occupations and had only been in the army a comparatively short time.

Fifty per cent. of those cases which began with constriction of the blood vessels began first to show signs on the fourth day in the trenches, and 46 per cent. on the third day. The remainder had been working in wet trenches, gun pits, or wagon lines behind the lines, and wearing gum boots more or less continuously.

The following is the history of a typical case commencing with constriction of the blood vessels:

Pte. E. P., aged 26. In front line trenches eleven days. He wore long gum boots continuously during his stay in the trenches, as he had to wade knee deep through water to get to a bombing post, where he stayed two days. He then returned to the trench for two days and then had another day in the bombing post. During his stay in the bombing post he was ankle deep in water the whole time, and his clothing was soaked with rain during most of his stay in the trenches.

He had a change of socks the day after getting into the trenches, but they got damp after being worn a few hours in spite of the fact that he was wearing gum boots. He rubbed his feet for fifteen minutes each morning with whale oil. His feet began to give trouble after he had been in the front line two days, that is, on the third day. They first became numb and very white in appearance. This condition lasted about thirty-six hours. They then became very painful, red, and swollen, and the skin became very shiny.

This stage lasted about three days, after which the swelling began to subside. A day or two later the skin began to come away between the toes, leaving a raw surface, which healed rather slowly. The skin on the soles of the feet became wrinkled and loose, and finally peeled off, leaving the soles of the feet tender for some time afterwards.

A slight rise in temperature and some transient albuminuria was noted in the more severe cases. Cases of this class very closely resemble the milder cases of frostbite, and in their second stage are hardly distinguishable from the more severe cases of chilblains; however, there is no history of the feet having passed through the stage characterized by marked loss of sensation and vaso-constriction, and the affection is more likely to be confined to one foot. Blistering and excoriation of the skin are much less common and marked in the case of chilblains.

In some of the cases commencing with vaso-constriction, pain, which is worse at night and neuralgic in type, is marked and severe from the commencement of the complaint, lasting for some time after all signs of inflammation have disappeared and the patient is able to walk.

In a few cases the skin of the toes became livid and discoloured. These gave a good deal of trouble on account of the slowness with which ulcers that developed where the skin had been discoloured healed. None of my cases developed gangrene.

None of the cases of the first and second types suppurated or showed any inclination to do so, neither did any of them develop whitlow or teno-synovitis of the suppurating type.

About 5 per cent. of the cases had to be evacuated owing to the slowness with which ulcers healed. The ulcers were healthy, and only needed time to recover.

Those cases which commenced as chilblains did not show any signs of vaso-constriction, but almost immediately became red, swollen, and painful. They did not so frequently develop blisters and ulcers, and were more amenable to treatment.

Three cases sent to me as trench foot turned out be acute rheumatism.

The average time taken for the recovery in the vaso-constrictor type was about ten days; some, especially those which were sent early for treatment, recovered in five or six days, whilst the few that developed ulcers and similar lesions took five or six weeks.

Those cases which had had a previous attack were the most intractable, and one case, which had the scar of a large burn received in early childhood on the dorsum of one foot, gave a good deal of trouble on account of the slowness with which ulcers that developed on that foot healed.

Second and subsequent attacks of trench foot gave more trouble than first attacks, and men who had had one attack should be kept out of the trenches in winter if possible.

Prevention.

The preventive measures to be taken are now well known.

They consist partly of means taken to improve the surroundings of the men, draining trenches, the provision of

trench boards to enable the men to carry out their duties without being exposed to the risk of constantly wet feet.

The provision of waterproof coats to prevent their clothing getting wet in wet trenches, as constant exposure in wet clothing is bound to lower their resisting power to disease.

Special attention is paid to the daily massage of feet and legs with oil, and the provision of a daily change of clean dry socks.

Attempts are made to keep the inside of gum boots dry by the provision of special drying rooms, which as a rule are not very effective.

It is important that units should be relieved from their duties in the trenches as frequently as possible, as it is found that the number and severity of the cases increases in proportion to the length of time spent continuously in the trenches. This is due partly to the confinement and lack of exercise which trench warfare entails.

Treatment.

In those cases which developed in spite of precautionary measures, the following method of treatment in the early stages gave good results:

The patient was kept in bed and the affected parts were carefully covered with lint which had been saturated with spirit (methylated) and wrung out until nearly dry. The moist lint was carefully covered by waterproof material to keep it from drying too quickly, then with a layer of wool and fixed with a bandage. As the lint dried it was moistened and reapplied.

The main points in the use of this method are to take care that the lint is not too wet and that it is thoroughly covered by the waterproof material; if too wet the skin gets sodden, and if not thoroughly covered by waterproof material it dries out too quickly. This application acts as a vaso-dilator and aids in restoring the circulation. It also relieves the pain. It was used in both first and second types of cases with extremely good effect.

After the swelling had subsided massage was employed if the skin remained intact. Ulcers and excoriations were treated with the usual astringent and antiseptic lotions.

