NOTE BY DR. KEITH.

It was fortunate that one with so sharp an eye as Lieutenant West was at hand when the discovery was made, for it would have been easy for a casual observer to have overlooked the nature of the cranial fracture. I have shown the flint flakes found with the remains to Mr. Reginald Smith, of the British Museum, but they are not sufficiently characteristic to give an accurate date for the burial, which may be assigned to any point of a period extending from the Neolithic almost to Roman times. The posture of the skeleton and a comparison with other discoveries of a like nature lead one to assign it to the Bronze period, or perhaps a late Neolithic date. As Lieutenant West has inferred, the skeleton is that of a young man; his epiphyseal lines have just closed; his teeth are unworn. They are massive teeth, showing a slight degree of irregularity in implantation and a certain degree of contraction of the palate. Contraction of the palate, so common in our modern population, is unknown amongst the ancient British. Nor is Lieutenant West's warrior an exception; the contraction is only apparent, not real, for it is due to the massive teeth being implanted on a palate of more than average dimensions.

As regards head-form, Lieutenant West's warrior has the character of the British of Neolithic period. The skull is comparatively a small one: its maximum length is 184 mm.; its greatest width 136 mm.; its cephalic index 74—long-headed. The height of the vault above the ear-holes 120 mm.; the cranial capacity 1,420 c.cm. From the femur and other bones the stature is estimated to have been about 5 ft. 2 in. (1,658 mm.). The bones are remarkably slim; those of the thigh and leg show extreme flattening. Details of all of these characters will be placed on record in the *Journal of the Royal Anthropological Institute*. The remains may be inspected at the Museum of the Royal College of Surgeons.

ON THE SALT PACK TREATMENT OF
INFECTED GUNSHOT WOUNDS.

BY

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AND

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THE method of dressing wounds with a firm pack of gauze and sodium chloride tablets, devised by Colonel H. M. W. Gray, C.B., combined with a preliminary free excision of the wound and lacerated and infected tissues, has in our hands given results which have effected revolutionary changes in our methods of treatment. During the last twelve months it has gradually supplanted other methods of treatment, until now we employ it in the majority of cases. At first we regarded it with suspicion and used it but half-heartedly; finding, however, that wounds dressed in this way became clean at least as speedily as those treated by other methods, and that the general condition of the patients improved owing to undisturbed sleep, increase of appetite, and absence of mental apprehension of frequent painful dressings, we ended by becoming complete converts to the method.

The operative details in connexion with a wound naturally vary with the site, nature, and degree of infection of the wound.

For example, wounds of the buttock by shrapnel ball or shell are invariably laid open in their whole extent. If there are separate entry and exit wounds they are joined by an incision dividing the glutei down to the track between them. Foreign bodies are removed and the necrotic tissue lining the track excised. Bleeding points are tied with catgut, and after examination for bony or visceral lesions a salt pack is applied. Such a wound is often ready for suturing within ten days to a fortnight.

Wounds of Limbs.

The superficial wound if small is excised so that it will admit a finger. The full extent of the wound is then determined as far as possible by digital examination, and unless essential structures are involved the whole area is laid open, all pockets being exposed to the end. Foreign

bodies, including pieces of cloth and blood clot, are carefully searched for and removed, and all necrotic tissue cut away with scissors until a freely bleeding surface remains. If the deep fascia or superficial muscles tend to come together and close the mouth of the wound sufficient tissue is excised to ensure that, when the salt pack is in place, the mouth of the wound will be widely open. A conical wound not requiring the use of drainage tubes is thus produced.

Where there exist entry and exit wounds and their junction would involve the sacrifice of essential structures, such as a large motor nerve, two conical excisions with their apices meeting in the centre of the track may be made and a pack applied at each end.

