TREATMENT OF VARICOSE VEINS

POSSIBLE DANGER OF INJECTION OF SCLEROSING FLUIDS

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Our purpose here is to discuss the causes of unsatisfactory results of treatment of varicose veins. The veins have been studied by phlebography and also by direct examination at operation. The numbers so studied are small. This paper is a preliminary communication. Further anatomical studies and follow-up results will be incorporated in a future publication.

Examination of the whole problem of the treatment of varicose veins is well worth while. Patients complaining of varicose veins form a significant percentage of out-patients at any hospital. In military hospitals they compete with painful feet and piles as the principal cause of loss of man-hours. A soldier patient of one of us (A. M. B.) had spent 18 months out of two years' military service attending various hospitals for treatment of his varicose veins.

Are varicose veins a cause of disability? It is significant that 95% of patients attending civilian varicose vein clinics are women. In many instances they admit seeking advice for purely cosmetic reasons, occasionally from fear of future ulceration; only a small minority complain of pain. Where are the thousands of young men whose varicose veins gave rise to agony in the Services but who do not complain in civilian life?

These facts strongly suggest that varicose veins seldom cause serious discomfort. It is our contention that a very careful clinical assessment should be made in each case before advising operation. The most popular operation for varicose veins is ligation combined with retrograde injection of sclerosing solutions.

Unsatisfactory results fall into two main groups: (1) recurrence, and (2) deep thrombophlebitis.

Recurrence

Recurrence of varicosities after operation is due partly to inadequate ligation and partly to subsequent develop-

ment of valvular incompetence in deep perforating veins. The internal saphenous systems may be refilled at several levels.

(a) *Groin*.—The importance of ligation of all the tributaries entering the saphenous vein at the fossa ovalis has been stressed repeatedly by many authorities. Failure to do so may lead to rapid recurrence (Fig. 1). It is outside the scope of this paper to discuss the anatomical variations which occur at the fossa ovalis leading to inadequate ligation. This subject has been ably reviewed by McPheeters (1945) and Daseler *et al.* (1946). It should, how-

FIG. 1.—Dilated tributaries of saphenous vein refilling main trunk following inadequate ligation in groin.

FIG. 2.—Phlebogram showing filling of femoral and upper third of popliteal vein following injection of pyelectan into the distal end of the divided saphenous vein.

ever, be mentioned that oblique incisions parallel to the inguinal ligament, while sound from the point of view of healing, may give inadequate access where the sapheno-femoral junction is abnormally placed. Vertical incisions may be enlarged upwards or downwards where the sapheno-femoral junction is unusually high or low or where large tributaries enter further distally than normal.

(b) *Lower Third of Thighs*.—The internal saphenous vein communicates with the femoral vein in the lower third of the thigh through a large perforating vein. This vein was present in twelve consecutive phlebograms (Figs. 2 and 3). It is found 4 to 6 in. (10 to 15 cm.) above the adductor tubercle. The exact position of this perforator can be detected clinically, if it is a source of regurgitation from the deep to the superficial systems, by means of the tourniquet test of Mahorner and Ochsner (1938) combined with careful circumferential palpation of the limb. When a "blow out" is evident in the internal saphenous vein in the lower third of the thigh it is the rule to find a deep connexion related to it, usually within 1 in. (2.5 cm.) of the swelling.

(c) *Knee*.—A communicating vein is very commonly found passing from the external saphenous vein behind the internal condyle to join the internal saphenous vein. It can be easily detected by careful palpation. Failure to ligate this vein may lead to filling of the internal saphenous system from the external saphenous vein.

(d) *Below Knee*.—Perforating veins linking the superficial with the deep veins occur regularly below the knee. One large

FIG. 3.—Popliteal vein well filled with pyelectan following injection into the distal end of the saphenous vein divided in the groin. Note all the injected solution has passed into the popliteal vein.

perforator is often present about 1 in. below the articular margin of the tibia.

Consideration of these facts suggests that in fully developed varicosities of the internal saphenous system ligation is required at four sites: (1) fossa ovalis—division of the saphenous vein and ligation flush with the femoral vein, together with ligation of all tributaries of the saphenous at this level; (2) ligation of the perforating vein in the lower third of the thigh; (3) ligation of the communication from the external saphenous vein, if present; and (4) ligation of the internal saphenous vein immediately below the internal condyle of the tibia.

