enables us to understand the therapeutic value of the revival of memories; and in light hypnosis we have a helpful method, if judiciously and sparingly used, to speed up the process or make it sufficiently complete. It is only in a small minority of the cases that this is needed or advisable.

TRANSVENOUS ANEURYSMORRHAPHY.

DESCRIPTION OF THE OPERATION.

BY

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I wish to draw attention to an operative procedure which I have employed in the treatment of aneurysmal varix with most gratifying results, and which I have termed "transvenous aneurysmorrhaphy." It appears to meet the needs of a certain number of cases in an admirable manner.

I will first give an account of the case, which presents some points of peculiar interest, and will then offer some observations in regard to the operation itself.

CASE.

Pte. H. M., aged 22, was wounded in the right thigh by a rifle bullet on October 1st, 1916. On October 10th he came under the care of Captain P. Cheal, R.A.M.C., who found a small healed entrance wound on the antero-internal aspect of the thigh 4 in. above the knee-joint, with an exit wound at the same level on the posterior surface not quite healed. Considerable persistent swelling developed in the leg and foot, and was considered to be due to venous thrombosis. There were no signs of aneurysm. On January 5th, 1917, massage was instituted, after which a very marked vibratory thrill was observed for the first time in the neighbourhood of the wound. On January 6th I saw the case in consultation with Captain Cheal. The foot and leg were dusky and showed slight general oedema, and there was definite dilatation of the superficial veins from the knee downwards. In the upper part of the popliteal space there was slight swelling, with systolic pulsation, and other signs of arterio-venous aneurysm were present. There was faint pulsation in the anterior and posterior tibial arteries. I regarded the case as one of varicose aneurysm, and advised operation.

Description of Operation.

The operation was performed on January 15th, 1917. The popliteal vessels were exposed in the upper part of their course where the artery and vein were firmly adherent to one another without any intervening sac.

FIG. 1.—Aneurysmal varix of popliteal vessels, with a sacculated venous aneurysm on the opposite wall of the vein.

Here the vein was greatly dilated and the artery below was considerably smaller than usual. When freeing the side of the vein remote from its connexion with the artery a saccular venous aneurysm was exposed (see Fig. 1) and was removed, disclosing the arterio-venous stoma through the lumen of the vein. It was of elongated elliptical form, $\frac{1}{2}$ in. in length, and lying in the long axis of the vessel. The opening in the vein was enlarged very slightly upwards and downwards, and through it the aneurysmal opening was sutured (see Fig. 2) with fine silk sterilized in liquid paraffin. The vein was then closed in a similar manner.

On removal of the tourniquet there was no bleeding and the circulation through the vessels seemed perfect. Operation was completed by suture of the fascial tissues and the skin.

After operation good pulsation was felt in the dorsalis pedis and posterior tibial arteries. On the following day there was no trace of oedema in the limb, the colour was normal, and the dilatation of the superficial veins had disappeared. Healing was uneventful, the circulation remained good, and the patient was allowed to walk four weeks after operation. He was kept under observation for two months longer and was then discharged to light duty, the circulation being normal.

It is remarkable that until massage was instituted, three months after he was wounded, the patient exhibited no signs of arterio-venous aneurysm, although there were evidences of venous obstruction present from the beginning. I have previously¹ drawn attention to the rapid development of traumatic aneurysm following massage in certain cases of gunshot injuries, and it would appear that massage was the exciting cause here also, though naturally the vascular injury dated from the time of the wound, and

it is probable that in the absence of massage active movements would have produced the same result. A reasonable explanation of the signs previously present is that the arterio-venous opening and the lumen of the vein were occluded by a clot which was disturbed by massage, but in that case it is difficult to understand why no evidences of embolism appeared, and at operation the lumen of the vein appeared perfectly smooth and normal. Consequently I find it hard to account for the train of events in this case. Another point of interest is the presence of a distinct venous aneurysm which accounted for the swelling and pulsation at the upper end of the popliteal space, and led to the diagnosis of varicose aneurysm rather than of aneurysmal varix.

A few words are necessary in regard to the technique of this operative procedure:

Apart from the necessity for rigid asepsis, scrupulous care must be exercised to avoid injury to the delicate intima of the vein. Consequently any blood which may obscure the view on opening the vessel must be washed away by gentle irrigation with saline solution, which is then carefully mopped up by a gauze swab or aspirated by a syringe. On no account must a swab be introduced into the vein for the purpose of wiping off blood; such a measure will favour subsequent venous thrombosis. The vessel wall should be smeared with sterilized vaseline, as recommended by Carrel.