Good results in the few cases in which it was tried were got from the use of iodine in chemical combination with oil (liquid paraffin). This was used instead of plain oil for massage and seems worthy of a more extended trial.

In conclusion, the necessity for well fitting foot-gear and the importance of not allowing the use of any form of clothing which may interfere with the circulation through the lower limbs may be emphasized.

TREATMENT OF SECONDARY HAEMORRHAGE FROM THE BUTTOCK BY LIGATURE OF THE INTERNAL ILIAC ARTERY.

BY

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It is difficult to realize without having seen the tragedies associated with secondary haemorrhage how real they may be in connexion with wounds of the buttock. A brief glance at the anatomy of the part—the muscle mass, the distribution and anastomosis of the vessels after they emerge from under cover of the sacro-sciatic ligament—makes one pause to think.

The spread of sepsis in this area, the softened tissue, and the granulations render the task of the surgeon no easy one. Again, he is faced with the difficulty as to which vessel the bleeding is coming from. The haemorrhage is generally sharp, the patient is collapsed, and very little more will turn the scale against him.

Plugging of wounds has at all times been found unsatisfactory. The septic material is only dammed up and the condition of the patient rendered worse. A slow oozing persists, or the haemorrhage recurs after removal of the pack, and the patient, worn out by sepsis and loss of blood, finally succumbs. Saline packs—tablet and gauze—have been tried and are occasionally successful, particularly in the less serious type of case. Ligature of the bleeding point is, as in all other parts of the body, the method of choice, but is not always possible. To open up the buttock freely of necessity means a considerable loss of blood, and

even then one cannot always be certain of getting at the bleeding point, and this is particularly true if the vessels have been eroded in the region of the sacro-sciatic ligament and their ends have retracted within the pelvis.

It is here, then, that proximal ligation of a main arterial trunk, so exceptionally justifiable in other parts of the body, has a distinct advantage over other methods of treatment. It effectively controls the haemorrhage, and allows, if necessary, free opening up of the buttock without dangerous haemorrhage, while it does not in any way retard the healing of the parts involved. The hypogastric—internal iliac artery—is the main trunk of supply to the buttock, and is easily accessible in the pelvis. Ligation of this vessel was performed by Annandale for gluteal haemorrhages.

To reach the artery the transperitoneal route is selected, a rectus incision made, and the patient put into the Trendelenburg position. The common iliac artery is then easily identified, the posterior parietal peritoneum incised, and, with very little dissection, the internal iliac can be found just as it bifurcates from the common trunk. A double chromic catgut ligature is passed under the vessel and tied. The position of the ureter and vein has to be kept in mind, and care must be taken to secure the vessel before it divides. On the left side a little difficulty may be experienced, according to the position of the pelvic colon and its mesentery. The posterior parietal peritoneum is sutured with fine catgut, and the abdominal incision closed in layers.

The following cases are illustrative of the condition. A temporary plug was employed for a few hours to control the haemorrhage till the patient recovered from the initial shock.

CASE I.

Pte. W. H., aged 35. Wounded November 16th, 1916; admitted two days later. Gunshot wound of buttock. The patient complained of abdominal pain and tenesmus, and there was evidence of pelvic peritonitis; wound in buttock very septic. X rays showed two shell fragments lying in the pelvis.

Laparotomy: Free fluid in pelvis, much inflammation. Shell fragments lying in recto-vesical pouch; small tear of peritoneum of rectum, but gut not actually perforated. Fine catgut suture introduced; shell fragments removed; pelvis drained.

The patient improved steadily until November 30th, when he had a severe secondary haemorrhage from the buttock; controlled by pack; intravenous saline given. The right rectus was incised and the internal iliac artery ligated; the buttock wound was opened up, washed out, and lightly packed with eusol gauze; vessels found to be eroded at sacro-sciatic ligament in track of shell fragments.

There was daily improvement until December 5th, when there was a slight recurrence of haemorrhage. The wound was now quite clean and granulating well. A small branch of one of the lateral sacral arteries was found to be oozing; it was ligated with catgut. The patient made an uninterrupted recovery.

This case illustrates the rapidity with which collateral circulation can be established in the buttock.

CASE II.

Pte. S. P., aged 32. Wounded February 25th, 1917; admitted March 1st. Gunshot wound of left groin and buttock, with comminuted fracture of ilium. Shell fragments had been removed at the casualty clearing station, but the wounds were still very septic and were treated with eusol and saline.

On March 3rd, early in the morning, there was severe secondary haemorrhage from the left buttock; controlled by pack, and patient given pituitrin and saline. At 9.30 a.m. the left internal iliac artery was ligated. Pack removed from buttock and wound irrigated with eusol and explored with finger, but not opened up, as patient's condition was not good. Track went down to sacro-sciatic ligament in region of vessels; it was lightly packed with eusol gauze.

The patient made a good recovery; there was no recurrence of haemorrhage, and the buttock wound healed well.

