Description of Cardiac Wounds.

The pericardium showed an entrance and an exit wound over the right ventricle. On opening the sac a small piece of khaki cloth was found, together with a small quantity of clotted and fluid blood. The pericardium presented the appearance of early pericarditis. The left ventricle was distended, but the right was partially collapsed, and near the centre of its anterior surface was a small circular wound of entrance which passed obliquely through the muscle to a wound of exit very near to the right border of the heart; an interval of an inch separated the two wounds, and round each was a small circular area of bruised tissue. The right ventricle was opened posteriorly and found to contain some very bright red blood clot. No wound was visible from the interior, and on passing a probe it was found that the wound passed through one of the lacunae between the pillars of cardiac muscle, having just penetrated the ventricular cavity.

The cause of death was severe haemorrhage, complicated with pulmonary collapse and interference with the heart's action. The enormous amount of blood in the pleural sacs came from the heart; the lung wounds were not capable of causing much haemorrhage. With each systole some blood would be forced through the small openings in the right ventricle into the pericardial sac, and from there blood would ooze through the pericardial openings into the pleurae. There was no attempt at closure of the openings by clot. Their small size accounts for the length of time the patient survived.

The occurrence of pericarditis and pleurisy (the latter being curiously localized) showed the beginning of an infective process.

The wounds of the left lung were no doubt closed by blood clot, while that of the right was kept open by the shrapnel on the surface causing collapse.

An x-ray photograph of the specimen was taken by Captain F. H. Gibson, R.A.M.C., and no foreign body other than the one described was found.

The specimen has been sent to the War Museum of the Royal College of Surgeons, London.

WHITE GANGRENE.

BY

MAJOR A. J. HULL, F.R.C.S., R.A.M.C.

In addition to gas gangrene and gangrene due to direct interference with the blood supply, septic gunshot wounds may be attacked by a very acute infective process which is a form of gangrene. The condition appears to be an acute streptococcal infection, and is, in appearance, not unlike phlegmasia alba dolens, but is attended by the local circumstances associated with gangrene and the general effects of an acute toxæmia.

This form of gangrene has only been seen in the lower extremity.

The skin is glazed and white, moist, cold, and pits on firm pressure. A very firm oedema is present, and the distal pulse in the limb cannot be felt. The glazed white appearance of the distended skin, instead of the usual redness, seems particularly characteristic. Early in the condition the patient is extremely ill, with clammy, sweating face, and running pulse. The condition is extremely fatal, and death occurs in about twelve hours. The infection is so rapidly fatal that little change in the colour of the limb has been noticed. In those cases which have survived somewhat longer, it has been found that, during the last few hours, the limb has become mottled black and the discharge exceedingly foul. No gas has been noticed in the discharge, and no crackling has been detected in the tissues. The appearance is somewhat suggestive of deep-seated pus, owing to the tension of the skin, but, on making an incision into the limb, the wound merely oozes serum.

In the more severe and extensive forms the infection is so severe and the patient's condition so serious that no treatment appears practicable.

Amputation gives the only chance of recovery, and is successful when the infection is more localized, as happened in Case I.

White Gangrene of the Leg.

CASE I.—Pte. S., wounded March 9th with rifle grenade, dressed at field ambulance and transferred to base. Shell wound of left leg with comminuted fracture of upper third of tibia and fibula, and flesh wounds in the region of knee. Leg swollen and white, extending well up to thigh, and looking like

phlegmasia alba dolens. Foot cold, and no pulsation to be felt in distal vessels of ankle; wound foul with sanious discharge; temperature 102°, pulse 124. Bacteriological examination showed streptococcus. Amputation through lower third of thigh; recovery (Lieutenant S.'s case).

CASE II.—Pte. L. was shot through the calf on September 24th and admitted to a base hospital on September 25th. There was a small wound of entrance and a wound of exit the size of half a crown, through which muscle bulged; the leg was white, the skin tense and cold. Incisions, 3 in. long, were made on each side through the bullet track, capillary bandages were inserted, and continuous saline irrigation applied. The next day the skin was much more swollen, it pitted on firm pressure, and had the appearance of a limb containing deep-seated pus but was white in colour. Very little pus came from the wounds; a thin, foul-smelling discharge exuded. The patient's temperature was 103°; he was restless, and his general condition was very much worse. Numerous incisions were made into the subcutaneous tissue. The patient's condition did not improve, the pulse became rapid, shock was very pronounced. The limb turned blotchy black and was extremely foul. The usual remedies were employed, including rectal saline injection. The patient died eight hours after the second operation.

CASE III.—Cpl. W., admitted to hospital suffering from a shell wound of thigh. There was a compound fracture of femur and severe destruction of the knee-joint. The wounds had been cleaned and dressed with cyanide gauze at a clearing station. About fifty-six hours after the injury the patient had a rigor. His temperature rose to 104° F.; vomiting and collapse occurred. The limb became cold and no pulse could be detected. The skin was white in colour, and a firm oedema rapidly occurred in the whole limb. No crackling was present, indicative of gas. The patient's condition did not admit of surgical interference, and he died twelve hours after the appearance of the gangrene. Bacteriological examination discovered streptococci in the blood and in the discharge from the wound.

SIMPLE AND INEXPENSIVE METHODS FOR FERMENTATION TESTS AND FOR OBTAINING CULTURES OF ANAEROBES.

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In most bacteriological laboratories the work during the war has been very much increased, and with the increased cost of apparatus and media various devices have had to be employed to reduce expenditure. It may, therefore, be of interest to record two methods which I am using, and which are simple, inexpensive, and, at the same time, efficient.

1. For Fermentation Tests.

For these I use small test tubes, which can be made in the laboratory from ordinary glass tubing of $\frac{1}{4}$ in. or $\frac{3}{8}$ in. diameter. Introduce into these tubes about $\frac{1}{2}$ c.cm. of any of the sugar media. These tubes, plugged and sterilized in the ordinary way, are inoculated with the organism whose reaction is to be tested, and then some sterilized vaseline, which has a melting point of about 55° C., poured into the tube. The vaseline solidifies and forms a plug, lying in contact with the fluid media. The tubes are then incubated in the ordinary way, and where gas is formed the vaseline plug is pushed up in the tube, and, if the media is cold when inoculated, there is sufficient absorbed oxygen to allow the free growth of the organism and to allow the reddening (the acid reaction) to show. In twenty-four hours, with the ordinary acid and gas-producing members of the typhoid-coli group, the reactions are very definite. Later, reduction takes place and the media becomes colourless, but if a hole is bored through the vaseline plug to allow ingress of air the red reaction reappears in a few minutes, starting at the upper part of the media and gradually spreading downwards. This method is simple and inexpensive, and it has the added advantage over the ordinary method that small quantities of gas, which may not be indicated by the ordinary Durham tube method, are always detected, the gas showing as small bubbles at the lower part of the vaseline plug. The method may be used for accurate estimation of the amount of gas produced by any given organism.

2. For Anaerobic Cultures.

Ordinary test tubes containing peptone broth or glucose peptone broth are used, and for the common anaerobes I find the peptone broth quite satisfactory. Melted sterilized vaseline is poured into the tube till it forms a