stiffness. The shock, thrill, and bruit have all disappeared, and the pulse can be felt in the posterior tibial and dorsalis pedis vessels. It will be seen that the popliteal vessels must have been wounded just above the division of the artery.

I am much indebted to Sir William Osler for his interest and loan of recent literature; to my colleagues, Dr. Jephcott (anaesthetist), and Mr. Blagden who assisted me, and to the nursing staff for their excellent arrangements.

ANGLO-FRENCH HOSPITAL, NO. 2, CHATEAU TOURLAVILLE, CHERBOURG.

BY

MABEL L. RAMSAY, M.D., CH.B. EDIN., D.P.H. CANTAB.,

AND

FLORENCE A. STONEY, M.D., B.S. LOND.

This hospital was organized by the Women's Imperial Service League (Mrs. St. Clair Stobart administrator). It arrived at the Chateau Tourlaville, Cherbourg, on November 6th, 1914, and patients were received two days later, on November 8th. It closed March 24th, 1915.

As a hospital, a sixteenth century chateau is not ideal, but with proper organization it became adapted for its purpose of a temporary military hospital. The sanitation was primitive, a pail system being necessary. The extent of the grounds surrounding the chateau enabled the trenches to be placed at a sufficient distance, so that contamination of the water supply was not possible. The greatest hardship has been the lack of water taps, except on the ground floor, and the lack of gas for heating. Water had to be brought up two flights of stairs, and all boiled for surgical use over oil stoves.

The medical staff consisted of Miss Florence Stoney, M.D., Médecin-en-Chef and Radiographer; Miss Kathleen Gibson, M.B., Miss Helen Hanson, M.D., Miss Mabel L. Ramsay, M.D., Miss Mildred Staley, M.B., Miss Joan Watts, M.B., and, later, Miss Ina Clarke, F.R.C.S.I., and twelve nurses, with Sister Bailey in charge.

The hospital was well equipped with four motor ambulances and two touring cars. Also there were some twenty orderlies to help in multifarious ways. It was due to their untiring exertions that the many wheels have run so smoothly. Patients were fetched from the arsenal in the ambulances, having been brought by steamer from Dunkirk or Calais to Cherbourg. Only the gravest cases remain in the local hospitals, the greater proportion being entrained for other districts in France. In November last some 5,000 to 7,000 wounded were being landed.

From November 6th to January 5th there have been admitted to this hospital 106 patients. During the first six weeks it was one constant struggle to overcome sepsis; in fact, pus was chased up and down the limbs.

Notes of some of the cases are appended. The majority have been compound fractures, and almost all horribly septic.

Fractures of the Cranium.

CASE I.—A gutter fracture of the vertex of the skull from a sabre or bayonet cleaving the skull in an antero-posterior direction and exposing the grey matter of the brain. He was quite unconscious when admitted, and also completely paralysed. When not sleeping he moaned, "Oh! mon majeur." There was a constant outpouring of pus, and brain substance came away freely in the dressings. He died four days after admission of septic meningitis, no operative procedure being possible in this case.

CASE II.—A marine with a compound fracture in the neighbourhood of the external angle of the frontal bone, caused by an exploding shell, and exposing the left frontal lobe for about two square inches. The dura mater was not torn, only pierced by some sharp spicules of bone. The flesh wound also tore the outer part of the eyebrow. The patient when admitted was in a state of great cerebral irritation. The next day he was chloroformed, and several pieces of the depressed fracture were removed.

The after-treatment consisted of boric douching and use of weak hydrogen peroxide, with four-hourly fomentations. He made a rapid recovery, and fifty-five days after admission he was discharged completely healed. The mental condition showed signs of some instability.

CASE III.—This was a fracture of the right external angular process of the frontal bone, and also involved the orbital

plate. The right eye was ruptured by an exploding shell. The clinical picture was one of panophthalmitis. The day following admission the eye was removed and orbit freely drained. At the time of operation no foreign body was felt in the orbit. By an x-ray photograph a piece of shell about $\frac{3}{4}$ in. long and $\frac{1}{4}$ in. thick was shown to be lying far back in the orbit. This was subsequently localized and removed.

