

Calcutta, which circumstance will, I hope, serve as some apology for the very incomplete character of the present investigation.

ON THE TREATMENT OF ANEURISM BY ESMARCH'S BANDAGE.

BY SURGEON S. HASSAN, M.B., I. M. D.

Essur Singh, a Hindoo male, aged 40 years, was admitted into the Amritsur Civil Hospital* on the 16th June 1883. Occupation sedentary, and not requiring great physical or muscular exertion. Temperament not marked, if anything rather lymphatic. No signs of pain or prolonged suffering on the features. Sits in bed with right leg somewhat flexed. Complains of a tumour in the popliteal space, which he says is pulsating and painful, especially when he tries to walk.

No history of rheumatism, drunkenness, or syphilis can be elicited, nor are there any suspicious signs of these conditions. Says that while travelling in an *ekka* he was thrown out—the horse stumbling and coming down on the patient's right leg. At the time he only felt a severe pain in the knee, shooting down the leg to his foot; but about a fortnight afterwards he noticed a small pulsating swelling in his ham, which has gradually attained its present size.

On examination a large tumour was found, the size of a closed fist, situated in the lower part of the popliteal space, encroaching downwards on the leg to about the level of the lower border of the popliteus muscle, and reaching above a little beyond the line of the flexure of the joint. It was ovoid in shape and regular in contour, smooth, even, and of nearly the same density and firmness throughout its whole extent. The pulsation was distinct, forcible, expanding and eccentric, and the other characteristic signs of the disease were so marked that there was no difficulty in diagnosing it as a circumscribed aneurism.

No pulsation was visible in the superficial arteries, nor did they present any hardening or

other perceptible change: other organs apparently normal. Pain and general suffering when at rest were not great, and the patient could sleep fairly well. Difficulty and pain in locomotion were his most serious troubles; comparative measurements of the two joints were not taken.

Considering the case a good one for the "rapid method" of cure, I recommended Esmarch's bandage, which was accordingly applied on the 19th, thus:—Commencing at the foot it was carried firmly and without reverses up the leg to the lower level of the tumour, over which it was passed lightly, and was again firmly applied to the thigh, ending about its middle. The elastic tubing was then adjusted over the last turn of the bandage. When I saw the patient the bandage had been applied for some time; I took it off however, and left the elastic tubing alone *in situ*. The patient's suffering was intense, and the limb became gradually colder. The pulsation in the tumour was completely stopped, and it had become decidedly harder to the feel. At the end of two hours from the time the bandage was first applied, the elastic tubing was removed, when faint pulsation was felt in the tumour. Pressure was now applied to the femoral at the groin by means of a horse-shoe tourniquet, which was removed at intervals, as it became very painful. This was continued for about twelve hours, and was then removed altogether, the pulsation having stopped meanwhile. During the course of this treatment lead lotion was applied externally to the tumour.

20th.—No pulsation. No pain in the tumour. Complains of pain over the inner ankle.

22nd.—No pain in the leg or ankle. No pulsation in the tumour, which is softer. The patient was very anxious to go home, but having been persuaded to stop, he absconded, unnoticed, to my great annoyance. No observations could be made about the return of pulsation in the arteries about the knee. I may add that pressure with an ordinary pad and bandage had been tried in this case, but the patient could not bear it, and it had to be removed.

* I am indebted to Surgeon-Major G. Thomson for his kind permission to publish these notes, and for general access to the wards of the Amritsur Civil Hospital; and to Assistant-Surgeon Sahib Ditta Mull for affording me every facility in the examination and treatment of interesting cases.

The result of this case, so far as it went, was as remarkable as any I have seen or read of in cases treated on this plan. The patient's own surprise at it was immense, and he expressed it with the most genuine enthusiasm. I was, however, somewhat anxious about this man owing to his having left hospital so soon after the consolidation of the tumour. I even expected his return to hospital for some time, but as he has not turned up, and as cases of external aneurism are comparatively rare in this country, I have ventured to publish these notes.

