Notes

ON

SURGERY AT SALONICA.

BY

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AND

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THE campaign of the allied armies in Macedonia has lasted two years, and the present time seems fit for the record of some surgical experiences amongst the British troops in this area.

There are many ways in which this campaign differs considerably from that in France; the extreme cold of winter, the moist heat of summer, the prevalence of malaria and dysentery, difficulties in transport, are all factors which influence the surgical problems.

Malaria, for example, has been most annoying to the surgeon; acute attacks are frequently precipitated by wounds or by any surgical procedure. Moreover, it is found that an acute attack delays or may completely arrest the process of healing; in severe cases the granulating surface changes in appearance, becoming greyish-brown in colour with a varnish-like brown discharge; under quinine treatment the healthy condition of the wound has usually returned in four or five days. There is the further difficulty that rises of temperature in the case of a wounded man may be due either to malaria or sepsis; the only rational plan is to assume that the raised temperature is due to the latter until the presence of malaria is proved microscopically; even then the temperature may be septic rather than malarial. Chronic malaria has produced little material effect on the healing of wounds, though convalescence is somewhat retarded and the effects of haemorrhage more felt. The simulation of appendicitis in cases of malaria has been disconcerting; acute pain in the right iliac fossa, onset with vomiting, tenderness, and rigidity may all be present, but a mistake has usually been avoided by the absence of leucocytosis or the discovery of the malaria parasite.

With regard to dysentery, the abdomen has occasionally been opened following a mistaken diagnosis of appendicitis; the caecum and appendix have been purple in colour, very thick and very oedematous, an appearance which reminds one that suture of a dysenteric perforation may be a matter of some difficulty.

The prolonged moist heat of the Macedonian summer also influences the healing of wounds. Its enervating

effects, combined with the prevalence of malaria, have certainly diminished the resistance to infection, and the men wounded in the autumn have not, as a whole, shown the same active recovery as those wounded in the spring.

TRANSPORT.

It need hardly be said that local conditions have caused many difficulties as regards transport of wounded. The tangled mass of hills, scored by innumerable steep-sided dongas, and the scarcity of good roads, necessitated experiments in various forms of transport. It is difficult to say which of these is best, for all have their advantages. The following are in use at the present time:

1. *Travois*.—This consists of a pair of shafts, 15 to 17 ft. long, drawn by a single mule; the patient is slung in a horizontal position. This travois is actually a good deal more comfortable than it looks, and has the advantage that it can be got round a sharp corner. The dis-

advantages are that it may tear or cut telegraph or telephone wires, the ends must be reshod at frequent intervals, and over rough ground it is hard work for one mule.

2. *Mule Litter*.—A single stretcher is slung from horizontal shafts between two mules. This form of transport is expensive, both in mules

and men; it is also evident that in very hilly country it is difficult to turn round sharp corners, but it is less tiring than the travois to the mule, and has the further advantage of being easily converted, so that the patient may be carried in the Fowler position.

3. *Cacolet*.—Here a single mule has a double burden. A seat is arranged on either side of the pack-saddle; the distance over which the patient is carried must be short, and obviously the cacolet is suitable only for sitting cases.

Ambulances.

Apart from this, extensive use has been made of the horse ambulance and the motor ambulance; the latter form of transport does all the work between the casualty clearing stations and the base, except so far as railways are available. In good weather the motor ambulances have been able to reach the field

ambulances, and even the advanced dressing stations. The transport over long stretches of country of men wounded in the chest and abdomen was one of the many difficult problems. This applies especially to the abdominal cases, in which speedy transport to an operating station is a matter of urgency. On the whole the travois has worked satisfactorily in these cases, producing a minimum of jolting over rough tracks and roads. In order to attain the Fowler position, two methods are in use—either the canvas of the stretcher is

FIG. 1.—Travois.

FIG. 2.—Mule litter.

lengthened and fixed by iron supports to alter its shape to that of a deck chair, or, simpler still, two triangular wooden wedges are strapped to the stretcher to support the back and thighs.

WOUND TREATMENT.

The general treatment of wounds has followed the evolution seen in other theatres of war. At first the ordinary eusol dressing was most in use. A reaction in favour of the hypertonic saline solution and salt packs then set in; and, finally, Carrel's method of treatment has become the method of choice.