CASE III.

Pte. G. E., aged 21. Wounded March 5th, 1917; admitted the following day. Gunshot wound of right thigh and buttock; wounds very septic. X rays showed shell fragment lying in region of sacro-sciatic ligament. Wound excised; foreign body removed, from close proximity to gluteal vessels; eusol gauze.

March 9th. Smart secondary haemorrhage; controlled by pack. Right internal iliac artery ligated. The buttock wound was opened up and clot washed out; vessels eroded at point of emergence from under cover of sacro-sciatic ligament; light pack of eusol gauze introduced.

The patient made an excellent recovery; there was no recurrence of haemorrhage, and the buttock wound cleaned up and healed well.

CASE IV.

Pte. W. H. (Prussian Infantry). Wounded April 3rd, 1917; admitted April 6th. Entrance and exit wounds of right buttock in line of gluteal vessels; wounds mildly septic—opened and drained.

April 9th. Smart secondary haemorrhage in early morning; controlled by pack, and patient given pituitrin and saline. At 9.30 a.m. the right internal iliac artery was ligated; buttock wound opened up—much septic clot, muscles soft and friable, gluteal vessels eroded and ends retracted under the sacro-sciatic ligament. A light pack of eusol gauze left in buttock wound.

The patient made a complete recovery; there was no recurrence of haemorrhage, and the wounds healed well.

CASE V.

Driver J. W., aged 25. Wounded April 28th, 1917; admitted May 1st. Gunshot wound of left buttock. Large entrance and exit shell wound which had been excised at the casualty clearing station. Track of wound crossed line of gluteal vessels. Wounds very septic, edges gangrenous. Treated with Carrel's tubes.

May 3rd. Severe secondary haemorrhage in early morning; controlled by pack, and patient given pituitrin and saline. 9.30 a.m.: Intravenous saline given; left internal iliac artery ligated. Clot washed out of buttock wound—vessel found, eroded beneath sacro-sciatic ligament; saline pack introduced into buttock wound. Dressed on the third day—buttock wound now clean and granulating. General condition of patient much improved. There was no recurrence of haemorrhage; the buttock wound granulated and healed well.

FRAGMENT OF SHELL IN THE ARTERIAL CIRCULATION.

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THE following interesting case is put on record owing to the great rarity of the condition and its interest from a radiological point of view:

Sgt. P. was wounded at 7 p.m. on August 7th, 1917, and was admitted to a casualty clearing station on the morning of August 8th in a very collapsed condition with a running pulse of 128 a minute and wounds in the left posterior axillary line, fifth interspace, left lumbar region, and left thigh. On admission the patient was too ill for a thorough clinical examination of the chest, but it was found that the heart was not displaced and that there was well marked pericardial friction.

On August 10th the patient was moved to the x-ray room and screened. It was then found that the shadow over the left chest was uniformly obscure and dense, and practically no movement was seen in the left diaphragm, which was depressed and flattened to an obtuse angle. The right chest and diaphragm were normal in appearance. The most striking picture was seen in the cardiac region. The shadow of the heart was much to the right of the mid-line, which would be expected with a large haemothorax which gives the picture of a combination of great obscurity of the chest, depression and fixation of the diaphragm on the affected side, with dislocation of the heart shadow to the unaffected side. However, in this instance not only was the heart shadow more to the right than normal, but it was increased in breadth, and was globular in shape. The cardio-hepatic angle was obtuse and the muscle of the right side of the heart could be differentiated from the extreme edge of the heart shadow, and the diagnosis of pericardial effusion was made. About one inch above the base of the heart and two inches from the right border and two and a half inches deep, a foreign body was made out within the heart shadow with an extraordinary movement. The black shadow of the foreign body, some 2 cm. long with a maximum breadth of 0.6 cm., could not be separated from the heart shadow whatever the incidence of the x rays. The movements seen were a downward movement with the mediastinal respiratory movement, a lateral movement with systole to the right, and a flail-like movement, with the base of the flail to the right side. These movements were synchronous with the heart beats, giving a curious rotary effect. The diagnosis was then made that the foreign body was within a chamber of the heart, probably within the left ventricle, and had one end of it fixed under a valve flap. Half an hour after returning to the ward from this examination the patient called attention to his left leg, which was found to be blue in colour and cold from above the knee to the foot. One hour later the leg appeared to be normal again.

On August 11th the wounds in the left lumbar region and left thigh demanded urgent surgical interference owing to the development of signs of gas gangrene, and on his way to the operating theatre the patient was again screened with a view to more accurate localization of the fragments in the thigh and lumbar region. His chest was also screened, and although otherwise the picture was identical no trace of the foreign body in the heart could be seen, and on rapid examination of the course of the thoracic and abdominal aorta it was found that the missile must have passed through the aortic valve and was lying in the abdominal cavity 2½ in. deep from the anterior abdominal wall, 1 in. below and 1 in. to the left of the umbilicus. No movement was seen and the foreign body was apparently