For a time after the removal of this foreign body he had severe headaches, and one feared the complication of cerebral abscess. He, however, considerably improved under potassium iodide grains x t.i.d. The orbit drained freely, several pieces of necrosed bone (orbital plate) gradually detached. Repeated exploration with a probe failed to reveal any fissure in the roof of the orbit. The general condition was improving.

After being in hospital 101 days there was a recurrence of headaches, but they were of an intermittent character. Pulse 70; temperature normal, with an occasional rise to 99° F. in the evening. He never had any cerebral vomiting. Once or twice he had complained of nausea. At this date the left eye was examined by an oculist; vision $\frac{3}{4}$; there was no evidence of papillitis, only some floaters in the vitreous.

Three days after this examination, that is, on the 104th day, he had an attack of severe bilious vomiting, which lasted two days. On the 106th day the hitherto free purulent discharge lessened and the headache increased. He became queer and was disinclined to get up. The temperature rose to 99° and the pulse fell from 70 to 65, then to 58 in the next three days. A diagnosis of cerebral abscess was made, and on the 109th day he was brought to the theatre with a view to exploring the frontal lobe through the fractured orbital plate.

Half an hour before the anaesthetic (CHCl_3) he was given a hypodermic of morphine gr. $\frac{1}{4}$. He had just had 5iv CHCl_3 when respiration suddenly failed. Artificial respiration was at once begun and kept up for one and a half hours; stimulants of ether, atropine, and intravenous saline were given, but all of no avail. The heart continued to beat for one and a quarter hours and then failed.

Post-mortem Examination.—The orbit was explored, and a large fissure on the outer side of the orbit was found. It admitted the finger, and dura was felt. A trephine opening through the temporal bone revealed a bulging dura, through which, on incision, pus welled up. A large abscess cavity was found occupying at least one-third of the frontal lobe.

Apparently this was a case in which some portion of the septic bone had been carried into the brain substance, and whilst the orbit drained freely the symptoms were quiescent. The closure of the fissure with granulations rapidly produced symptoms of cerebral compression. Also, one fears that the administration of morphine given before the operation was a contributing factor for the onset of respiratory failure.

Throughout the period of observation—that is, 109 days—there were few symptoms to assist a diagnosis of cerebral abscess, the temperature and pulse being no guide; the headache was intermittent, and did not seem of sufficient intensity to warrant a diagnosis of cerebral abscess.

CASE IV.—In this case the bullet entered the left cheek and came out behind the right ear. In its passage it had fractured the left superior maxilla, crossed the spheno-maxillary fossa, and out through the right temporal bone on a level with and behind the external auditory meatus, the passage of the bullet being well shown by the x-ray photograph. His chief symptom was headache, and tenderness of the temporal bone when touched. He was discharged quite healed twenty-seven days after admission.

Fractures of the Jaws.

CASE I.—A compound fracture of the lower jaw, the whole of the chin being blown away. He was in a state of suffocation when he came in, and required immediate tracheotomy. The history given was that he had been unable to swallow liquids or solids since being wounded, eight days previously. The whole neck was in a state of cellulitis, the tongue was swollen, and the wounds involving upper and lower lips were foul and stinking. Tracheotomy was done with some difficulty owing to the enormous swelling of the neck. The trachea was opened and a tube inserted, but he died a few minutes after, artificial respiration being of no avail.

CASE II.—A fracture of upper and lower maxilla on the right side due to an expanding bullet fired by a German up a tree. The bullet passed through the mouth, shattering the alveolus posteriorly of the superior maxilla, and the entire vertical ramus of the inferior maxilla, producing a large stellate wound of the face. The bullet then dented a metal button and passed down below the right coracoid process, splintering the coracoid, and finally ending in the axilla, breaking up into numerous pieces. For a time the external carotid artery was exposed, and with so much sepsis there were fears of a secondary haemorrhage from this artery. Portions of the jaw have been removed, but now the face wound has completely healed up. Most of the pieces, carefully localized by Dr. Stoney, have been removed, and the long track from below the coracoid process into the axilla after three months' suppuration has now completely healed. A few pieces remain, but as they are not giving trouble they will be left *in situ*. He is able to eat well, and there is good movement in the shoulder.