In all cases side tracks and pockets are opened up so that they may be packed to the bottom. Where a fracture exists, fragments, unless small and completely detached, are not removed. These proceedings are not really so heroic as at first sight may appear, for, first, most of the muscle excised is infected, and secondly, it has been shown that muscular tissue even though not infected has lost its striation and contains haemorrhagic areas for a considerable distance around a gunshot wound. Such muscle will not regain its function and will ultimately be replaced by fibrous tissue. Fascia and tendinous structures are badly supplied with blood and invariably slough when exposed in infected wounds. They should be cut away at the primary operation. On the other hand, the sheaths enclosing intact muscles should not be unnecessarily opened. When infection is confined to a single muscle it is sometimes advisable to remove the whole belly in its sheath, for instance, the rectus femoris or one of the hamstring group. Thrombosed veins should be dissected out to their full extent and excised.

With the exception of iodine for the skin we do not apply any antiseptic to the wound.

The wound having been thus prepared the salt pack is applied in the following manner. A piece of plain gauze, four to six layers thick, is lightly wrung out of 5 per cent. salt solution and carefully laid in the wound so that it is in contact with the whole of the surface. Care should be taken that this sheet of gauze is sufficiently large to cover the whole surface of the wound. If several smaller overlapping pieces are used, small spaces in which pus collects form at the lines of junctions and there is also great danger of the pieces being displaced when the rest of the packing is inserted, thus leaving bare surfaces. When the wound is a deep one the gauze lining is carefully carried down by the fingers within it to the deepest recesses of the wound. No spaces should be left, as they rapidly fill up with pus. A few 40 grain tablets of salt* are now placed in the deepest part of the wound, or, if the wound is flat, placed on the surface of the gauze about an inch apart. The interior of the gauze-lined wound is now firmly packed, somewhat in the manner of the old-fashioned petticoated tube, with a roll or long strip of gauze moistened in the same way. This strip is carried alternately from one end of the wound to the other and numerous tablets of salt are laid between the successive layers. A handful of tablets should not be thrust in all together, as when they dissolve a cavity is formed. For a wound 4 in. long by 3 in. deep ten to twenty tablets would be used. When the pack becomes flush with the skin surface a few more layers of gauze are applied and over that a thick wool dressing, composed of at least three layers, completely encircling the limb. The whole is then firmly bandaged, so that the surface of the wound is kept in intimate contact with the pack, and all spaces which tend to form are obliterated. Really firm pressure should be used both in applying the pack and in bandaging. The elasticity of the thick wool dressing distributes the pressure and effectually prevents anaemia of the wound surface and congestion of the limb below.

Where a compound fracture is present it is not usually possible to avoid leaving spaces between and around the fragments of bone, and therefore in such cases, after placing the lining sheet of gauze, a large rubber tube is introduced down to the fracture and the remainder of the gauze and tablets packed around it. This serves to prevent the tracking of pus along the bone. A hole cut in the lining gauze allows any discharge to gain free access to the tube.

* These tied up in convenient numbers in small gauze bags may be sterilized along with other dressings in the autoclave.

We have frequently packed on to exposed main arteries, such as the femoral, brachial, and subclavian. In no case has the vessel given way, but we have been careful to interpose a rather greater thickness of gauze than usual between the hard tablets and the vessel. If a salt tablet comes into direct contact with the tissues it causes a necrotic area a little larger in diameter than itself, but quite superficial, its depth being not more than a millimetre. This is really of little importance, as it disappears by the next dressing, but is better avoided. It appears to be quite safe to pack on to exposed surfaces of bone.

During the first twelve to twenty-four hours a copious exudation of serum occurs, soaking the gauze, wool, and bandage. After this no further exudation usually takes place, and, if the dressings are inspected during the next four or five days, they are generally discovered to be quite dry. As soon as the outer layers of the dressing become moist a packing of fresh sterile wool is placed outside without removing the bandage.

It is important that the wound should be kept at rest. In large wounds of limbs we employ a splint, but in smaller wounds the nature of the dressing, with its firm bandage and the fact that the serum-soaked outer gauze dries into a hard mass of the consistency of a starch bandage, renders a splint unnecessary.

