of broth. (c) 10 to 15 c.cm. of blood were poured into flasks containing 100 c.cm. of bouillon with 1 per cent. saponin. This method had to be given up owing to the difficulty of excluding air organisms. (d) Blood was poured directly on to the surface of agar plates incubated at 37° C., and also at room temperature. (e) 2 c.cm. of blood were put into a sterile test tube, incubated for twenty minutes at 37° C., and then at room temperature for one hour. The serum was pipetted off, and 10 c.cm. of broth were added to the tube containing the clot. The tube was replaced in the incubator at 37° C. Other media employed were: 1 per cent. saponin broth, 1 per cent. sodium taurocholate broth, 1 per cent. sodium glycocholate broth, 1 per cent. sodium citrate, 0.9 per cent. saline, and media containing adsorbents—aluminium hydroxide, animal charcoal, iron hydroxide. Anaërobic methods were also employed. The cultures were kept for ten days or a fortnight and frequently subcultured.

In all, 96 observations were made on 43 cases. In no instance was any organism grown, except in the few cases which became contaminated by organisms from the air when the flask method was used.

Since the patients were of the same clinical type we may collate the findings in the two series. In the second series, when the methods of sterilization were controlled, the results were consistently negative; it may therefore be assumed that the positive results obtained in the first series were due to contamination. Using the methods of cultivation in general vogue we have failed to demonstrate the presence of bacteraemia in cases of "irritable heart," and must therefore conclude that bacteraemia does not play a demonstrable part in the pathology of this disease.

We wish to express our thanks to Captain H. S. Blackmore, R.A.M.C., for the help he gave in carrying out the first part of the investigations at University College Hospital.

REFERENCES.

- ¹ T. Cotton, T. Lewis, and F. H. Teale: A Note on the "Irritable Heart" of Soldiers. ² *Technique of the Teat and Capillary Tube*, p. 194. ³ *Journal of the Royal Army Medical Corps*, October, 1916, p. 522.

TRAUMATIC RUPTURE OF THE SPLEEN.

BY

J. LIONEL STRETTON,

SENIOR SURGEON TO THE KIDDERMINSTER INFIRMARY AND
CHILDREN'S HOSPITAL.

TRAUMATIC rupture of the spleen is rare in this country. The two following cases, which occurred within seven months, are worthy of record:

CASE I.

W. T., male, aged 24, had been acting as a dispatch rider in Egypt, where he had attacks of malarial fever.

On December 18th, 1915, at 1.30 p.m., he was riding his motor bicycle, when he collided with another. The impact was sufficient to throw him forward thirty yards. He was stunned, and, when picked up, was taken home and attended by Dr. Griffiths at 2 p.m. I saw him at 9 p.m. He was blanched; the pulse was 128; the abdomen was distended and immobile and dull in the flanks.

At 9.30 p.m., under a general anaesthetic, an incision was made through the left rectus. Five pints of bright blood and some clots were removed from the peritoneal cavity. The spleen was enlarged to three or four times its natural size and an irregular laceration could be felt on its upper surface. At this juncture the patient became so collapsed that it was impossible to entertain the removal of the spleen. Gauze was packed into the laceration, the lower portion of the wound was closed, and the patient returned to bed.

He rallied during the night. There was no further haemorrhage. He was given calcium chloride gr. xv every four hours. He remained much in the same condition until December 23rd, when he gradually sank and died, five days after the accident.

CASE II.

J. M., male, aged 14, working on a farm, on July 15th, 1916, at 9.30 p.m., was running down a bank, when he caught his foot in some fern roots and fell on an ant-hill. He states that he hurt himself so much that he lay there for half an hour before he was able to get up and walk home, a distance of only fifty yards. The pain was in his left testicle and there was a swelling on the left side of the scrotum. He vomited three times after he reached home. His mother put some fomentations on him. The next morning he was seen by Dr. Deacon, who ordered him into the Kidderminster Infirmary.

He arrived at 2 p.m.; he had been driven fifteen miles in a two-wheel trap and was sitting up by the driver and appeared to be well. He got down and walked to the ward. He was said to be suffering from a hernia. I saw him at 3 p.m. He did not appear to be ill; the temperature was 97° and the pulse 106. There was no swelling in the scrotum, but when he coughed there was a protrusion from the abdomen into the scrotum, which was easily returned. It felt like a portion of omentum

with some fluid. He denied any sign of a hernia previously. The abdomen was not distended, the movements were free, and there was no rigidity. There was some dullness in both flanks.

At 3.30 p.m., under a general anaesthetic, an incision was made for radical cure of left inguinal hernia. The sac was isolated; before applying the ligature it was opened, when a quantity of blood poured out; the operation for radical cure was completed. The abdomen was opened by an incision through the left rectus. About two pints of blood and clots were removed from the peritoneal cavity. The spleen was felt to be lacerated. It was lifted out and the pedicle tied. The cavity was sponged out and the wound closed in layers. The spleen weighed seven and a half ounces, and was lacerated in four places.