Before offering any remarks on the above method of treating aneurisms, it will be well to state briefly the *modus operandi* by which the cure is effected in these cases. And here we must bear in mind two things, namely, (1) that the process is *par excellence* a rapid one, and (2) that it is altogether different from what takes place in all other modes of compression. When Esmarch's bandage is applied to a case of aneurism as above, what happens is (*a*) complete stasis of blood in both the arteries and veins of the limb. Now, inasmuch as the sac of the aneurism is uneven and rough, and does not possess the vitality which the arteries and veins do, it cannot prevent coagulation in stagnant blood, as contact with living tissue does, to so great an extent, in the case of the vessels themselves. Hence (*b*) the blood coagulates and forms a clot in the aneurismal sac; (*c*) the coagulation then extends to the blood in the arteries and clots form in them. This is what we may call the temporary or provisional arrangement for the cure of the aneurism. The permanency of this is secured by (*d*) the organisation of the clot in the arteries. The clot in the sac itself does not organise, but is more or less absorbed.* Perhaps the softening of the tumour noticed on the day our patient left hospital, was due to contraction of the clot and partial absorption of the contents (the exuded serum of the clot?)

It will be noticed that the process described above is entirely different from the deposition

of laminated fibrin, which takes place when any other mode of compression is used which more slowly and gradually, but more securely, fills up and cures the aneurism. And this is simply because other forms such as genuflexion or compression of the femoral artery, either digital or instrumental, do not cause complete stasis, but only a retardation of the arterial current which passes through the aneurism.*

As to the exact manner of applying the bandage several questions present themselves in practice, and the first in order is, where is the bandage to begin? The practice of Staff Surgeon Walter Reid, R. N., to whom belongs the credit of having first employed Esmarch's bandage in the treatment of aneurisms, was to begin at the toes, and this has been the general practice of other surgeons, as far as I have been able to ascertain. But Mr. A. Pearce Gould of the Westminster Hospital, who I believe has collected some seventy cases treated on this plan, justly observes that the bandage, while securing complete stasis, should do so with the least possible disturbance to the general circulation. His teaching therefore is, that it should not be applied to the whole limb, but should be commenced over the part immediately below the tumour, so as to press out the blood from that part alone.

The next question refers to the mode of dealing with the tumour itself. Is the bandage to cover it, or to pass on to the upper part of the limb without doing so? To cover the tumour is in most cases sound practice, but the surgeon may exercise his discretion. "Whenever the aneurism is of large size, and especially is rapidly growing, the elastic bandage should be carried *lightly* over the tumour." It has been mentioned as an objection to covering the tumour, that however lightly this is done, it is sure to empty the sac more or less.† But if this is considered undesirable, it can be remedied by

* It must not be understood that in other forms of compression coagulation never takes place, but I believe it is rarely complete in them. Reid's method differs from all others in its perfect control of the collateral circulation, as well, and in that while the limb is perfectly bloodless, the aneurismal sac is full of stagnant blood.

† Mr. Walter Rivington.

* Mr. A. Pearce Gould.

applying the upper bandage in the vertical dependent position of the limb, which will distend the aneurism again.

Sometimes Esmarch's bandage has been used by itself, and pinned up at its upper end. More commonly the elastic tubing is used with it and adjusted over its last fold. But are the bandage and the tubing both to be kept on? Dr. Reid's practice was to remove the bandage as soon as he had adjusted the tubing, and it may at once be added that this is the most approved and the best practice. It has not, however, always been adopted, as would appear from the reports of various cases in the medical journals. The bandage has often been left on for hours. In one case brought before the Clinical Society of London, it was kept on for four hours, but the "upper part of the bandage" was removed "one hour previously, a tourniquet being kept on the femoral artery during this alteration." One advantage of removing the bandage is, that you can make such observations on a tumour as might determine a doubtful diagnosis.* And to this might perhaps be added the advantage of the surgeon being free to make any local applications to the tumour, if he considers these desirable. A very strong objection, moreover, to keeping the bandage on seems to be, that it is unnecessary and superfluous if the tubing has been properly adjusted, and is certainly more irksome to the patient, if not actually more painful.

Another very important question is—How long is the bandage to be kept on? In the discussion before the Clinical Society of the case quoted† in the last paragraph, the fact was elicited that the bandage had been kept on for even five hours without any evil consequences resulting. It is quite enough, however, to apply the elastic tubing for an hour or an hour and-a-half. And after its removal the pulsation in many cases will have stopped in the aneurism. But whether it does so or not, we should apply digital pressure, or a horse-shoe tourniquet to the femoral at the groin, and

keep it up at intervals, guided by the patient's sufferings, for six to thirty-six hours, according to the time the pulsation in the tumour takes to stop.

Besides the application of the bandage itself, there are some other important points in the treatment. First of all, should time permit, and should the tumour not be of such rapid growth as to require immediate surgical interference, the patient should be prepared for the operation by preliminary constitutional treatment. This consists of rest in bed, and the administration of a low albuminous diet and iodide of potassium.