After dressing, morphine tartrate grain $\frac{1}{4}$ is usually given, as most patients complain of pain for a few hours. In many cases, however, the pain is quite slight, and no analgesic is necessary. In the few cases in which pain has persisted exposed sensory nerve endings have been discovered, and these may be cut short under novocain. Successive dressings become less painful, and after the second an analgesic is usually unnecessary. A rise of temperature and increase of pulse-rate usually follows the manipulations, but unless these persist after twelve to twenty-four hours no apprehension need be felt.

In the behaviour of the temperature and pulse the cases fall into three main classes. In the larger number the temperature and pulse-rate fall to normal on the second day and remain so, except for temporary slight rises following the first dressings.

In another class the pulse-rate comes down at once, but the temperature comes down by lysis, taking four or five days to reach the normal. In a comparatively small number of cases, although the pulse-rate remains below 90, the evening rise of temperature may persist for one or two weeks, although the wounds when dressed appear clean and free from retained pus.

The pulse-rate and general condition of the patient is a much better index of the well-being of the wound than the temperature.

After a few days the outer dressings may acquire a very offensive odour. This is due to decomposition in the dressings themselves, and if they are removed the wound is found to be perfectly sweet. The outer dressings are more offensive than the inner. At one time we changed the outer dressings when they began to smell, leaving the packing in the wound untouched. The objection to this is that it is difficult to change the outer dressings without disturbing the deep pack. We then used various substances, such as sanitas powder, potassium permanganate, and cupad powder, thickly dusted on the dressing immediately beneath the outermost layer of gauze. All these diminish the odour. With Dakin's chloramine-T powder, which we are now using, all odour is practically abolished. Mixing chloramine-T tablets with the salt tablets in the deeper dressing was found to be unsatisfactory, as it did not prevent the smell.

The Normal Favourable Course.

The course of events in an ordinary, fairly severe, infected wound of the soft part is as follows: After excision and packing the dressing is untouched for five or six days; the wound is then dressed, usually under an anaesthetic. In the majority of cases the pack is now loose, and the dressing comes away as a whole. The surface of the wound is covered with a yellow fibrino-purulent exudate, with here and there a few small yellow sloughs where damaged muscle or aponeurosis has been incompletely removed. A small amount of creamy yellow "laudable" pus is seen in the wound, quite different in appearance from the original brownish stinking anaerobic pus. If the surface of the wound is swabbed, some of the exudate is

removed, exposing a readily bleeding surface underneath. The muscle is no longer oedematous and does not project beyond the skin surface, which is quite healthy and shows no sign of surrounding inflammation. The skin is swabbed with iodine and a fresh salt pack is applied, smaller in dimensions than the primary one. The pressure of the wound surface against the gauze pack is re-established when the firm bandage is applied. This dressing is changed in another five or six days and the whole surface of the wound is now seen to be covered with brilliant red, easily bleeding granulation tissue, all sloughs having separated. If some areas are not yet clean, another pack is inserted, otherwise the wound may be brought together with strapping or may be sutured. The majority of wounds of soft parts are ready for closure within three weeks. Some have been closed as early as the tenth day. The time which is required before a wound is in a fit state to close varies in accordance with the nature of the tissues exposed. Thus muscular tissue rapidly becomes clean. Tendinous and fascial sloughs take longer to separate. Pieces of dead bone take so long that it is inadvisable to close a wound complicated by a fracture.

Indications for Changing the Pack.

Indications that the wound is not doing well and that the pack must be changed are:

1. A continuously rising pulse-rate.
2. Increasing oedema in the limb.
3. Sudden onset of severe pain. This generally means spreading gas infection.
4. A persistent rise of temperature for which no other cause can be found.
5. A change for the worse in the patient's general condition in cases in which a raised temperature has persisted from the beginning.
6. Oozing of pus from under the edge of the dressing. This is generally due either to the dressing having been left unchanged too long, or having been too loosely applied.
7. The dressing must be reapplied when the pack has become loose from diminution in the circumference of the limb as oedema disappears.