The method of introducing the suture to close the arterio-venous communication is important: The needle is first passed through a small portion of the fibrous tissue which binds the vessels together at one end of the communication, on its external aspect (that is, entirely outside the vessels and between the two), and does not penetrate the intima of either—it thus resembles the commencement of the outer row of sutures in a gastro-jejunostomy. This stitch is immediately tied and the needle is then passed obliquely from without inwards, emerging on the inner surface of the vein close up to the extremity of the stoma (see Fig. 2). The extreme edges of this are then brought together by fine continuous sutures through intima and media until the opposite end

FIG. 2.—The venous aneurysm has been removed and the opening in the vein slightly enlarged, its edges being retracted by fine traction stitches. The arterio-venous stoma is being closed by a fine continuous suture. Note that no knot appears on the interior of the vessels (see text). In practice the stitches do not lie so close together as figured, and when drawn taut they do not present so much on the surface.

is reached, when the needle is again passed out from the lumen of the vein obliquely through its wall and the overlying tissue which binds it to the artery, so as to emerge between the two, when it is secured in a similar manner to the other end. Thus it will be seen that there is no knot projecting in the lumen of either vessel, and if the stitches are placed accurately and drawn taut throughout they do not present in the lumen of either vessel any more than in the case of ordinary through-and-through stitches which produce eversion of the edges in vascular suture. The closure of the incision in the vein presents no difficulty, being effected by the ordinary method advocated by Carrel.

While many cases of aneurysmal varix cause little or no inconvenience to the patient and do not require operation, others demand treatment by reason of circulatory disturbances. In some of these, when conservative and reconstructive measures are desirable, the procedure I

have described presents certain clear advantages over the usual operation, which consists in division of the junction between artery and vein followed by suture of each. The dissection and freeing of the anastomosis from the surrounding parts is sometimes very difficult and tedious, while it involves risk of injury to the vessels themselves and to neighbouring structures—for example, nerves—which may be adherent. These disadvantages are obviated by the transvenous operation, which thus offers the same facilities as does the transsaccular operation in cases of simple traumatic aneurysms and varicose aneurysms, and which I have previously emphasized.² I may say that since my former communication my further experience in the two latter types of cases fully justifies the claims I made for the transsaccular route. I have adopted it in every case where it was feasible, and it has invariably been successful.

While the case I have cited was an ideal one for transvenous aneurysmorrhaphy, in view of the presence of the venous aneurysmal sac, I do not advocate its adoption in all instances. Each case should be considered carefully when the local conditions are exposed at operation, and a decision should then be taken by the surgeon.

I desire to express my indebtedness to my former colleague, Mr. Harold Squire, for the admirable drawings of this case, and to Captain P. Cheal for his assistance at the operation and his after-care of the patient.

REFERENCES.

¹ BRITISH MEDICAL JOURNAL, December 9th, 1916. ² *Ibid.*

SOME OBSERVATIONS ON ABDOMINAL WAR SURGERY.

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THREE qualifications are essential to the surgeon who undertakes the treatment of wounds of the abdomen.

The first is speed in operating. He should not spend more than half to one hour over the operation. This will be greatly facilitated by making a liberal incision, which may, if necessary, extend from the ensiform process to the symphysis pubis; large incisions cause practically no shock and heal well. The second qualification is gentleness. The more gentle the surgeon's manipulations the less the shock, and this again is aided by a liberal incision. The third is good judgement. During a push it is very important for the surgeon to be able to judge whether a given case is likely or not to recover if he decides to operate; and time that might be devoted to saving other lives may be wasted in operating on an abdominal case that is hopeless from the first.

It is generally said that a patient who is alive thirty-six hours after a wound of the abdomen, is better left alone; a small percentage of such patients recover. My experience is that very few patients with injuries of the hollow viscera of more than twenty-four hours' standing are benefited by operation. If the lacerations are severe he usually already has diffuse peritonitis and operation does no good. If they are slight, they may already be shut off by adhesions, and the patient has a chance of recovering, which will be diminished by having the adhesions pulled asunder.

Indications for Operation.