Deep Thrombophlebitis

Deep thrombophlebitis occasionally follows high ligation of the saphenous vein combined with injection, distally, of sclerosing solutions. A common practice is to pass a ureteric catheter down the saphenous vein to knee level and inject 5 ml. of sclerosing solution slowly as the catheter is withdrawn. A deep thrombophlebitis may also follow simple injection by subcutaneous puncture.

Disability varies with the extent of the phlebitis, ranging from some aching in the calf and slight oedema of the ankle at the end of the day to a full-blown "white leg." The frequency of this complication is hard to assess. One of us (A. M. B.), working in a large base hospital in Cairo, saw 12 patients with deep phlebitis following injection treatment between October, 1942, and February, 1943. The disability was such that discharge from the Army was recommended. A short paper drawing attention to this danger was read at the Middle East Surgical Conference in March, 1943. In the weekly recategorization boards held at this hospital at least one patient every week had to be down-graded for deep phlebitis. The latter condition was undoubtedly due to the sclerosing fluid entering the deep veins. In order to investigate this possibility, phlebographic studies have been made of the distribution of fluids injected into the saphenous vein at various levels.

Thigh and Leg Segments

Thigh Segment.—The saphenous vein was ligated and divided in the usual way at the fossa ovalis. A plate, 12 by 14 in. (30 by 35 cm.), was placed beneath the thigh, and 15 ml. of "pyejectan" was injected into the distal end of the divided vein, the injection taking about 10 seconds. A single exposure was taken at the conclusion of the injection. Twelve consecutive patients with typical dilatation of the internal saphenous system and varicosities below the knee were investigated in this manner. These phlebograms showed that most of the pyejectan had entered the femoral vein through a communicating vein in the lower third of the thigh. A large communication between the saphenous and femoral veins was found in all 12 cases; the vein was relatively constant in position 4 to 6 in. (10 to 15 cm.) above the adductor tubercle.

Leg Segment.—In a further series the saphenous vein was divided at the level of the internal condyle of the femur and pyejectan was injected into the distal segment. In one patient a large communicating vein was seen just below the articular margin of the tibia through which pyejectan passed into the popliteal vein (Fig. 4). In the remaining patients, however, most of the contrast medium remained in the superficial varicosities; only a small amount reaching the deep veins (Fig. 5). It would seem, therefore, that injection of sclerosing solutions distally, from the knee downwards, is relatively safe. The likelihood of significant quantities passing into the deep veins is remote, since the communicating veins below the knee, although numerous, are small.

FIG. 4.—Saphenous vein divided at level of internal condyle of femur. Pyejectan injected into distal end. Some of the opaque solution has passed through a perforating vein just below the level of the knee-joint, filling the popliteal vein. This is an exceptional recurrence.

It would be possible, however, by subcutaneous puncture if made in close proximity to a deep communication, to inject sclerosing fluids direct into the deep veins.

Summary and Conclusions

Unsatisfactory results of treatment of varicose veins are due to recurrence and to deep thrombophlebitis. Recurrence can usually be explained by inadequate ligation. Deep thrombophlebitis, although uncommon, is a serious disability.

This investigation demonstrates the possible danger resulting from high retrograde injection of sclerosing solutions. The obvious criticism is that a very small amount of sclerosing solution is used, and that if any reaches the deep veins it would be diluted and washed away.

The length of time contrast media remain in the femoral vein with the leg horizontal and at rest, coupled with the fact that the whole length of the popliteal vein is filled by fluid passing through the perforating vein in the lower third of the thigh, suggests that the blood flow in the femoral vein under these conditions is very sluggish. Very small amounts of irritant substances might cause intimal damage with subsequent venospasm and clotting. High retrograde injection of large quantities (20–30 ml.) of strong dextrose or salt solutions is undoubtedly dangerous.

FIG. 5.—Phlebogram obtained by technique similar to that employed in Fig. 4. Insignificant quantities of the opaque solution have reached the deep veins.

The ease with which fluids injected distally from the groin level pass into the femoral veins suggests that high injection of the thigh segment is unwise. There is much less risk below the knee. The large perforating vein immediately below the knee shown in one phlebogram appears to be inconstant. The remaining deep communications are small.

In our opinion operative treatment of varicose veins should consist of adequate ligation with, if necessary, distal injection from knee level of not more than 5 ml. of sclerosing solution.