Recent difficulties in evacuation from this area by sea have been all to the advantage of the wounded man, for they have resulted in his receiving continuity of treatment—that is to say, a large number of wounded men have been kept in this country until their wounds have healed, and in many cases treatment has been completed in an orthopaedic dépôt. In this way we have had the opportunity of studying wound treatment in all its phases, and of observing the wounded man from the time of his injury to the final stages of his treatment.

It has always been obvious that a wound should if

standard method in many of the hospitals. Other forms of wound treatment have been in use, but we have not yet seen with them the same consistency of results, the quick sterilization of the wound and its secondary suture, which certainly occurs with Carrel's method. We need not labour the point that good results can only follow the strictest attention to details as laid down by Carrel himself; any half-hearted application of the method or modification has resulted in disappointment. It so happened that the majority of the men wounded during the fighting of last spring were dealt with throughout by this plan of treatment. It was started in the casualty clearing stations, continued on the ambulance trains, and completed at the base. There has been no diffi-

culty in carrying out the treatment during what is commonly called a "rush" after heavy fighting. Arrangements for dealing with large numbers were carefully planned beforehand; the surgeons worked continuously in the theatres, whilst medical officers and sisters, specially trained in the method, carried on the treatment in the wards.

FIG. 3.—Cacolet.

FIG. 4.—Advanced dressing station.

possible be continuously treated by one method, and that if an ideal method could be found it should be made the standard plan of treatment. Carrel's method of treatment appeared to us to approach most closely to the ideal, and during the past eight months it has been used as the

A series of 1,000 consecutive cases, mostly serious, is being published by Major Basil Hughes, D.S.O., R.A.M.C., and show conclusively the excellent results that have been obtained; this series includes 248 cases of fracture of the bones of the extremities and 176 cases of injuries to joints.

A second series of 1,000 consecutive cases is on the point of completion.

As a result of the introduction of Carrel's method, a plan of treatment has evolved which we have recommended as appearing to give the best results. There is nothing new in what is advised; it is simply that the opportunity of co-ordination has occurred. This plan is applicable to those patients who may make a complete recovery in this country within a short time, and also to those who, for one reason or another, stay here for a time before being transported to Malta or England.

1. In the Regimental Aid Posts and the Field Ambulances.

Little is done in the regimental aid posts and field ambulances beyond the general cleaning of the injured area and the application of a dressing; ensol dressings are advised, as they most closely fit in with the subsequent treatment. The finest work that these units can do is the rapid evacuation of the wounded to the clearing station.

2. In the Casualty Clearing Stations.

Carrel's method is commenced in the casualty clearing stations. To repeat: we have recommended this as the standard method of treatment, for it gives all that one wants in early sterilization of the wound with subsequent secondary suture. The method requires surgeons who have learnt it and sisters and orderlies who are trained to it. The initial stage, the operative work on the wound, is of supreme importance; the thoroughness and accuracy with which this is done largely determines the ultimate results.

3. Transport to Base.

On the ambulance train or during other means of transport to the base arrangements are made that the regular sterilization of the wound is not interrupted.

4. At the Base Hospital.

(a) The process of sterilization is continued. The bacteriological condition of the wound is at once investigated; this examination is usually limited to the estimation of the average number of organisms in a field. As soon as the bacteriologist reports the wound ready for suture this is done. Bacteriological control of the progress of the wound is an essential part of the treatment, and the only reliable guide as to its readiness for secondary suture; the clinical appearance of the wound surface has again and again proved deceptive in this respect. The count of the average number of organisms in a field requires no expert knowledge and no elaborate apparatus; it can be done quickly, and is applicable, therefore, to a large number of cases. Recently a number of wounds have been sterilized within the first week; this is mainly due to improvement in technique, and especially to the early performance of

thorough excision—by way of example, two cases of compound fracture of the femur have been sterilized and sutured successfully before the end of the first week.

(b) The orthopaedic side of the question is considered side by side with the actual treatment of the wound. This aspect is sometimes overshadowed by attention being focussed on the healing of the wound; many of the disabilities seen at a later stage are due to neglect of the orthopaedic aspects in the early stages.

FIG. 5.—Compound fracture of femur. Photograph of wound immediately after secondary suture on sixteenth day. Primary union.

5. Orthopaedic Convalescent Dépôt.

The patient is received into this unit as soon as his wounds are soundly healed; he here receives massage, exercises, electricity, and "curative" work, according to the nature of his disability. Further details of this dépôt are given below.