CASE III.—A very bad case, with the whole of the bony portion of the chin and lower lip blown away, the upper lip being split. His condition was one of foul sepsis. He can only take food when lying down. He awaits a plastic operation to re-form the lower chin and lips.

CASE IV.—The bullet passed through the right cheek and across the mouth through the angle of the left inferior maxilla, fracturing it, and then behind the clavicle downwards and outwards, grooving the skin over the scapula. The angle of the jaw is much splintered and suppuration continues, but is decreasing, numerous pieces of necrosed bone being shed at intervals. He continues under treatment.

Injuries to the Lungs.

CASE I.—The bullet went in just below the left acromial process, and made its exit between the right tenth and eleventh ribs posteriorly, about 3 in. from the spinous process of the vertebra. He was in the crouching position when hit. In its course the bullet must have damaged some branches of the sympathetic plexus, and also possibly the posterior roots of the ninth and tenth thoracic nerves, as he suffered from an enormously distended abdomen, with paresis of the intestines. There was also hyperaesthesia of the abdomen in the belt region. He shortly after admission developed an attack of shingles in the same region. The left pleural cavity was full of fluid and the right border of the heart was displaced to the right 4½ in. from the mid-sternal line.

For two and a half months he was quite unable to be out of bed, owing to breathlessness and palpitation. To date all the fluid in the lung has quite cleared up, and the heart has returned to its normal position. The patient is now convalescent, but is not yet able to over-exert himself. He suffers from cardiac weakness and has considerable palpitation on the slightest over-exertion.

CASE II.—The bullet entered close to the left border of the heart in the third interspace, and came out just above the superior angle of the scapula on the same side. The pleural cavity is full of fluid, and the right border of the heart is displaced 4½ in. from the mid-sternal line. He had been treated for a month at a hospital in Dunkirk, and arrived at this hospital with a normal temperature, but very breathless on the slightest exertion. He gave a history of bad haemoptysis just after being wounded. At intervals he has attacks of spitting up dark blood-stained fluid, which looks like old blood clot, accompanied by a rise of temperature—101° to 102°—and cough. There was very little increase in the rate of respirations. There is marked dullness over the whole of the left lower lobe and no breath sounds. In the upper lobe in the attacks moist râles are heard. The chest has been punctured, but only sanious fluid has been withdrawn. No doubt the bullet track is septic, and he is gradually expectorating the contents of the septic area. There is no evidence of a cavity in the upper lobe. Since admission he has had three of these attacks of expectorating this dark blood-stained fluid. Temperature, pulse, and respiration return to the normal after a few days. He has been placed under open-air treatment and considerable improvement has resulted; he is now able to get up. Later x-ray examination showed the heart in its normal position and the left lung clear except for a few patches.

CASE III.—This patient came in with a bullet wound of entrance an inch to the outer side on a level with the sixth thoracic spine, and an exit wound in the right axilla, which produced a large tearing wound, exposing the intercostal muscles. A second wound of entrance in the ninth interspace and an exit in front of the right humerus, splintering the head of the humerus. There was also a burn on the right foot. These wounds were made by the bursting of a shell in his vicinity. The left lung was completely collapsed, and there was blood in the left pleural cavity, as proved by puncture. He subsequently developed septic pneumonia of the left base. An x-ray photograph shows that there is a piece of shell lying close to the coracoid process and also another piece just above the heart in the second interspace on the left side. The shoulder was drained and necrosed bone removed. His condition, after being in the hospital three months, is that all the wounds are healed. The shoulder gives a good range of movement. The fluid has disappeared and both lungs are now acting equally. His respiratory capacity is normal. Open-air treatment has considerably assisted his complete recovery.

Fractures of the Humerus and Forearm.

We have had nine cases of fracture of the humerus; one only involved the shoulder-joint, and one the elbow-joint. All the cases have united and the bones are in good position, and good functioning arms have been obtained. In all cases operations have had to be done before finally healing, to remove dead sequestra. These results have been materially assisted by the services of a very skilful masseuse—Miss Cowles.