Some Other Details.

Where the innermost layer of gauze is found to be firmly adherent to the wound surface it is not removed, but a new pack is applied within it. If it is removed bleeding is caused, the protective barrier is broken down, and a rise of temperature takes place.

When once the wound is granulating healthily it is not advisable to continue the salt pack, as the granulations become exuberant, pale, and oedematous. If the wound cannot be closed, any of the simple dressings should be applied.

Occasionally a wound becomes sluggish, even during the separation of sloughs. A change from the salt pack to a dressing of gauze soaked in pure glycerine usually causes a rapid change for the better. Where a wound is not doing well with a salt pack, and a pure streptococcal infection is present, the use of a 1 per cent. salt solution as a wet dressing, continuous irrigation or bath will sometimes be found to effect an improvement.

CONCLUSIONS.

The salt pack has given very good results with flush amputations and in excised joints. It appears to be of great value in field ambulances and clearing stations, as in time of stress it may be impossible to renew dressings for two or three days. Those cases we have received from clearing stations in which the treatment has been thoroughly carried out have arrived in excellent condition, and contrast very favourably with those treated by other methods. Cases treated by eusol irrigation, however clean they may be when leaving the clearing station, often have their wounds in an unsatisfactory state on arrival at the base twenty-four hours later.

Our advocacy of this method of treating wounds is based entirely on our clinical experience, and we do not in this place advance any theories to explain its action. It is based originally on the well-known work of Sir Almroth Wright.

Cases.

The following cases are given as examples of different types of wounds. The list might be extended manifold:

CASE I.—Wounds of Right Leg and Left Thigh: Gas Infection of Both Wounds.

Pte. B., admitted May 25th, 1916. Small superficial entry wound in left calf running deeply in, with a tube in it. Calf greatly distended and bubbling with gas, skin bronzed. In front

CHART 1.—Case I. B, On admission, operation, morphine gr. 1/2. R, Repacked. C, Redressed; strapped.

of outer side of left thigh was a wound the size of a shilling; great oedema of muscles, stinking pus and gas oozed out.

Operation.—Wound in calf of leg laid widely open—much infected muscle cut away and a cavity 6 inches long down to the bone left and packed with salt and gauze. The left thigh treated in same way. Patient collapsed, jaundiced and vomiting; put on "dangerous" list. May 26th, 1916: Temperature

CHART 2.—Case II. E, Operation; packed. R, Repacked. A, Redressed.

102°, but pulse 86 only. Still vomiting. *B. perfringens* grew freely from pus. May 27th: Great improvement; temperature 99.2°; eating well. June 1st: Repacked for first time; much cleaner. June 9th: Redressed; quite clean and granulating; wound strapped. June 13th: Sent to England practically healed. (See Chart 1.)

CASE II.—Wound of Thigh: Gas Infection.

Pte. W., admitted May 11th, 1916, with deep wound on outer side of left thigh. A tube had been put deeply into muscles of thigh, where it was tightly grasped by swollen muscle. Thigh much swollen up; very tender and bronzed. Tube removed, and much stinking gassy pus came away. Wound excised freely. Gauze and salt pack applied. May 14th: Comfortable; thigh now not swollen; much smaller, so that bandages and pack are loose. Repacked without anaesthetic. May 19th: Redressed; wound clean and granulating. Strapped across and sent to England next day. (See Chart 2.)

CASE III.—Wound of Left Buttock.

