose veins.

Herein lies the guide to efficient operative treatment! One should ascertain, however, how much must be done in order to make certain that the various channels through which this back pressure occurs will be obliterated. One must also find out in certain cases with a history of deep phlebitis whether any operation on the superficial veins be permissible at all.

Various tests will show that the back pressure, evidenced in the superficial veins, is due to (a) inefficient valves, and (b) communication with the deep veins.

(1) Make the patient lie down and elevate the affected limb. The veins empty. Place a finger over the upper end of the internal saphenous vein to compress it, and make the patient stand up. The veins are found to be collapsed. Now remove the compressing

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finger and the blood rushes backwards down the vein and distends all the varicose parts.

(2) Patient recumbent as before. Elevate the limb, put a finger on the saphenous, and make the patient stand up. Keep the finger in position, occluding the saphenous. The superficial veins in the limb, which are empty at first, are seen to fill up slowly till they are nearly as full of blood as at the end of test (1).

(3) The patient stands. Place a finger on saphenous vein as before. Then bring the "muscular pump" of the limb into action by making the patient flex and extend the knee and hip joints rapidly. The action of the muscles not only drives the blood out of the deeper parts, but sucks the blood out of the superficial veins. These are found to become empty, but fill up again at once when the finger compressing the saphenous vein is removed.

(4) The foregoing tests do not "come off" when the deep veins are thrombosed.

(5) As Mayo has pointed out, in cases of thrombosis of the deep veins, the circulation in the subcutaneous veins may be essential for the comfort and well-being of the limb. Therefore, one prescribes the use of an elastic supporting bandage or stocking, which obliterates the superficial veins. If the wearing of such an elastic support adds to the discomfort of the limb, operation will do no good, but probably will do harm. If, on the other hand, the elastic support alleviates symptoms, operation will also be of benefit.

Tests (1), (2), and (3) show that an operation, such as Trendelenburg's, in which the internal saphenous vein is obliterated near the saphenous opening, will usually alleviate symptoms enormously, but that it will vary in success according to the amount of communication which exists between the superficial and the deep veins. Such an operation cannot have much effect when the external saphenous vein is also affected, which is frequently the case. The readiness, also, with which the tributaries of the internal saphenous establish a collateral circulation adds further explanation of immediate failure or rapid recurrence of the symptoms when this operation alone is carried out.

In passing, it may be remarked that test (3) offers a complete explanation of the fact that such patients, in the erect posture, are more comfortable when they are walking than when standing. The "muscle pump" acts vigorously during walking exercise. After exercise, if they remain standing, their symptoms are exaggerated, because, owing to exertion, more blood has been brought to the limb and the valveless veins, handicapped in supporting the
increased quantity of blood, become more distended, and hence pain and feeling of tiredness become more marked.

The most successful operation is that which divides not only the vein mainly at fault (the internal saphenous), but also its tributaries and communications with the deep veins. Hence, complete excision of the saphenous with ligature of its tributaries and communications was resorted to in order to make certain of cure. This necessitated an absurdly long skin wound, which too frequently became infected. The operation was a most tedious one. Then came Trendelenburg's operation, which had to be supplemented by separate ligature of the main tributaries and communications (Phelps), and even then the results were too often unsatisfactory. The so-called "garter" incision was introduced to deal with cases in which several "leashes" of veins occupy the circumference of the limb below the knee. The site of this incision (fig. 4) is usually 1 or 2 inches below the level of the tuberosity of the tibia. The incision runs horizontally, and may have, in bad cases, to be carried right round the leg. It is made down to the deep fascia, all superficial veins are divided, secured, and partially excised. The internal and external saphenous nerves should be spared.

With American surgeons rests the honour of having developed operations which fulfil the requisites for success in such a simple
manner that one or other of them is bound to oust all other operative procedures except, perhaps, the "garter" incision, which must still be fairly often required to ensure good results.

Keller\(^1\) apparently led the van. He exposed the internal saphenous vein near the saphenous opening, isolated it, tied it doubly, and divided between the ligatures. Over the lower end of the vein he made another small incision, isolated the vein, tied it distally, and divided it. From the lower end to the upper he passed a loop of wire through the lumen of the vein. The loop was passed out through a small lateral incision at the upper end of the vein, and the ligature on this part was firmly attached to it (fig. 1). When traction was made on the lower ends of the wire, the upper end of the vein was made to involute (like "flyping" (Scottic) a stocking), and could be in many cases pulled out in its entirety. A small incision had sometimes to be made in order to divide a strong tributary, which showed its position during the extraction by causing a slight crumpling of the skin. This method, which was unsatisfactory owing to the frequent tearing of the vein, was speedily followed by other more satisfactory procedures.