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PENICILLIN BY INTRA-ORAL DRIP

BY

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This short paper describes a method for the continuous local application of penicillin to the mouth and fauces, together with some clinical impressions.

Penicillin has been used for the treatment of various pharyngeal infections by local applications in the form of sprays (Woodward and Holt, 1945), pastilles (MacGregor and Long, 1944, 1945a, 1945b), lozenges (Woodward and Holt, 1945), snuff (Meadley and Barnard, 1946), and swabbing (Schallenberger *et al.*, 1945), and by intramuscular injection (Schallenberger *et al.*, 1945; Schwartz, 1945; Bronstein, 1946) and injection of the pharyngeal tissues (Cone, 1945). Results have been encouraging for Vincent's infections (Woodward and Holt, 1945; MacGregor and Long, 1944; Schwartz, 1945). MacGregor and Long (1945a, 1945b), using pastilles containing methylene blue on healthy volunteers, were able to stain the uvula, anterior pillars of the fauces, and the tonsils and tonsillar fossae satisfactorily, but were unable to stain the posterior pharyngeal wall. These experiments gave some measure of support to the belief that when pastilles are allowed to dissolve in the mouth the therapeutic substance incorporated in them would reach the fauces and tonsillar areas. Treatment by pastilles, however, tends to be irregular during the day and necessarily ceases during sleep. State and Hart-Mercer (1945) in their work on acute ulcerative gingivitis found a distinct inverse correlation between the length of time penicillin persisted in effective concentration in the saliva after local application and the length of time elapsing before clinical cure. To overcome these difficulties penicillin has been administered by means of a continuous drip into the mouth, thus providing continuous contact between the penicillin and the infected tissues throughout the 24 hours.

The method previously described by Royston and Deverell (1945) had originally been used on about 70 patients. A further 20 have now been treated.

Method

The apparatus is quite simple (see Diagram), consisting of a standard drip-transfusion set, with the needle replaced by a piece of soft thin rubber tubing 8 in. (20 cm.) long bent into the form of a J on a piece of dental wire in its lumen. The tubing is led into the mouth with the short limb of the J lying in the bucco-gingival sulcus and the long limb lying along the outside of the cheek, to which it is attached by a piece of strapping. The delivery tubing is then led over the side of the nose to the forehead and thence to the bottle suspended over the head of the bed. This arrangement enables the patient to lie comfortably on either side and to turn over in bed without disturbing the tubing,

thus not interfering with sleep. The solution used is made up from the impure calcium penicillin normally used for application to the skin, to contain 50,000 units to 1 pint (568 ml.) of normal or half-normal saline. The drip rate is adjusted to deliver 1 pint of the solution in 24 hours.

Patients tolerated the drip well and, except for two, did not find it interfered with sleep. A few were conscious of having to swallow more often than usual, but not to an uncomfortable degree, and while they were asleep the solution trickled down the pharynx, there being no leakage on to the pillow. Only one patient complained of nausea. There was no need to remove the drip while eating or drinking, and the patients were instructed not to remove the tube from the mouth except when cleaning the teeth.

Diagram showing the apparatus in position.

Results

It is not intended to discuss the clinical results in detail, because adequate control, notoriously difficult from both the clinical and the bacteriological standpoint, was not carried out. Certain clinical impressions were definite enough to warrant description.

1. Patients liked the treatment and stated that should they have a recurrence of their trouble they would prefer to have it again.

2. Patients suffering from infection of the tonsils and fauces by Vincent's organisms (18 cases) responded well, losing their pain and the foul taste in their mouths. This subjective improvement was well marked within six hours of beginning the drip, and compared favourably with 13 cases of similar severity treated by local applications of a weak solution of iodine and by gargles.

3. Two patients with glandular fever of anginous type and six with acute tonsillitis, peritonsillar swelling, oedema, and gross dysphagia who could scarcely articulate were made more comfortable within a few hours and enabled to get a good night's sleep.

4. Diphtheria carriers of three weeks' duration (seven cases) were rendered swab-negative after 72 hours of the drip, but all became swab-positive again within three days of cessation of treatment.

Conclusions

It was noted that about a quarter of the patients developed a dark-brown fur on their tongues, associated in some cases with a metallic taste and in others with headache. No other toxic symptoms were observed. This is of interest, as Bedford (1946), Ellinger and Shattock (1946), and MacGregor (1947) have reported a similar condition of the tongue when using penicillin pastilles, but in their cases there were no