It is also our duty to reduce the patient's suffering during the treatment as much as possible, and happily a great deal is possible in this direction. I should inject gr. $\frac{1}{3}$ or gr. $\frac{1}{2}$ of the acetate of morphia hypodermically immediately before applying the bandage, so that by the time it becomes painful, the morphia will have had time to act. If in spite of this the suffering becomes intense, and it is desired to keep the elastic tubing on for some time yet I should at once put the patient (supposing the heart to be sound) under chloroform; so that by the time he recovers from its effects the treatment is completed,—at least in so far that the tubing is removed. Of course the anæsthesia under competent supervision can be prolonged if necessary.

As regards local applications to the tumour itself, I have not been able to find any records, nor have seen any views expressed on the subject in the cases to which I have had access, or which I have been able to look up. As nearly as I can remember, I have seen a local application made in one at least of the cases I saw treated on this plan in the wards of the University College Hospital, London. This, and the hope that it would be soothing to the patient, induced me to order one in the case of our own patient. Considering that the interior of the aneurismal sac is more or less rough, and its vitality so low, and that the blood in it is stagnant, and often not far from the surface, we may for all practical purposes look upon it almost as if it was out of the body altogether, and under many

* Mr. Walter Rivington of London Hospital. For some of his cases of obscure diagnosis, *vide Lancet*, 1880.

† *Lancet*, 1880, page 770.

of the conditions favourable for coagulation, could we not then hasten the coagulation by local applications or other means? It would be a pity if we could not, knowing, as we do, that the cure is initiated by such coagulation. Of the means which hasten that process there is one which seems available in this case—namely, the application of moderate warmth. The reduction in its temperature which the limb very soon undergoes in these cases, would seem further to indicate this measure, and it is one which can be easily carried out chemically by means of either hot-water in properly shaped vessels, or by heated bran.

A word of caution may here be given against too frequent or too free manipulation of the sac while the coagulation is proceeding, or soon after the process is completed. It will only be necessary to bear in mind the possibility of driving portions of the clot into neighbouring blood vessels in order to stifle undue curiosity or avoid indelicate handling in the examination of the tumour.

Should this treatment fail after due trial, we might try it a second time in conjunction with the injection of the perchloride of iron into the sac in suitable cases. Or we may ligature the femoral artery, "with as good a prospect of success as if no previous treatment had been adopted."

In those cases in which there is no room for applying the bandage to the limb above the tumour, as in aneurism at Scarpa's triangle, it should be applied up to the lower border of the tumour, digital or instrumental pressure being applied to the artery above.

A word on the selection of cases for the "rapid method." This plan is applicable more or less to all external aneurisms, except those of the neck, but it is particularly adapted to and successful in popliteal aneurism. It is important that the heart and blood vessels should otherwise be healthy. It is especially suited to aneurisms having a large mouth or opening of communication with the artery. In a recent number of the *British Medical Journal* (June 9, 1883) Mr. T. Holmes makes some remarks

on the subject of popliteal aneurisms, and as anything coming from so great an authority is of much weight, I shall reproduce here such of his views as bear on the subject of this paper. Mr. Holmes says:—"I have come to a very confident opinion that the safest plan of treatment for all large, all rapidly growing, and all thin walled popliteal aneurisms is to tie the femoral artery at once, that is after a few days' confinement to bed." Throughout his remarks on the treatment by Esmarch's bandage, Mr. Holmes regards it as only one of the many forms of pressure; and not having given it a trial, he judges of its results by those of other forms of pressure; so that his remarks lose part of their value. The reader is referred to his paper, but the tenor of his views would be apparent from the following quotations. Speaking of pressure, he says:—"In fact, in one or other of its forms, it is indisputably the routine treatment; yet, like all other "routine" treatment, it is liable to do mischief, if it be not used with discrimination; and this seems to me specially the case with the two forms of pressure which are the most uncertain in their effects, and the least easy to regulate,—I mean genuflexion and the use of Esmarch's bandage" * * *. With regard to his own experience of this method of treatment, Mr. Holmes goes on to say:—"I have never ventured on the application of Esmarch's bandage to a large rapidly growing, thin-walled tumour; nor do I think that a prudent surgeon would advise the treatment; while, as I have been successful in the treatment of such cases of small aneurisms as I have had under my care by methods with which I am more familiar, and in which I have more confidence, I have no personal experience of the method, nor have I heard that any of my colleagues have used it."

ON ENTERIC FEVER.

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(Concluded from page 246.)

Having now entered as fully into the subject as is possible in an essay of this kind, I shall briefly sum up the conclusions arrived at as