6. Secondary Operations.

Secondary operations are necessary in a certain proportion of cases; these are mainly for the correction of deformities or for the repair of damaged nerves. Under ordinary circumstances the operations are performed after the patient leaves this country; but when the operation will fit the man for duty and when there is delay in his evacuation, the operation is done here.

OTHER METHODS OF WOUND TREATMENT.

Through the courtesy of Dr. C. H. Browning, of the Bland-Sutton Institute of Pathology, samples of proflavine and brilliant green were received and are being used in various forms in a series of cases in one of the general hospitals. The report on this series is not yet completed.

Bismuth-iodoform paste has been employed in a small number of cases, mostly cases with sinuses; a few fresh accidental wounds have also been treated by this paste, but their number is too small to warrant any comparative statement. Our advice has been that this paste should be reserved for those wounds in which sterilization and suture are impossible or have failed.

Primary suture without the use of any special antiseptic has been performed in many cases of wounds of the scalp,

abdomen, articulations, and soft parts; in those cases in which a satisfactory and very early excision of the wound has been possible, primary suture has been a decided success.

WOUNDS OF SPECIAL PARTS.

The following are the main principles that have been adopted for special groups of wounds:

1. Head Injuries.

All gunshot fractures of the skull are operated upon as early as possible and are kept in the unit of operation for at least fourteen days; this unit may be a casualty clearing station or a stationary hospital, according to

FIG. 6.—Group of patients with fractures of humerus treated by Carrel's method.

circumstances. All scalp wounds are excised and explored.

In cases other than those with mere fissures, all loose fragments of bone are removed, and then with freshly sterilized forceps a further half-inch of the surrounding bone is excised; the dura is not opened, if intact; but in cases of penetration the brain for a distance of half an inch is gently explored with the finger and any foreign bodies removed. General opinion is opposed to the extensive use of the horseshoe flap, sliding flaps and primary suture being used in those cases in which the operator feels that he has excised the infected area.

2. Penetrating Wounds of the Chest.

The chief difficulty in these cases has been that in certain areas transport over long distances by road has been necessary. These patients travel very badly, and they have therefore been kept as a rule for at least fourteen days in the casualty clearing stations before commencing their journey by easy stages to the base. On the other hand, when evacuation has been by train, uncomplicated cases are sent down after the third day. Of a series of 105 cases so evacuated, including 72 with definite haemothorax and 23 with pneumothorax, 18 (17 per cent.) subsequently required drainage and 30 simple aspiration.

No operation has been performed for removal of foreign bodies from the lung.

3. Penetrating Abdominal Wounds.

The principle of early operation whenever possible has been in force from the beginning. In certain areas the difficulties in recovering wounded and their rapid evacuation to a clearing station have been considerable. But keen work by the field ambulances has overcome these difficulties, and the majority of the cases reach the clearing station within twelve hours of injury.

Captain E. G. Gauntlett, D.S.O., F.R.C.S., recently reported a series of 28 laparotomies for penetrating wounds with 15 recoveries. In 14 of these cases perforations of the intestine were sutured, and 11 recovered. During the same time at the corresponding base hospital there were admitted 45 cases of penetrating abdominal wounds. Of these 33 had been operated upon in clearing stations and all recovered; 23 involved the small intestine, 5 the large intestine, and 7 the solid viscera. Of the 12 cases operated upon at the base 9 recovered; operation for injury to the small intestine was successful in 7 out of 8 cases.

For wounds of the hepatic and splenic flexures of the large bowel, and wounds of the spleen and diaphragm, we have found that Perle's incision gives good access; for cases in which a projectile has traversed the upper part of the abdomen from side to side a complete transverse

incision cutting through both recti has allowed perfect exposure; it is sutured with surprising ease, and heals well.

4. Fractures.

Compound fractures are of all injuries the best evidence of the value of Carrel's method. Major Basil Hughes, in his paper already mentioned, brings out two striking points: (1) That in his series of fractured femurs reaching the base, in no case in which Carrel's treatment was started in the casualty clearing station was the limb

lost; (2) that the majority of cases of fractured femur had healed, and were up in walking splints in five to seven weeks after their injuries.

Two illustrations are appended (Figs. 6 and 7) showing patients with fractures of the humerus and femur treated by Carrel's method.

A special department for the treatment of fractured jaws was instituted early this year. All such cases are moved to this department as soon

as they are fit to travel, and are placed under the dual care of a surgeon and a dental surgeon, who have fashioned some beautiful interdental splints.