Pte. C., admitted April 28th, 1916. There was a penetrating wound of left buttock, with entry and exit wounds at upper and lower margins and a space between of 7 in. Great oedema and redness. April 29th: Track laid open in its full length. Full of foul pus and necrotic tissue. The wound was about five inches deep in the centre when all muscles were divided. Firm salt pack applied. May 2nd: Redressed; cleaner; *B. pyocyanus* present; repacked. Temperature to 101° each night,

but pulse keeps about 90. May 6th: Repacked. May 12th: Pack out; clean and granulating; strapped across and to be dressed daily. May 14th: Sutured with deep stitches; small bit of rubber tissue drain at angle. May 20th: Good union; stitches out. Corner where drain was, not quite healed. Rest of wound entirely healed. Corner strapped. To England. (See Chart 3.)

CASE IV.—Shell Wounds of Leg and Arm: Gas Infection.

Pte. S. Two wounds outer side of leg; gassy herniating muscle; whole limb from foot to knee swollen to nearly twice the size of its fellow. Wound of Forearm: X ray shows two pieces of shell in arm and two in leg. May 27th, 1916: Immediate operation; wounds of leg excised and enlarged; much sloughing muscle tissue excised. One foreign body removed through lower wound; the upper piece of shell through a counter incision on inner side of leg. It had passed through tibia and fibula. This wound also was made conical. Numerous half-inch incisions into subcutaneous tissues were made all round the leg from foot to knee. Salt packs to all three wounds. Wound of arm not badly infected. Shell fragment removed; salt pack. May 31st: Repacked; wounds covered with yellow slough. June 5th: Repacked; oedema gone, wounds cleaner. June 12th: Repacked; upper leg wounds looking cleaner; some slight oedema in lower wound. June 15th: Put on daily glycerine dressings, as granulations were looking pale. The deeper part of wounds closed and wounds almost flat. June 20th: Sent to England.

CASE V.—Wound of Thigh: Septic Thrombosis of Saphena Vein.

Pte. R. March 9th, 1916: Admitted to eye wards. Right eye blind; much chemosis; wound of lower lid; septic wound of right thigh. March 12th: Transferred to surgical division. Wound below eye reopened; piece of shell removed from below and behind globe. Entry wound on outer side of thigh excised. A conical excision of infected sloughing muscle down to femur. The track passed behind the bone. Two pieces of shell removed

CHART 3.—Case III. E, Operation; packed. R, R, Repacked. C, Redressed; strapped. S, Sutured. F, Stitches taken out.

through a counter incision on inner side of thigh. Femoral artery not felt. Salt packs to both wounds. March 17th: Right eye excised as orbital cellulitis persisted. Wounds of thigh dressed; some more sloughing muscle removed. The internal saphena vein was thrombosed, and contained pus from within an inch of the saphenous opening to near the knee. It was tied at both ends and dissected out. A deep branch under the deep fascia was thrombosed and was removed. Salt-pack dressing. March 20th: A small haemorrhage occurred into a

CHART 4.—Case VI. O, Operation. D, D, D, Dressed (anaesthetic). W, Dressed without anaesthetic.

wound on outer side of leg. Clot turned out, and bleeding point in muscle tied. Wounds cleaner; packed. March 30th: Repacked; wounds granulating. A few small tendinous sloughs to separate. April 6th: Repacked; wounds quite clean and granulating. April 20th: The patient was sent to England, the wounds now being small, and rapidly closing.

CASE VI.—Shell Wound of Thigh.

Pte. B. March 13th, 1916. Very offensive wound through back of lower end of thigh between femur and hamstrings. No vessel or nerve injured. Entry and exit wounds enlarged. Much sloughing muscle excised, two funnel-shaped wounds meeting behind femur being thus made. A piece of shell was found and removed. Salt packs to both wounds. March 16th: Dressed under anaesthetic. More sloughing muscle excised.

CHART 5.—Case VIII. o, Operation. D, D, Dressed (anaesthetic). w, Dressed without anaesthetic.

Salt pack. March 20th: Dressed under anaesthetic; wounds quite clean. March 25th: Dressed wounds covered with healthy red granulations and much smaller. Redressed on April 1st, 4th, and 8th. Sent to England with wounds almost healed. (See Chart 4.)

