Conclusions.

The conclusions drawn from experience of these cases are:

1. Cases of diffuse traumatic aneurysm require early operation in all cases.
2. Results of operation at the point of the lesion are satisfactory.
3. Fifty per cent. of arterio-venous aneurysms benefit, temporarily at any rate, by delay in operative treatment, considering the known results of operation in these cases.
4. Considering the proportion of obliterative lesions, care in the early treatment and good transport arrangements probably reduce the incidence of diffuse false aneurysms.
5. Where the advent of sepsis is suspected in cases of diffuse false aneurysm, free drainage after operation is unattended by danger of secondary haemorrhage.
6. Efficient collateral circulation is established in most cases of destructive gunshot arterial lacerations within a month of the date of injury.

TRAUMATIC ANEURYSM DEALT WITH BY OBLITERATIVE ARTERIORRHAPHY.

BY

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The aneurysm in the following case was a true traumatic aneurysm. The coats of the artery were wounded by the bullet, and one of two events happened: either the wound healed but the scar subsequently formed stretched, or the outer coats were ruptured, and in course of time the intima, with probably part of the media, bulged through the gap to form an aneurysmal sac.

Pte. R., aged 37, was admitted to the Rochdale Infirmary suffering from septic shell wounds of the back. He had also been wounded in the left arm by a rifle bullet. The missile had entered the posterior and outer aspect of the forearm about 2 in. below the line of the elbow-joint, and, travelling upwards and inwards, had emerged just above the internal epicondyle of the humerus. The patient stated that there had been little haemorrhage from the wound at the time of infliction, and that it had healed within five days. Two weeks after admission a pulsating swelling appeared in the antecubital fossa. As the injury had been caused by a small bore bullet, and the man's general condition, by reason of the septic shell wounds, was very poor, it was considered best to await developments.

At the end of another four weeks, however, the swelling was the size of a hen's egg and still increasing. It was accordingly decided to deal with it by arteriorrhaphy, and a tourniquet having been applied to the arm the sac was laid open and the contained clots turned out. Three openings into it were discovered; one was small, situated on the inner aspect of the sac, and leading upwards and backwards. This was, in my opinion, a common trunk of origin of the anterior and posterior ulnar recurrent arteries. Two larger openings in the lowest part of the sac were distant about $\frac{1}{2}$ in. from one another, and connected together by a deep groove. From them a probe travelled upwards and downwards along the tracks of the brachial and ulnar arteries respectively. A probe sharply bent could be passed into the upper opening and then immediately downwards along the course of the radial artery. Thus the condition was an aneurysm of the highest part of the ulnar artery.

The interior of the sac was well scrubbed with iodine to promote adhesions, a continuous suture of fine chromic catgut on a fully curved intestinal needle was taken, and the smallest opening closed with four points of suture. In a like manner the upper opening was closed and the suture continued along the groove to close the lower opening. Following the recommendation of Matas, the sutures were made to enter the sac wall rather wide of the margins of the openings and the sides of the groove. In this way was produced a firm approximation of as large a marginal surface as possible. The tourniquet was now removed and complete haemostasis seen to have been secured. A second row of sutures was now inserted about half-way up the walls of the sac. The skin flaps had not been dissected at all from the subcutaneous surface of the sac and so were lined with smooth sac wall. Two relaxation sutures were then put in on each side to complete the obliteration and silkworm-gut sutures brought the skin edges into apposition. Recovery was uneventful and the result quite satisfactory.

The only alternative treatment worth discussing in this case is that of excision of the sac. Excision of the sac would have required a much more extensive dissection than simple opening and stitching up from the inside. Further, excision would have, in my opinion, necessitated in this case ligation of the brachial artery at its bifurca-

tion, and so have also obliterated the radial artery as well as the ulnar. The foregoing considerations are, no doubt, not of paramount importance here, but in other situations they might well be of much greater significance.

To state the matter shortly, arteriorrhaphy deals with aneurysm by a comparatively simple method in which the sac is little disturbed and the collateral circulation not interfered with.

REPORT ON 170 CASES OPERATED UPON UNDER SPINAL ANAESTHESIA.

BY

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I VENTURE to publish the following series of cases in the hope that they may be of interest to those who, like myself, are advocates of spinal anaesthesia.

The cases were operated upon by me at the Station Hospital, Lucknow, during 1914 and 1915. The majority were British soldiers, about a dozen were sepoys, three were women, and one a child. The solution used in each case was Barker's stovaine-glucose solution.

For operations upon the abdomen and lower limbs the lateral posture was used for the injection; for perineal, the sitting-up posture. The height of anaesthesia reached in each case was carefully noted and found to be usually the nipple line, although in some cases it extended a little higher.

The average time at which anaesthesia was complete was found to be three and a quarter minutes, the moment of injection being carefully recorded in each case. The duration of the anaesthesia was found to be ample for the cases under consideration, lasting usually fifty to sixty minutes, though in some cases longer.

Three complete failures to obtain anaesthesia occurred, but in each of these I have reason to believe that I was myself to blame for faulty technique, as they were all early cases. No failures occurred in the later cases.

After-Effects.

No serious untoward effects were observed either during or after the injections. A few patients experienced slight dyspnoea during abdominal operations if the anaesthesia reached above the nipple line, but this disappeared rapidly on slightly elevating the shoulders and head.