In two cases there has been temporary musculo-spiral paralysis, but this subsequently cleared up with use of a faradic battery.

The case involving the elbow-joint—a much comminuted fracture of the lower end of the humerus—has recovered in a position midway between pronation and supination, with the joint ankylosed. He will require an excision of the elbow-joint.

There have been three cases of fracture of the forearm, one of the radius, one of the ulna, and one of both bones. In the two former cases good results have been obtained; but in the case of fracture of both bones the position of the bones is bad, but it is hoped a useful limb may ultimately be attained. This limb was in a bad condition of sepsis, and the wounds on both aspects of the forearm close to the wrist were such that an extension apparatus could not be used. Finally, a plaster-of-

Paris splint was applied and union obtained after six weeks' severe sepsis.

Fractures of the Hand.

There were only four cases, one with fracture of the phalanges in which gangrene developed, and the line of demarcation reached the middle of the palm, and required disarticulation at the wrist. This case did well after operation.

Two cases remain under treatment. One has a fracture of the second and third metacarpals, and numerous pieces of shell in the palm. Another case died from tetanus, and will be referred to under this heading.

Fracture of the Pelvis.

There has been one case. The bullet entered close to the pubic ramus of the left side, passed through the scrotum without injuring the testicle, and then across beneath the perineum to the opposite vertical ramus of the right pubes. It produced no injury to the bladder. The bullet had been extracted before admission. Necrosed bone has been removed. He is now able to get up and walk with the aid of sticks. A sinus persists, leading to some necrosing bone not loose.

Fractures of the Femur.

Ten cases of compound fracture of the femur have been admitted. These cases proved the most difficult to treat and nurse.

Five of the cases were comminuted fractures of the lower end of the femur, two in the middle third, and three have been fractures of the upper end of the femur close to the great trochanter.

Five of the fractures united and are in good position.

In four cases there is shortening of less than one inch, and in one case there is 3½ in.

One case (fracture of the lower third of femur) united well, and was allowed up with a healing, although septic, sinus, after being in bed two months. He caught a chill and developed an acute osteo-myelitis of the lower fragment, and subsequently pus in the knee-joint. He was desperately ill. Amputation was performed above the united fracture. He is now progressing well.

Two other cases required amputation. In one there was a compound fracture of the tibia and fibula, and also the lower end of the femur was cracked. Incision and drainage of the knee-joint was attempted, but a condition of general septicæmia supervened which necessitated amputation.

The third case requiring amputation is interesting owing to the multiplicity of his fractures and wounds, due to the bursting of a shell in his vicinity. He had a compound comminuted fracture of the middle of the right femur, a large wound of entrance in the front and to the outer side of the lower end of the thigh, and a large exit wound just above the popliteal space; also a compound fracture of the left radius and second metacarpal, a large lacerated wound on the outer aspect of the left thigh, and a bullet wound of entrance and exit between the left tibia and fibula in the upper third of the leg. Every effort was made to save the right leg. It was put up in a Liston's splint, the wounds enlarged and freely drained. The patient was, however, in a state of great shock and anaemia from loss of blood previous to admission. The tissues for a long time showed no signs of healing. The temperature was never very high, the pulse 80. On the ninth day after admission he began to have secondary haemorrhage. Further incisions for better drainage were made, but with only temporary improvement. The discharge was foul and fetid. Also he began to spit blood, and, although the lungs do not show any definite clinical signs of phthisis, his aspect is distinctly tuberculous. Finally, on the twenty-third day after admission the limb was amputated through the upper third of the femur. His troubles were not at an end, for on the third day after amputation the inner margins of the flaps showed gangrene. There were also three secondary haemorrhages from the stump. The whole of the flaps were opened up and pine sawdust dressings applied. In three days the effect was marvellous, the sloughs came away, and a clean granulating surface replaced the foul suppurating area. He was then moved to a wooden hut, and placed under strict open-air treatment. He forthwith began to improve generally. His blanched appearance soon gave place to one of a ruddier hue; the haemoptysis ceased, and all his wounds have now healed except a small sinus in the stump. The left radius has also united, and he has a useful arm. The tearing of the external lateral ligament of the wrist causes a displacement of the whole of the hand to the inner side. This arm required an enlargement of the wound to let out pus, which developed after his general condition began to improve. His grip is good, and he is now able to get about on crutches. His nervous system, however, is very bad, and he will require careful treatment and management.