The patient bore the operation well. He gradually improved and the wounds healed. He had an attack of acute parotitis at the end of August, which delayed his recovery, but he was discharged on October 5th. He looked well, and did not appear to suffer any ill effect from the loss of the spleen. He is now at work again and enjoying his usual health.

The contrast between these cases is interesting. The first patient had an enlarged spleen, which predisposes to rupture. The violent nature of the accident was sufficient to make us suspect a serious injury. Although the operation was performed eight hours afterwards, the loss of blood was so great that the patient was unable to recover from it. This result was favoured by the concussion, which prevented a sufficiently early recognition of the abdominal condition. Although it was not possible to remove the spleen this did not affect the result, as there was no further haemorrhage. In the second case the spleen was of normal size, and there was no predisposing cause of rupture. The accident was not severe, and did not make us suspect a serious injury. Although the operation was not performed until eighteen hours afterwards, the loss of blood, though serious, was not sufficient to prevent recovery. If the hernial sac had not been opened the condition might not have been discovered, as it was obscured by the sudden appearance of a hernia and by the moderate nature of the constitutional symptoms. It is difficult to believe that a boy could sit up in a shaking trap and drive fifteen miles over a very hilly road with such severe injuries.

A CASE OF "SPONTANEOUS" RUPTURE OF
THE SPLEEN: SPLENECTOMY: RECOVERY.

BY

CAPTAIN W. RANKIN, R.A.M.C.(T.C.),

MEDICAL OFFICER IN CHARGE SURGICAL DIVISION, No. — GENERAL
HOSPITAL, B.E.F.

THE case is published for two reasons, first, on account of the rarity of rupture of the spleen as an abdominal catastrophe in this part of the world, and secondly, so that medical officers may be reminded of the necessity of examining the spleen in cases who have served for a period abroad.

I am indebted to Lieut.-Colonel Hayes, R.A.M.C., for his permission to publish the notes on this case.

Pte. P., aged 26 (service seven and a half years), was admitted to No. — General Hospital on March 29th, 1917.

He complained of acute abdominal pain and was cold, collapsed, somewhat cyanosed, and without any perceptible radial pulse. The abdomen was not rigid. There was dullness in the left flank. The liver dullness was present and normal. The patient had an "appendix" scar in the right iliac fossa. A lung lesion and locomotor ataxia having been excluded the case seemed clearly an acute abdomen, though its nature was doubtful. Marked cyanosis of the finger-nails was noted, and Colonel Hayes suggested the spleen as the focus of mischief, when the patient remarked "that some had said malaria was his trouble."

Operation.

Immediate middle-line laparotomy was performed. Captain Frew, R.A.M.C., gave the anaesthetic, and Captain F. T. Hill, M.C., R.A.M.C., assisted. On opening the peritoneum free blood was at once found. The wound was enlarged, and a very big spleen was quickly delivered through it. The capsule of the spleen was torn, and the torn surface was covered with firm clot. The pedicle was clamped and the spleen removed; the vessels were secured with a Staffordshire knot. Nearly two pints of blood were then wiped out of the pelvis and the kidney pouches; when the peritoneum was clean, the abdomen was closed with through-and-through silk-worm-gut stitches. Salines, morphine, and stimulants aided the rallying of the patient. His wound healed well, and surgically he made a good recovery.

The blood examination showed the parasite of malaria present in very great numbers. No crescents were found, and,

whilst the case looked a malignant one, the opinion expressed was that he had a double infection of tertian ague. This condition seemed to settle after a course of quinine, followed by one of liq. arsenicalis.

Previous History.

The patient had served in India for three years. There he had "an odd day or two" with attacks of malaria, but was never in hospital, and no blood examination was made. From November, 1915, to December, 1916, he was at Salonica. In August, 1916, he had an attack of malaria for which he was detained five days in hospital and then attended for three weeks, taking quinine. He was invalided home after an operation for appendicitis. From the beginning of 1917 he began to notice that heavy work and "jumping about" gave him a feeling of discomfort in his stomach, and after such exercise he vomited on several occasions. He was not short of breath, and thought his discomfort was due to his appendix operation. He arrived in France the day before his admission to hospital. He had been uncomfortable for five days before that, but had suffered no special trauma on land or sea during that time. He marched to his dépôt, took ill with bad abdominal pains during the night, and, when seen by his medical officer, was immediately sent to hospital. The spleen after removal was about eight times the size of the normal organ; it must have been much larger before it ruptured. The patient was transferred to England very well on May 14th, 1917.

THE EARLY TREATMENT OF COMPOUND FRACTURE OF THE FEMUR CAUSED BY GUNSHOT WOUND.*

BY CAPTAIN R. C. DUN, R.A.M.C.(T.F.).

GUNSHOT WOUND, causing compound fracture of the femur, must certainly be looked upon as one of the gravest of war injuries. A more widespread appreciation of sound principles of treatment, and a thorough application of those principles, will, I feel confident, lead to improved functional results.