Slight headache occurred in one or two cases after operation, but was immediately abolished by the administration of phenacetin and caffeine. I believe that this headache is entirely due to unskilful handling of the patient, because I notice that if the patient be moved with extreme care no headache occurs. To minimize the shaking of the patient it is a good plan to have under the body a canvas stretcher upon which the patient can be moved from the table to his bed by the insertion of two bamboo poles—the table having previously been wheeled alongside the bed. If great attention is paid to these details I am sure no headache should ever occur.

Cases.

The total number of cases was 170. The more important were as follows:

Appendicectomy	23	Hernia	23
Removal of loose cartilage	11	Hydrocele	8
Circumcision	14	Varicose veins	11
Aneurysm of popliteal artery	1	Varicocele	20
Amputation of thigh	1	Wheelhouse	1
Haemorrhoids	19	Salpingitis	1

Advantages.

The principal advantages of spinal anaesthesia are the perfect relaxation obtained in abdominal and rectal operations. The portability of the necessary apparatus is also a great advantage, especially under tropical conditions where it is often difficult to obtain an anaesthetist. Shock and respiratory disturbance are also greatly diminished, and this tends to a healthier convalescence. As regards the patient's choice, I have always found that when patients have submitted to both general and spinal anaesthesia they invariably prefer the latter. It was very noticeable that in a regiment soldiers frequently asked to

O. W. J. WYNNE, D. T. RICHARDSON, AND G. E. DODSON: GUNSHOT WOUNDS OF BLOOD VESSELS.

FIG. 1.—Case I.

FIG. 4.—Case V.

FIG. 2.—Case III.

FIG. 5.—Case X.

FIG. 3.—Case IV

FIG. 6.—Case XII.

N. H. MUMMERY AND P. L. GIUSEPPI: COMMUNUTED FRACTURE OF HUMERUS PRODUCED BY MUSCULAR ACTION.

FIG. 1.—Right humerus; anterior view. Photograph taken at time of accident.

FIG. 2.—Right humerus; external view. Photograph taken at time of accident.

FIG. 3.—Right humerus; anterior view. Photograph taken twenty-four days after operation.

FIG. 4.—Right humerus; external view. Photograph taken twenty-four days after operation.

have spinal anaesthesia "because their pals had had it," in preference to a general anaesthetic.

Disadvantages.

These are mostly attributable to lack of experience, the more practised one becomes in the technique the less do the disadvantages become. The main one, however, is the limitation of the sphere of the operation to parts of the body below the nipple line.

COMMUNUTED FRACTURE OF THE HUMERUS PRODUCED BY MUSCULAR ACTION.

BY

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(With Special Plate.)

THE interest of the following case lies in the fact that there can be no doubt that the fracture was due to sudden and forcible contraction of the deltoid.

Corporal A. B., aged 33, was admitted to the hospital on April 26th, 1916, having sustained a fracture of the right humerus.

The accident had occurred half an hour previously. He was being instructed with a squad of other men in throwing hand grenades. The grenades are known as

owing to sepsis, it took two months to heal. No disability of the arm resulted.

X-ray photos showed the fracture to be comminuted. There was a spiral fracture of the shaft, and apparently three fragments. In the lateral view a portion of the shaft at about the middle of the bone was separated and lying loose. The upper fragment, into which the deltoid was inserted, was abducted.

Operation.

On May 1st a free incision was made on the outer aspect of the arm, and after considerable trouble, caused by the thickness of the muscles, the site of the fracture was exposed. It was not found possible to plate the fragments, and accordingly two stout silver wires were passed round the humerus after first detaching the musculo-spiral nerve from its groove and holding it aside.

On completion of the operation the fragments were found to be rigidly held together by the wires. The arm was put up on a triangular splint. At the time of the operation no osteomyelitis or other disease of the bone could be detected. Early massage, movements, and electrical treatment were employed, and good union and function resulted.

On June 10th—a month and a half after the accident—the patient suddenly died under an anaesthetic, which was being administered in order to break down a few adhesions in the elbow-joint. *Post-mortem* examination showed fatty changes in the myocardium and well-marked healed tubercle of the apex of each lung. Examination of the fracture revealed good union, and

Anterior view.

RIGHT HUMERUS.

Posterior view.

Internal view.

RIGHT HUMERUS.

External view.

"Mills," and were being used empty. They are about the size of a duck's egg, made of steel, and weigh just over two pounds. They should be thrown by an action somewhat similar to that of bowling in cricket. This man, however, not understanding the method, raised the grenade up to and behind his shoulder, as in the first position for "chucking it," as one would do in throwing a stone, and he did this suddenly and with a jerk. He felt his arm break, and it and the grenade, which had not yet left his hand, dropped. The officer in charge of the party saw the accident happen, as did several other men, and there is no question as to this having been the exact method of its occurrence. The patient was an exceedingly muscular man, with thirteen years' service, who had never had any serious illness nor previously broken a bone. He went to the front in December, 1914, and in January, 1916, was wounded by shrapnel in the right elbow. The wound was superficial, and no fragments penetrated, although,

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no evidence whatever of any disease of the bone, nor was any necrosis present.

It was found that there were four fragments, the largest of which was the upper one, into which the deltoid was inserted. The fragments were well held together by the wires, even after the specimen removed at the *post-mortem* examination had been boiled.

We have published this case, as it must be rare to find an instance of comminuted fracture of the humerus produced by muscular action and to have the opportunity of examining it, whilst still recent, *post-mortem*.

Drawings made by one of us of the *post-mortem* specimen are appended, as are also the radiograms taken at the time of the accident and after wiring. (See Special Plate.)

The *post-mortem* specimen may be seen in the War Office collection at the Museum of the Royal College of Surgeons.