CASE IV.—A compound fracture near the level of the great trochanter has as yet failed to unite. There was a great deal of sepsis, which spread in front and behind into the buttock. It is due to the persistence of Dr. Joan Watts, who succeeded in overcoming the sepsis, by making repeated large incisions, that this limb has been saved. The Balkan splint has been of great service in this case, as the ordinary Liston's did not permit easy access to the wounds in this region.

CASE V.—Also a case of fracture near the great trochanter. He died three days after admission. He had repeated secondary

haemorrhages, and it was impossible to control them. The question of disarticulating at the hip was considered, but his general condition precluded all thought of his being able to stand such an operation. In view of reports of similar cases in the BRITISH MEDICAL JOURNAL, it probably would have been wise to have removed the limb through the fracture, tied the femoral artery, thus securing drainage and control of the haemorrhage, and when the condition of the patient permitted to proceed, if required, at a subsequent operation to disarticulate at the hip-joint.

CASE VI.—This limb was badly comminuted high up by a rifle ball which broke in the wound. It has united with the metal *in situ*, and the result is a shortened but quite useful limb. The recovery of useful limbs after these fractures is largely due to early and constant massage, which gives the patient mobile instead of stiff joints.

Fractures of Tibia and Fibula.

Three fractures of tibia and fibula were admitted.

CASE I.—A compound fracture of the right tibia and fibula. There was a reversed bullet in the inner side of the foot. The foot and leg were drained. Suppuration began in the ankle-joint. The general condition did not improve, and the limb was amputated through the middle of the leg. A good stump has resulted.

CASE II.—Also a compound fracture of the right tibia and fibula in the lower third. The patient had had multiple incisions made for the cellulitis of the leg. He required further incisions for drainage, but the limb has been saved. Unfortunately the union of both tibia and fibula which has taken place has not resulted in a good position. He continues under treatment, and will require further operative measures to remove sequestra.

CASE III.—A compound fracture of the lower end of the right tibia and fibula, with a large portion of the tibia blown away. There was a large gangrenous entrance wound in front of the tibia, and a large exit posteriorly in the lower third of the leg. Sepsis travelled upward between the gastrocnemius and soleus, and the flexors of the foot, and finally the ankle-joint became involved. The lower fragment of the tibia necrosed, and as the general condition was not improving, this limb was amputated just above the condyles of the femur, as, owing to incisions for drainage, good flaps could not be obtained. A good stump has resulted, which healed by primary union.

There were two cases of fracture of the tibia only. One case developed erysipelas, and was transferred to the fever hospital. The second case united well and in a good position.

There was one fracture of the head of the fibula; this will be described under tetanus.

Fractures of the Feet.

There have been five cases of fracture of the tarsal bones. One case was very interesting, as practically every tarsal bone was pulped except the os calcis. This, case, however, recovered, and although the foot was rigid and enlarged with callus, he had finally quite a useful foot.

There have been also six cases with fractures of the toes. Only in one case was it necessary to amputate a toe. These cases have all done well.

Nerve Injuries.

Two cases have shown temporary musculo-spiral paralysis after fracture of the upper third of the shaft of the humerus. Both ultimately recovered.

Two cases have paralysis of the extensors of the foot following bullet wounds, one through the thigh and one through the buttock, thereby injuring the sciatic nerve. In the latter case there was complete anaesthesia on admission, but sensation returned within ten days, and the motor movements are slowly returning and the foot-drop is lessening. All the extensors show movement. Faradism and massage have considerably assisted this good result. The former case, however, has not improved, and there is no doubt some sectioning of the sciatic nerve by the bullet.

Tetanus.