CASE VII.—Compound Fracture of Humerus and Rib.

Pte. G. December 28th, 1915. Wound of arm enlarged. Sloughing muscle excised down to fracture of middle shaft of humerus. Wound 4 in. long. Bone not much comminuted. Salt pack and Delbet splint. Wound of chest wall also excised and part of fractured tenth rib removed. Wound of arm was redressed about every five or six days. It rapidly became clean, and patient went to England on February 6th, 1916, with firm union of bone and a small superficial granulating wound. The bullet, which was not seen in the skiagram of the chest, was afterwards discovered under the skin of the loin, and removed under novocain. The temperature and pulse-rate remained normal after the first few days.

CHART 6.—Case XI. o, Operation. R, R, R, Repacked. c, Redressed; strapped.

CASE VIII.—Perforating Wound Buttock to Groin: Femoral Artery Exposed.

Pte. F. March 15th, 1916. One wound on inner side of thigh just below scrotum, one on outer side of buttock. Both about 1/2 in. in diameter and exuding stinking pus. Immediate operation. Both wounds freely opened up; large cavity beneath wound on inner side with femoral artery exposed in its roof. Outer wound revealed sciatic nerve partly divided. Wounds salt-packed after excision of all sloughing muscle. Foot put on splint at right angle as paralysis of all leg muscles was complete. March 20th: Repacked; yellow pus. March 25th: Repacked; wounds covered with bright red granulations. April 1st: Dressed without anaesthetic. April 8th: Sent to England with wounds rapidly closing. (See Chart 5.)

CASE IX.—Wounds of Thigh: Femoral Artery Exposed.

Pte. S. March 5th, 1916. Septic wound of left groin 3 in. long. Superficial wound excised. Track passed backwards for 4 1/2 in., deep to the adductors. Common femoral artery exposed but not injured; some sloughing muscles excised; salt pack. A second wound on outer side of thigh with septic herniating muscle was excised; wound penetrated vastus externus; salt pack. March 10th: Wounds repacked. Yellow pus instead of dark brown anaerobic pus. March 15th: Repacked; wounds granulating and clean. April 8th: Patient sent to England, wounds rapidly closing after strapping.

CHART 7.—Case XIII. o, Operation. R, R, Repacked. A, Redressed.

CASE X.—Compound Fracture of Ulna and Radius: Gas Infection: Thrombosis of Median Basilic Vein.

Pte. I. March 25th, 1916. Three septic wounds, one in ante-cubital fossa, one on inner and one on outer side of forearm. Rubber drainage tubes protruding, tightly gripped by herniating gassy muscle. Much swelling and oedema. X ray showed fracture of both bones not involving elbow-joint. Ulnar anaesthesia and paralysis.

Operation.—Wounds opened up, median basilic vein thrombosed and removed. Gangrenous muscle excised; salt pack to all wounds. Put up in Thomas's arm splint fully supinated. The ulnar nerve was seen to be bruised and partly frayed. April 1st: Dressed; no spread of gas; yellow pus. April 7th: Repacked, wounds much cleaner. Some red, easily-bleeding surfaces seen; still some sloughs. April 14th: Repacked, wounds clean. April 20th: Redressed without anaesthetic. Wounds clean and much smaller. May 6th: Sent to England with wounds nearly healed; bones uniting.

CASE XI.—Aneurysm of Posterior Right Tibial: Compound Fracture of Left Tibia.

Pte. C., admitted March 8th, 1916. Right leg enormously swollen and brown; no pulse at ankle, small wound on front of leg. Wound explored at once. Piece of shell removed, and huge mass of clot and pus found in calf of leg; very offensive; an arterio-venous aneurysm of posterior tibial was ligatured and removed, and a large posterior excision of muscle performed. Salt pack. Left leg put up in splints. Shell fragment removed from between ends of tibia. Salt pack to fracture with small tube in centre of pack. March 11th: Pack loose; removed and replaced; cleaner; less swollen. March 17th: Repacked; cleaning rapidly. Fracture in good position. March 22nd: Repacked, now granulating fast; still a few sloughs. March 24th: Redressed and strapped. Sent to England three days later. (See Chart 6.)