In no class of case is it more important that the treatment be early and adequate. I emphasize both adjectives.

This note is chiefly based on the practical experience which I have gained in working at casualty clearing stations, and, in the main, deals with the treatment carried out in them. But it has become obvious to me that it is the regimental medical officers and field ambulances in front of the casualty clearing stations who have in their hands the power of giving these cases the best possible start in their race for life. To obtain the best results a definite line of treatment must be adopted as early as possible—that is, by regimental medical officers and field ambulances, and carried on at casualty clearing stations.

What are the factors which we have to fight in these cases of compound fracture of the femur, and how can they best be dealt with before and after reaching a casualty clearing station? Broadly speaking, they are: (1) Shock, (2) haemorrhage, and (3) sepsis.

Shock.

I think we may fairly divide the shock from which these cases suffer into two classes—(a) and (b). The former is due to the gravity of the injury and the pain necessarily caused, especially in the earlier stages of transport, before complete immobilization of the fractured limb is possible; morphine and the best available fixation of the limb is the obvious treatment. Hot drinks, hot-water bottles, and saline injections should be made use of as early as possible. I submit that, up to the time when the patient can be put on a stretcher, a method probably as good as any is to fix the thigh with short local splints and to tie the thighs and legs together.

It is to the second class of shock that I particularly want to draw attention. This is the shock which results from the often unavoidable incomplete fixation of the fractured limb, and frequent handling of the patient in his journey from the field to the ambulance. In my opinion the best and simplest method of completely immobilizing a fractured femur is a properly applied Thomas splint, and this should be put on as early as possible; it would be ideal if it could be done at regimental aid posts or advanced dressing stations. Another ideal would be attained if cases of fractured femur could be transported from advanced dressing stations to casualty clearing stations

* Paper read at a meeting of medical officers of an army in the field.

without removal from the ambulance, so reducing the movement of the patients to a minimum.

I have no hesitation in saying that cases of compound fracture of the femur which have had a Thomas splint applied early, and which are rapidly sent on to the casualty clearing station, arrive there in much better condition than similar cases imperfectly immobilized and subjected to movements during transit.

Haemorrhage.

As regards the treatment of haemorrhage before the case reaches the casualty clearing station, there is strong reason for avoiding the prolonged use of the tourniquet, on account of the increased risk of gas gangrene so entailed by producing anaemia of already devitalized tissues. Large vessels may have to be ligatured, or the patient may be sent down with artery forceps on. The most frequent form of haemorrhage, and one which should always be vigorously dealt with, is slow oozing from the wound. No case should ever be sent down until this has been checked. To do this, wounds often have to be opened up and ligatures or forceps applied to the bleeding points. Failing this, direct pressure with a firm packing of gauze into the *opened up* wound is often sufficient to check general oozing. A cork of gauze is worse than useless.

Sepsis.

To combat sepsis in the early stages, all that can be done is rapid disinfection of the skin for a considerable area around the wound or wounds. For this purpose a 5 per cent. solution of picric acid in methylated spirit is less irritating and more searching than iodine. Except for the necessary treatment of haemorrhage or the removal of visible foreign bodies, the wound should not be interfered with. The insertion of drainage tubes is unnecessary. Dressings should only be changed if soaked with blood.

Treatment at Casualty Clearing Stations.

Arrived at the casualty clearing station, all cases of compound fracture of the femur should be disturbed as little as possible, and sent without delay to the pre-operation ward. No case of this type should be evacuated to the base without first passing through the theatre. Small superficial wounds are deceptive, and invariably cloak much more extensive damage of the deeper tissues. Cases in which haemorrhage is taking place will naturally be given precedence in going to the theatre. Wherever possible inadequately splinted cases should also have next precedence; when this is not practicable the fixation should be improved. The greatest care must be exercised to prevent increase of shock by unnecessary movements; thus no attempt should be made to remove the clothing from the injured limb until the patient is anaesthetized, and he should not be lifted off the stretcher on which he arrives until anaesthesia is complete. The usual methods of treating shock—warmth, morphine, camphor, and salines—will be employed in cases which have to wait their turn for operation.

When the case reaches the operating theatre care must again be taken that no increase of shock occurs from unnecessary or rough handling of the patient. Probably the soundest plan in all cases is to lift the stretcher on to the operating table, and anaesthetize the patient before he is removed from the stretcher. The only circumstance which may justify an exception to this rule is an efficiently applied Thomas splint.

With a view to shortening the time occupied by the operation and to ensure smooth working, all members of the operating team should have been made thoroughly conversant with the details of the technique. Where multiple wounds are present, a second operator should get to work on them at the same time that the femur is being treated. The only reference I will make to the question of the choice of an anaesthetic will be to point out the advantage of spinal anaesthesia in some cases of fractured femur—for example, when associated with a penetrating chest wound.

Shock must be vigorously combated on the operating table. Warm blankets, hot-water bottles, salines, subcutaneously or intravenously, should be used. In all grave cases, the latter is the method of choice, and it should be employed at the start of the operation. As soon as the