Two cases, both of whom died. Neither of these cases received a prophylactic dose of antitetanic serum on admission. It was at first our custom to give a dose in cases regarded as suspicious. Later, every case admitted, if a prophylactic dose had not already been given, received a dose of 1,500 units as soon as possible. None of the cases so treated developed any symptoms of tetanus.

CASE I.—Symptoms of tetanus developed on the eighth day after being wounded, and thirty-six hours after admission. He had a shrapnel ball in the left leg and a shrapnel wound in the right thigh, and a bullet had passed through the palm of the right hand. He also had paralysis of the extensors of the left foot, the ball having sectioned the popliteal nerve. The temperature on admission was 104° F. The first symptom of tetanus was a slight trismus of the jaws and difficulty in swallowing, reported at 8 a.m., but from his statement he himself noticed the symptoms six hours earlier, but he did not say anything about it. In fact, he had diagnosed his condition but did not wish to prolong his life. His wife and children had died recently under tragic circumstances, and

he stated he had nothing to live for. The treatment adopted for this case was the injection of 500 units of antitetanic serum into each side of the brain through a small trephine opening.* 3,000 units were also given subcutaneously. He recovered from the effects of the operation, and was quite conscious. During the day of operation there were no convulsions, and he was able to take liquids by the mouth. He was also given morphine gr. $\frac{1}{2}$ in his milk and chloretone gr. xxx in olive oil per rectum. The next day the temperature fell to 98°. The wounds were dressed under chloroform. As the temperature began to rise at 10 a.m., a further dose of antitetanic serum (3,000 units) was given subcutaneously. In the afternoon there were some severe general convulsions. Chloretone gr. xxx was again given per rectum; liquids were swallowed almost to the last. At 7 p.m. the patient developed symptoms of cardiac failure. Treatment with cardiac restoratives were of no avail, and he died at 7.45 p.m., on the third day after onset of symptoms.

CASE II.—The patient developed tetanus five days after admission—that is, on the eighth day after being wounded. He was wounded by a bullet, which passed through the left leg and then across into the right leg, lodging in the outer side of and fracturing the head of the fibula. The temperature on admission was 100° F. Both wounds in the legs were very septic, but that in the right leg was the worst, and the pus was fetid and foul. On the second day after admission the bullet was extracted through a fresh incision on a level with the outer side of the head of the fibula, the x-ray photograph and the localization done by Dr. Stoney greatly aiding this operation. Both wounds in the legs were freely drained. On the fourth day after admission—that is, the seventh after being wounded—it was noticed that he complained bitterly of sharp lancinating pain in the right leg when the dressings were done, and also the right ankle was held very rigidly.

On the morning of the fifth day after admission—that is, the eighth after being wounded—whilst taking his *déjeuner* he complained of stiffness in the jaws and difficulty in swallowing; also severe darting pain in the right leg. The tongue, on being projected, was also noticed to deviate to the right, and had a faint tremor. A diagnosis of tetanus was made. Within an hour he was taken to the theatre, and treated with 1,500 units of antitetanic serum intracerebrally under CHCl₃, forty minutes being taken over the injection. All the wounds were thoroughly cleansed, and around them was injected two drachms of 50 per cent. carbolic acid in glycerine. The temperature before operation was 99° F., and after 103.2° F. He recovered consciousness, but the spasms continued, and soon became generalized. Morphine was given on account of pain in the right leg.

The next morning the temperature fell to 98.2°, and rose in the evening to 100.6°. There were marked spasms in the right leg, and also of the throat muscles. Even with deep anaesthesia of chloroform an endeavour to pass the stomach tube to enable his being fed *per vias naturales* failed.

During the second day the spasms became generalized, but he was quietened with morphine and chloral gr. xxx in olive oil per rectum, and fed with nutrient enemata. The wounds were dressed under CHCl₃, and a further 1,500 units of antitetanic serum injected intracerebrally. Two drachms of 50 per cent. carbolic acid was injected around the wounds.