The most important guide to a patient's condition is the pulse rate and blood pressure. If the pulse rate is over 120 chances of recovery are very small, but not always hopeless if a speedy operation is performed. To quote two instances:

CASE I.

An American had a shell wound over the stomach. The foreign body was localized 2 in. deep to the site of the injury. It was thought that haemorrhage was the chief trouble and not injury to many viscera. On operation the foreign body was found in the transverse mesocolon which was much torn, no hollow viscera were injured, but a large vessel was bleeding vigorously. The vessel was secured and the wounds sewn up; 300 c.cm. of 6 per cent. gum solution was injected intravenously, and the man made an uninterrupted recovery.

CASE II.

A man had a penetrating shell wound of the left buttock, and also a shell wound of the left arm, with fracture of the humerus,

a shell wound of the left leg complicated by fracture of the fibula, and a wound of the right arm.

After resuscitation his pulse was 138; he was warmed up further in the theatre and given hot drinks, and improved somewhat, but was still in a very feeble condition. It was decided to operate. The wounds were excised, the fractures put up, and the abdomen opened, while assistants adjusted the splints. One perforation of the large bowel and eight perforations of the small intestine were sutured, and the blood and extravasated faeces swabbed out. A rubber dam drain was left in Douglas's pouch. He was then infused with 1,000 c.cm. of gum solution. This was followed by a rigor. He vomited on and off for two days, but from that time onwards steadily improved, and was evacuated about eighteen days later, eating his food well and in excellent condition.

A very useful guide is the effect of moving a patient from the resuscitation ward to the theatre. He may have a pulse of 110 in the resuscitation ward, but by the time he has been carried the few yards to the theatre the pulse rate may have increased to about 130, and be difficult to count. This is a strong contraindication to operation. If he cannot stand being moved to the theatre, he will not survive an operation.

My practice has been as follows:

Any patient who is in a fit condition, and who, from the site of the wound, the physical signs, and the localization by x rays of the foreign body, probably has a wound of a hollow viscus, or a large foreign body in the liver or spleen, or shows signs of much haemorrhage, is after being sufficiently resuscitated, when this is necessary, taken to the theatre.

He is then anaesthetized. I have found Coxeter's gas and oxygen apparatus (invented by Boyle) the best—an injection of morphine and atropine having been given previously. It is usually necessary to let the gas and oxygen flow through the ether bottle that is provided, when the time for sewing up the parietes draws near.

All the entry and exit wounds are first thoroughly excised, and flavine packs introduced and left in. In most cases it is found best to make a separate incision to explore the abdomen. A para-medial is the most generally useful incision, as it is easier to make a complete examination through such an incision. In a wound of the side a para-costal incision is often suitable if the foreign body is localized near the entrance wound, and therefore it is not necessary to examine the whole of the abdominal contents. In the majority of cases the foreign body, from its position and the distance it has traversed, may have damaged many organs, and it will therefore be assumed that a para-medial incision has been made. I then make a systematic examination of the whole of the stomach and intestines, if necessary exploring the posterior surface of the stomach through the lesser sac and taking care that as little of the intestine as possible lies outside the abdomen at one time. This need not take long if a liberal incision is employed. A piece of gauze is clamped to each perforation to mark it. Then the solid viscera are inspected and the foreign body looked for and removed.

The next step is to suture all the perforations. A single continuous suture which inverts the peritoneum is all that is necessary to close a perforation. If a loop of intestine is in rags it may be necessary to resect it, and in this event an end-to-end union is best. But the mortality from shock is very great in these war resections, and it is better to sew up many perforations and tears rather than resect bowel; in fact, this latter procedure should be avoided if it is in any way possible to suture the wounds and preserve a sufficient blood supply. The large intestine will stand more traumatism to its blood supply than the small. Either fine catgut or linen thread may be used for suturing the intestine, but preferably the former. For the bladder, catgut should always be employed. For haemorrhage from the liver, spleen, or kidney, mattress sutures of catgut may be tried, but gauze packing, left in, will usually be found to control haemorrhage best. Relatively seldom is it necessary to remove the kidney or the spleen except for secondary haemorrhage which is usually due to sepsis. Wounds of the pancreas require a gauze pack to stop haemorrhage and prevent the pancreatic juice running over and digesting the abdominal contents. But pancreatic wounds are very fatal owing to concurrent damage to contiguous important structures. If there is a large foreign body in the liver it should be removed, if feasible, as it sometimes leads to dangerous hepatitis.