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\(^1\) New York: Philadelphia Medical Journal, August 19th, 1905.
The Mayos had, independently, gradually evolved the following plan:—

A ring vein enucleator or ring vein forceps is used (fig. 2). The internal saphenous is isolated and divided, after incision in the upper third of the thigh. The proximal end is tied, the distal end is passed through the ring of one or other instrument and then caught by a clamp. The vein is made tense by traction on the clamp, the tissues on either side of the vein in the thigh are supported by an assistant, and the ring is pushed along the vein, under the skin, for 6 or 8 inches, tearing through the lateral tributaries en route. The ring of the instrument is projected against the skin, and a small incision is made down to it. The ring is then pushed through the incision, and the vein unthreaded from it and pulled out after the clamp is removed. The instrument is withdrawn from the top wound, the vein is threaded through the ring again, and the process repeated. The torn tributaries have usually enough muscular and elastic structure to close spontaneously. Should the main vessel break, a new incision is made below the knee, the vein exposed and divided, and the enucleation made in both directions from this point. Below the knee the branches are larger, and the main vein more adherent, hence shorter distances are traversed. Calcareous deposits, sacculations, or extreme weakness of the walls render this method unsuitable (10 per cent.), and in such cases open dissection is practised, except opposite the knee-joint, where undermining is done. The Mayos avoid haemorrhage chiefly by slinging the ankle at varying heights to an ordinary gynaecological standard placed at the end of the table. If there be undue haemorrhage from any tributary, pressure by a small pad placed over the bleeding end is sufficient to stop it.

1 "Surgery, Gynaecology, and Obstetrics," April, 1906.
W. W. Babcock \(^1\) has produced a method which is at once the simplest, most efficacious, and most applicable to all cases. At first he used an ordinary \textit{bougie-à-boule} (17 or 18 French), but to shorten the operation and reduce the number of incisions he introduced a special extractor. (Fig. 3.) This is practically a thick, flexible, copper or brass wire, 26 inches in length, with acorn-like expansions at either end, like the tip of a \textit{bougie-à-boule}. The small bulbous tip is 16, and the larger 24 French, in size. Across a line extending from \(\frac{1}{2}\) inch internal to the middle of Poupart's ligament to the posterior margin of the internal condyle, an incision, 1 inch in length, is made, about 2\(\frac{1}{2}\) inches below Poupart's ligament, through the skin and subcutaneous fat down to the muscular sheath. The index finger is passed to the bottom of the wound, pressed backwards along the muscle sheath for a short distance, and then hooked inwards and forwards. The resistant cord of the vein is felt at once. This is lifted out, and caught at the upper end by an artery forceps. The vein is incised below the forceps, and the hemorrhage is stopped by at once introducing the smaller bulb.

of the instrument through the opening. The extractor is now carefully passed down the interior of the vein till it meets with a marked obstruction. Babcock states that the size and shape of the acorn tip enables the extractor to slip through valves which would catch a smaller instrument. In favourable cases the instrument can be made to pass as far as the ankle. The upper end of the vein is now tied firmly with silk thread round the shaft of the extractor. The vein is then tied above and cut across below the artery forceps, and the stump allowed to retract. The lower bulb of the extractor is located. The vein in which it lies is exposed through a small incision, clamped below the bulb, and cut proximal to the clamp. (Fig. 4.) The bulb is pushed out of the wound, and traction made upon it. The vein is pulled free from its surroundings, and massed, concertina fashion, in front of the upper bulb. The tributaries are torn across about an inch or thereby away from the main trunk. (Fig. 6.) In less time than the description requires, the extractor is pulled from the lower incision with a fusiform mass of vein huddled against the upper bulb. It is stated by Babcock that there is little chance of any portion of the vein that encircles the instrument being left behind. The hæmorrhage from the tract of the vein is slight, and in any case is easily controlled by a pressure bandage.

The writer has found Babcock's operation to be an eminently
satisfactory one. It is applicable in practically all cases as far as the part of the affected vein above the knee is concerned. If it is necessary to operate in thrombosed veins, it is self-evident that excision should supplant this method of operation. Excision is more suitable also when periphlebitis has caused the vein to become adherent to the surrounding tissues. The passage through the vein may be rendered difficult where the vein is much convoluted. The writer has also found difficulty occasionally, where the saphena is not much enlarged above the knee, in getting the instrument to pass a valve in the lower third of the thigh. In either case the difficulty is overcome by making a small incision over the point of obstruction, freeing the vein and milking the tortuosity over the point of the extractor, or pushing the point through the valve while supporting the vein externally; otherwise the extractor may perforate the wall of the vein when forced outwards. In the second case, however, the instrument may be withdrawn and passed from below up through an incision in the leg. To obviate any difficulty in finding the vein, the patient is made to stand erect before the operation is begun, and the position of the vein is marked above and below by lightly scoring the skin with a scalpel. The scarification shows plainly after the limb has been disinfected. The instrument should not be passed from below upwards when ulceration or phlebitis exists in the leg, and of course under such conditions special care should be taken to prevent infection of the wounds, especially that in the upper part of the thigh.

Babcock’s extractor, as originally made, has the defect that the larger acorn point is not quite large enough. A wide varicose vein has the tendency to involute, as in Keller’s method—the liability to tear across is then great. For this reason the writer has had the larger acorn tip made nearly half as wide again in diameter, with decided benefit in practice.

The extractor is much too long to be laid in the ordinary instrument steriliser without being bent. The repeated bending and unbending make the instrument break sooner or later near the middle. Therefore it should be provided at the centre with a narrow screw-joint, or locking catch, so that the two halves may be taken apart for sterilising purposes.