On the third day the patient's condition was much worse, and it was decided to amputate the right leg, with a hope of cutting off a further supply of toxins. The amputation of the right leg was performed through the middle of the femur. At the same time a further injection of antitetanic serum was given on the left side of the brain—that is, 1,500 units. A second attempt was made to pass the stomach tube, but failed owing to the tight spasm of the throat muscles. The wound of the left leg was treated with carbolic acid. He recovered consciousness from the anaesthetic, but, like Case I, died of cardiac collapse $4\frac{1}{2}$ hours after operation.

Notes.

From the experiences of the above two cases it would appear that antitetanic serum fails as a curative agent for tetanus. It probably has its place as a prophylactic.

A visit was paid to the local infectious diseases hospital (the Casino) of which Dr. Sainton is in charge. He has treated some 30 cases where the onset of tetanus occurred from the sixth to the thirtieth day after wounds were received. He reports that he has saved 25 per cent. of his cases. His opinion agrees with ours, that serum is of no avail once the definite symptoms of tetanus are established, and he has abandoned its use. The treatment he now uses is as follows:

The patient is kept as quiet as possible, and all active interference avoided save necessary dressings of wounds, and for them he only uses mild antiseptics, such as hydrogen

* The point trephined was found as follows: A line was taken from the external meatus across the vertex. From its mid-point a line was taken to the external angular process. This was divided in half. At this point the trephine was made. The serum was injected slowly. In Case II the trephine was not used, but simply a small hole bored with a large size drill straight through the skin and bone, and this permitted easily the insertion of the serum needle.

peroxide or potassium permanganate. Per rectum twice a day an enema of the following is administered:

Chloral	...	...	4-8 grams.
Eggs	...	...	1 or 2.
Milk	...	...	200 c.cm.

And also, subcutaneously, in the neighbourhood of the wounds, or if too much irritation is caused elsewhere, 40 to 80 c.cm. of a watery solution of 2 per cent. carbolic acid twice a day, these injections being continued for three to four weeks until every symptom has subsided.

This treatment has been adopted with considerable success in the other hospitals, including the chief naval hospital, L'Hôpital Marin, Cherbourg. There has been a great decrease in the number of tetanus cases brought to Cherbourg, due, no doubt, to the more prompt administration of a prophylactic dose of antitetanic serum given as soon as possible after the wounded are received into the clearing hospitals, and before being sent to the base hospitals.

If another case comes our way we shall endeavour to treat it upon the methods advocated by Dr. Sainton.

Dr. Sainton was also kind enough to point out the symptoms he regarded as indicating an onset of tetanus:

1. Elevation of the temperature out of proportion to the wound. Not always seen.
2. Greater pain, especially of a sharp lancinating character; also out of proportion to the wounds.
3. Slight fine tremor of the tongue and deviation, when projected, to one or other side.
4. Sometimes profuse sweating.

In regard to the last symptom, in Case II it was noticed by the anaesthetist at the time of the first operation that the patient came out in a profuse perspiration in the middle of the operation. It could not be attributed to the overheating of the theatre.

Case of Traumatic Aneurysm.

This man was shot through the right thigh, the entrance wound being on the inner side. The shell was removed after location by x-rays, and an extremely foul abscess opened. The man had severe pain. An arterio-venous aneurysm low down in Hunter's canal appeared requiring ligation of the femoral. A week later the thigh was amputated for secondary haemorrhage. On examining the limb the artery was seen to have developed a second small aneurysm just about the seat of ligation. The sciatic nerve was infiltrated with pus, accounting for the pain.

Some fifty pieces of shrapnel, bullets, and bullet coverings have been extracted, and for their extraction the x-ray work, especially the exact localization done by Dr. Florence Stoney, has been invaluable. The exactness with which the localization was done on many occasions saved the surgeons to whom fell the lot to make the search a vast deal of trouble, and also saved useless incisions. Another valuable thing the localization did was that useless searches were not undertaken—for instance, to search for a bullet well within the pelvis but giving rise to no trouble, and difficult of access. In only a few cases, however, were shrapnel balls or bullets not extracted.

Owing to the amount of sepsis quick healing was not usual. But as soon as good drainage obtained the cases healed. In five cases retardation of healing can be definitely ascribed to specific disease, and with the use of mercury and potassium iodide healing was hastened.

Medicated Sawdust.