5. Joints.

It is generally recognized that of joint injuries about half affect the knee-joint; in a total of 176 consecutive cases in one of our base hospitals 85 concerned the knee. Therefore, in considering joint injuries, those of the knee bulk largely both by reason of their frequency and their difficulties.

Opinion as to the best treatment has passed through many phases. Practice in this area has crystallized, and at the present time the following principles are generally accepted:

(a) Rigid fixation in a Thomas splint.

(b) Removal of excess of fluid from the joint; in other words, treatment directed to keeping the tension of the joint at zero; immediate bacteriological examination of the fluid.

(c) Early and complete operation for all cases except those of through-and-through bullet wounds. This, of course, includes a skiagram, the removal of foreign bodies, and the excision, as far as possible, of all contaminated tissues.

(d) The joint cavity is closed whenever possible; the other parts of the wound are also sutured without drainage when an early clean excision has been done; otherwise they are treated by Carrel's method.

In badly infected joints the results have been disappointing in spite of all the recognized forms of treatment, and a large proportion of this group has ended in amputation. We have, however, been surprised to find on occasion that a secondary excision has saved the limb; we recommend, therefore, that an immediate excision be done for cases in which the bones

FIG. 7.—Cases of compound fractures of the femur.

FIG. 8.—Amputation stumps: flaps sutured over Carrel's tubes.

are badly damaged and infection has become established.

6. Burns.

No. 7 paraffin has appeared to us the most efficient form of treatment for burns at the present time. The painlessness of even large dressings and the excellence of the resulting scars are very striking features.

7. Special Infections.

Gas Infection.

There has been a larger amount of gas infection than we had expected from the nature of the country. In the fighting of last autumn it was definitely observed that the number of cases depended directly on the nature of the soil over which fighting took place; there was an immediate jump in the figures as soon as the troops reached villages and cultivated soil. Later the onset of wet weather again increased the proportion of cases of gas infection. In one casualty clearing station statistics were carefully worked out by Captain St. J. D. Buxton, and it was found that gas infection occurred in 3.98 per cent. of all wounds.

Tetanus.

The incidence of tetanus has so far been remarkably low. As far as we can ascertain there have been only four cases of tetanus amongst the British troops here. Two of these cases died; both had received accidental wounds; in one it was an apparently trivial scratch of the finger and no prophylactic serum was given. One case of anaphylaxis following the injection of antitetanic serum has occurred. The patient had had an injection of antitetanic serum in November, 1916; in August, 1917, he received a slight wound of his right leg, and 500 units of serum were given; he vomited after the injection, but soon after was fit to return to his unit. Four hours later he vomited again, became collapsed, and was sent back to the field ambulance. On arrival there he was collapsed and slightly cyanosed; his radial pulse was impalpable, there was considerable oedema of the scrotum and penis, and an urticarial rash on the thighs and chest. With treat-

ment by stimulation, atropine, and adrenalin he recovered in forty-eight hours.

SURGICAL CONVALESCENT DÉPÔT.

A special surgical convalescent dépôt has been in existence during the last four months.

Its aim has been to start the important surgical after-treatment in those wounded who for various reasons are unable early to reach the orthopaedic centres at home. Moreover, the simplest form of orthopaedic work carried out at the commencement of convalescence means a great saving of time, and is of inestimable value to the moral and physical well-being of the patient. The principles followed are those which have been laid down by Colonel Sir Robert Jones,

C.B., the Director of Military Orthopaedics.

Each patient on admission has prescribed for him a particular and graduated form of exercise and massage suitable for his disability. These exercises are carried out in a gymnasium, where, under the direct supervision of a medical officer and by means of simple hand-made machines, the disabled muscles and joints are improved.

But, in addition to these methods, great stress is laid on

manual exercises performed in a workshop—the "curative" workshops, as they are called. In them the patient improves his muscles and joints unconsciously; his mind is fixed on the work done rather than on his disability. In the joiners' shop the exercises of sawing, planing, and hammering improve the power of the arm, whilst in using a treadle lathe the exercise of pedalling improves all the muscles and joints of the lower limb.

In another part of the camp

simple sun-dried bricks are made. The acts of digging and mixing the clay, and the bending over the moulds constitute excellent exercises for the arm, back, and thigh muscles. Gardening furnishes similar results.