CASE XII.—Compound Fracture of Humerus, Involving Elbow-Joint.

Pte. S., admitted April 19th, 1916. Arm was enormously swollen above and below elbow. There was much comminution of lower end of humerus, and the tissues were full of foul pus; a big tube had been thrust through the bony fragments. Fingers moved well, and no sensory changes detected. An attempt was made to save arm; wounds enlarged each side of arm and loose fragments of bone removed; much pus let out. Salt-packed with a tube down to fragments on each side, inside the inner gauze. Put up abducted on Thomas's splint with extension. April 27th: Slight haemorrhage, repacked, very clean; more fragments of bone removed and small vessel tied. Temperature 101.4°, pulse 92. May 4th: Repacked; cleaner; temperature 101°, pulse 84; has had temperature up to 101° or 102° each night; pulse keeps about 90. May 10th: Repacked;

arm became oedematous; pus let out of hand and forearm from small wound there. Was repacked every four or five days, and by June 1st temperature and pulse both normal. Joint now bent at an angle, and hand supinated. June 10th: Temperature 100°, pulse 100; small pocket of pus opened over olecranon; temperature and pulse became normal. Arm looks very well,

and elbow is firmly ankylosed; fingers move, and arm is apparently going to be useful. Still in hospital on daily dressing, and granulating fast.

CHART 8.—Case XIV. O, Operation. R, Repacked. C, Redressed; strapped. S, Sutured.

CASE XIII.—Compound Comminuted Fracture of Humerus : Gas Infection.

Pte. C., admitted February 18th, 1916. Very severe comminution of middle of humerus for about 2½ inches; tissues full of foul pus, skin bronzed and crepitant to a small extent. Exit wound behind was laid widely open, some loose fragments of bone removed. Salt-packed. Entry wound enlarged, and packed down to the bone. Put up in extension with complete abduction. February 21st: Repacked, a little cleaner; "arm looks hopeless owing to comminution of bone." March 1st: Redressed first time for nine days. Wound quite clean; strapped across; to be dressed and strapped daily. March 14th: To England. Wound very small, union becoming firm. (See Chart 7.)

CASE XIV.—Compound Fracture of Clavicle and Scapula.

Pte. L., admitted with large very septic wound over left scapula. The outer third of clavicle and the upper edge and all the inner two-thirds of the spine of the scapula were blown away. The spine of the third dorsal vertebra was fractured. The brachial plexus and the subclavian vessels were exposed, and the artery was beating in the bottom of the septic cavity. The wound measured 8 inches by 6 inches. The wound was cleaned up under an anaesthetic, and a large salt pack applied firmly. The patient was so collapsed that 20 ounces of saline was given intravenously. *B. perfringens* grew freely from pus. Next day much better. On the third day temperature and pulse were normal, and he had no pain. On the tenth day the pack was removed. Wound was much cleaner, and granulating in places; still some sloughs adherent about edges of fractured bones. Repacked as before; slight temperature reaction. Pack removed eleven days later, wound quite clean and granulating. It was drawn together by strapping, and dressed daily with lotio rubra. Four days later the wound was sutured; the skin was approximated over the inner half of the wound, but the outer and upper half could not be united owing to loss of skin. It healed rapidly, and the patient went to England with the wound over his scapula and clavicle filling in fast. (See Chart 8.)

CASE XV.—Compound Fracture of Humerus involving Shoulder-joint.