We found that medicated pine sawdust was a valuable adjunct for clearing up offensive odours and cleansing gangrenous and septic surfaces. It is used put up in sterilized muslin bags, about 1 in. thick, and placed over the wound. Especially valuable it was found where there was a large lacerated surface. It is essentially an absorbent and cleansing agent, and acts much in the same way as repeated boracic fomentations, but it has the advantage that it does not require to be changed so often. It is a substance worth a trial wherever there is fetid pus, such as is too often seen in the wounds of the present war.

Summary of Eleven Amputations Performed.

Eight cases amputated through the femur: Four cases for suppuration in the knee-joint, two of whom died; one case for secondary haemorrhage and gangrene following ligation of the femoral artery; one case for compound fracture of femur, necessitated owing to secondary haemorrhage and general septicaemia of the patient; one case on account of tetanus, which died.

One case amputated below the knee-joint on account of suppuration in ankle-joint and general septicaemia.

One hand disarticulated at the wrist on account of gangrene.

One toe (phalanges of second digit).

Mortality.

Ten deaths have occurred out of 120 patients: 3 from general septicaemia following suppuration and shell in the knee-joint; 1 due to oedema of glottis—tracheotomy no avail; 1 from septic meningitis; 1 from suppurative peritonitis; 1 from secondary haemorrhage and septicaemia; 2 from tetanus; 1 from failure of respiration under CHCl_3 , due to cerebral compression from abscess in the right frontal lobe.

X Rays.

The x-ray localization was done partly by Mackenzie Davidson's method and partly by stereoscopic photographs. The accurate localization of projectiles proved very useful. The telephone probe was helpful with small pieces of metal, which would otherwise have been undoubtedly missed.

X rays showed the actual condition of fracture before and after being set, and one could watch the progress of healing. It is a point to note that necrosed fragments can be successfully diagnosed by the darker shadow they throw. Small pieces of bone get absorbed, but larger ones have to be removed by operation.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

"LYMPH LAVAGE" OF WOUNDS.

I BEG to bring to the notice of your readers a method of the lymph lavage treatment of wounds adopted by myself, as the result of my own investigations some two or three years ago. I have found it very successful, and it is apparently much simpler to use than the hypertonic salt solution now being brought forward.

The basal fact by which it produces a continuous lymph lavage depends upon the hygroscopic properties possessed by glycerine. If pure glycerine (specific gravity 1260) is exposed to the atmosphere it will absorb moisture from it. If exposed long enough 69 parts by weight will absorb 31 parts of water. It is then a eutectic mixture, being in a state of balance. If additional water is added it will evaporate back to the same proportion. Hence, if such a mixture be applied (on lint) to a wound, the temperature of which is about 98° F., whilst that of the atmosphere varies, say, from 40° to 80°, the warmer wound will evaporate a certain amount of the water; but this loss will be immediately made good by the glycerine absorbing a similar amount of water (lymph, etc.) from the wound below, and will thus maintain a constant flow of lymph to the dressing. By virtue of this property also the lymph is stopped from coagulating, and there is, therefore, no interference with its free exudation.

In order to prevent decomposition in the discharges, I add a little perchloride to the water which is used to dilute the glycerine. My practice is as follows: To make the solution, I take any given quantity of pure glycerine (specific gravity 1260) and add to it one-half its volume of a solution of mercury perchloride (1 in 1,000). This gives roughly a solution containing glycerine 2,000, water 1,000, mercury perchloride 1.

When dressing a wound, I wash it out with plenty of warm water (in my own case drawn from the common hot water supply of the house), suture the skin where it will meet easily, wash next with perchloride solution, and then wipe off the surplus moisture. I wring out some ordinary white lint with sufficient of the glycerine solution to leave it in a rather moist but not a dripping condition. I make this just sufficiently large to cover all the wound, and upon the top, and sufficiently large to overlap the margins of the wound by about 1 inch I lay a strip of oiled silk, and then cover this with a little more lint and bandage loosely. I leave it for twenty-four hours if much discharge is expected. In lesser wounds it may be left for forty-eight hours. The oiled silk is used to prevent