Finally, under the direction of a metal worker and a saddler, we have started a splint factory. Simple splints in wood and iron are made to measure, and we can now turn out the Thomas's walking calliper splints and a simple

FIG. 9.—Tent for massage.

FIG. 10.—Brick-making.

form of artificial leg. This is fashioned with the upper joint like a Thomas's knee splint and with the lower end simply in the form of a wooden peg.

The few photographs give an idea of the camp and the class of work done there. The success of this camp has been due to the energy and enthusiasm of its commanding officer, Lieut.-Colonel F. Aphthorpe Webb, R.A.M.C.(F.).

SERBIAN PATIENTS.

Certain of the British hospitals serving in Macedonia have been attached to the Serbian army, and thus we have had an opportunity of studying the surgical aspects of Serbian patients.

Dealing first with non-military diseases, it may be noted that appendicitis is comparatively rare amongst the Serbs; on working out the proportion of cases requiring operation per 1,000 admissions to hospital we find that there have been approximately four times as many cases amongst British troops as amongst Serbs. It is stated that Russians suffer much more frequently from appendicitis than Serbs.

Herniae are common in the Serbs, and a large proportion of inguinal herniae are of the direct type; in one of our hospitals over 30 per cent. of inguinal herniae were direct. Serbian surgeons themselves think that the increased liability to herniae is due to the relative fullness of the abdomen in Serbian children, due to the bulky carbohydrate diet, which weakens the floor of the inguinal canal, and also to the fact that at an early age they carry heavy weights over very hilly country. Surgical tuberculosis has been small in amount, except as regards the epididymis, where it has been observed fairly frequently.

As regards wounds, the Serbs have proved excellent surgical patients; Major K. W. Mousarrat reports that recovery from shock has been rapid, major operations have been well stood, and septic wounds have healed extremely well—for example, in a series of thirty-one amputations through the mid-thigh or at the hip, no case was lost from shock, and only in a few instances was saline infusion necessary. Anaesthetics were taken excellently and pulmonary complications are rare.

Approximately 7 per cent. of shell wounds developed gas infection, and tetanus occurred approximately in one case per 1,000 wounded, with a mortality of 45 per cent.

INTERNATIONAL SURGERY.

The presence of the allied armies in Salonica naturally suggested an interchange of views on matters surgical.

An International Surgical Society was therefore formed under the presidency of M. le Médecin Inspecteur Ruotte, the Director of the French Medical Service in Salonica. Meetings are held once a month, cases being shown and short communications read. In addition, visits have been made to the hospitals of our allies and much of interest and value has been learnt—for instance, these visits have encouraged the establishment of surgical dressing-rooms in our general hospitals corresponding to the "salles de pansements" found in almost all the hospitals of the other armies. These dressing-rooms deal with all the minor dressings and a large number of walking cases; they economize time and personnel and allow attention in the wards to be concentrated on the treatment of the serious cases.

Surgery at Salonica has been made easy by the ever-ready help and encouragement of those who have directed the medical service there; to them our most grateful thanks are due. For the photographs which accompany this paper we would express our gratitude to Lieut.-Colonel E. J. Williams, D.S.O., C.A.M.C., and to the Survey Department, Royal Engineers.

FIG. 11.—Splint-making.

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FIG. 12.—Thomas's calliper splint: Artificial leg.

advantage of convenient standardization. The Oxford dysentery emulsions were not found so eminently satisfactory, but it is thought that recent improvements in them will give better results. The second part deals with specific bacteriological observations, the results of which are correlated as closely as possible with those of other workers elsewhere. The third part gives the main results of protozoological examinations, under the direction of Professor J. W. W. Stephens, made in parallel series with those of the bacteriologists working in the same material.

THE Medical Research Committee has issued a report upon 2,360 enteritis "convalescents" received at Liverpool from various expeditionary forces (Special Report Series, No. 7, V). The investigations were both bacteriological and protozoological, and formed part of the combined studies arranged by the Committee in 1915 at the chief centres in the country at which military patients and convalescents were being received with the diagnosis of dysentery or "enteric" from the Mediterranean and other areas. In the first part of the report Professor Glynn and his colleagues describe the technical methods used, with special reference to agglutination tests. A very high estimate was formed of the value of the typhoid and paratyphoid emulsions of the Oxford Standards Laboratory, and the technique suggested by Dreyer for their use is considered to be the "best method for routine work in the army," giving also the additional