Pte. R., admitted with wound over apex of right shoulder. X-rays showed that head of humerus was in three fragments, and a long piece of shell lying in centre of bone, with a long fissure fracture of shaft. The whole joint was full of pus. Head of bone excised just below tuberosities, and piece of shell removed. The resulting cavity was packed with salt tablets and gauze. June 1st, 1916: Repacked; clean and red. June 8th: Repacked; filling in rapidly. June 13th: Redressed; now on daily dressing as cavity is rapidly obliterating. Can move arm a little. Has never had any pain in joint.

CASE XVI.—Fracture of Femur : Gas Infection.

Pte. S., admitted March 20th, 1916, with an enormous gaping wound of outer side of thigh. All the external muscles with half the hamstrings and half the anterior muscles of thigh were blown away. The wound was roughly cubical, about 5 in. each way. The femur was shattered, and about 2 in. were completely missing. The surrounding tissues were gassy and necrotic. Owing to the fact that the femoral vessels were intact, and also the sciatic nerve, and that his ankle movements were good, we decided to try and save the leg, although the attempt seemed hopeless. The necrotic tissue was cut away and a pack applied, loose fragments of bone being removed. March 23rd: Repacked; muscle on distal side of wound still necrotic and gassy; more cut away and repacked. March 27th: Repacked; cleaner. He was repacked every four or five days for five weeks, and then the wound became sluggish; put on to glycerine dressings and improved rapidly. May 15th: Necrosed pieces of bone removed. Put up in Thomas's splint with plaster-of-Paris bandages with ends of bone apposed, and window over wound. About 2 in. shortening at most. May 20th: Healing rapidly. May 23rd: Sent to England in good general condition.

CASE XVII.—Wound of Left Leg : Severe Gas Infection.

Pte. H. This case is included to show the failure of a pack dressing. The whole of the calf of the left leg was infected with pus and gas—skin bronzed and crepitant. June 9th, 1916: Laid freely open, salt-packed. June 11th: General condition much improved; no swelling of thigh. June 14th: Sudden great pain in leg; temperature 101°, pulse 104; thigh swelling, foot going black, leg again full of gas. Is vomiting, and looks yellow. Circular no-flap amputation; salt pack applied. Amputation was performed 3 in. above knee; fat there looked yellowish-green and oedematous. Cultures from fat grew streptococci, but no gas. June 15th: Very comfortable. June 20th: Redressed for first time; surface of stump quite clean; repacked. Pulse has averaged 80 to 90. No pain; general condition good. Temperature reaction to 102.8° after

CHART 9.—Case XVII. O, Operation. G, Amputation. R, Repacked. A, Redressed. H, Extension on stump.

dressing; pulse 92. June 25th: Redressed. Extension strapping to skin. Stump entirely covered with red granulations. (See Chart 9.)

A PLEA FOR IGNORING "LAUDABLE PUS" IN THE TREATMENT OF SEPTIC WOUNDS.

BY

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BRITISH EXPEDITIONARY FORCE.

EXPERIENCE has taught us that the presence of pus in a well-drained septic wound is certainly no impediment to healing, whilst the disturbance necessary for its frequent removal retards the process of repair.

Having started as confirmed sceptics ourselves, and having passed through all stages of doubt, it is easier to appreciate the difficulties that other people will have in overcoming the prejudice against the formation of pus and the accompanying smell associated with "infrequent dressings." It is not difficult to prove that the presence of pus, if not under pressure, gives rise to no ill effect to the patient. Cases have been left considerably more than a week without change of dressing, and during that time the temperature and pulse remained normal and the patient's appetite rapidly improved.

The mental relief to the patients due to the knowledge that painful dressings are to cease is very great indeed. In the acute stages it is much more difficult to realize the necessity for absolute rest to the inflamed tissues, and this is unobtainable except in the absence of frequent dressings. The difficulty here arises from the fact that the patient has already a high swinging temperature and rapid pulse so that the disturbance due to the dressing is not so obvious on the temperature chart. The accompanying charts show, however, that the temperature and pulse,