REMARKS ON THE TREATMENT OF INFECTED, ESPECIALLY WAR, WOUNDS.

BY RUTHERFORD MORISON.

In the first year of the War the accepted rules for its infected wounds were that they must be gaping open and frequently dressed—the same treatment as was adopted for such wounds a hundred years ago—and these threatened to become the leading principles of military surgery.

But it is always good to work for an ideal, and mine was to discover some method of cleansing and using antiseptics which would allow of immediate closure of the wound and infrequent dressings of it. I have succeeded beyond my most sanguine expectations, and though not claiming perfection for this method of wound treatment, I do not hesitate to claim that it is an enormous advance on any so far suggested.

It is now certain that if the entire cavity of an infected wound can be thoroughly cleaned mechanically, then treated with suitable antiseptics, satisfactorily closed with sutures, and suitably dressed, it will heal frequently under a single dressing, and in more chronic cases without serious disturbance. This has been proved by hundreds of cases in the Northumberland War Hospital, and in the practice of surgeons who have communicated their results to me. The latest convoys we have had from France show that our method is now widely known, as more than half of the patients bring a card with them stating that they have been bipped. If the difference between these cases and those treated by other methods could be seen by military surgeons, there would soon be no other means used until something better had been demonstrated.

Capt. Anderson, R.A.M.C., speaking at a medical conference at Malta, said: "By the general and systematic use of bipp the work of the Surgical Branch of the Royal Army Medical Corps could be reduced by at least two-thirds." In addition to this I entertain no doubt that lives and limbs have been saved which would have been lost by any other methods, that suffering has been averted, expense diminished, and recovery hastened by this one.

Objections have been noted, such as iodoform or bismuth poisoning, that bipp interferes with X-ray examination after its application, and that bacteriological proofs of its efficiency are lacking; but I am convinced that these objections, important though they may be, should not be allowed to weigh against clinical evidence so definitely in favour of this method in times of such urgency. A study of means to overcome them should be the chief consideration.

The greatest objection, to which my attention was specially directed by Surgeon-General Sir George H. Makins, and one which cannot be exag-
gerated, is the possible danger of gas gangrene from closing these freshly infected wounds at the Front. This problem requires careful handling for settlement, and must be left to the accomplished surgeons who direct surgical advance in the fighting zones.

The most painful and dangerous wounds in the past were those involving the knee-joint. Thanks to the excellent surgery done at the Front, I am able to record a series of cases to substantiate the statement that they now cause the patient and ourselves very little trouble or anxiety.

The following examples of results are from patients at present or recently in my wards at the Northumberland War Hospital:

WOUNDS OF KNEE-JOINT.

Case 1.—Wound of Knee-joint by Shell; Removed from External Condyle of Femur.

A private; aged 31, was admitted to the Northumberland War Hospital on August 27, 1917.

History.—He was wounded in the left knee by a shell on August 7, 1917.

Note from France.—"Casualty Clearing Station, August 7, 1917: Penetrating gunshot wound of knee-joint—entered anteriorly, grooving outer border of patella and entering external condyle of femur, in which it lodged. Wound excised and joint opened up laterally by T-shaped incision. All loose bone scraped away thoroughly, and foreign body removed. (He brought with him the piece of shell, roughly half an inch square) Bipp rubbed in. Synovial membrane stitched and Dakin-Carrel into subcrural pouch.

"South African General Hospital, August 9, 1917: Wound rebipped and quite clean."

On admission to the Northumberland War Hospital, August 27, 1917: Left lower limb on a Thomas knee splint. On antero-external surface of left knee-joint an irregular wound, 3½ inches by 2½ inches; greater part superficial. At the lower end a deeper portion was packed with gauze. When this was removed, a little bipp came out of the depths. This wound appeared to be deep enough to go down to bone. In the upper part of the wound a Carrel-Dakin tube, which was removed. Wound clean. Some swelling round knee-joint, but no pain, and patient quite well. Rebipped.

X-ray Report.—August 30: "Gutter in external condyle of left femur, and another on the superior external border of the patella."

After admission, patient's recovery was straightforward, without pain or other disturbance. November 1: Wound very small, but not quite healed. Splint left off. November 8: Almost healed. Movement in knee fairly good, though not encouraged yet.
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Case 2.—Bomb Wound of Upper End of Tibia and Knee-joint and Popliteal Vein.

A driver, aged 30, admitted to the Northumberland War Hospital on October 3, 1917.

History.—Wounded on September 9, 1917, by an aeroplane bomb. (He had multiple wounds, but only that of the knee will be considered.)

Note from France.—“Canadian Casualty Clearing station, September 9, 1917: Left knee track of missile through head of tibia cleaned up and removed from posterior aspect of joint in popliteal space. Popliteal vein found to be wounded—tied and dressed. One Carrel tube in head of tibia. Bipp soft parts. Wound closed.

“African General Hospital, September 12, 1917: Since admission has been cleaned up; swelling at first below wound, but disappeared, and circulation good. Still fever at night.”

On admission to Northumberland War Hospital, October 3, 1917: Left leg in Thomas knee splint. Over inner surface of left knee, and extending on to leg a curved incision wound, six inches long, healed at either end, but about the centre of it a superficial, granulating wound, about the size of a sixpence. Over the popliteal space an incision wound, six inches long, closed at either end, but gaping in the centre, showing a granulating, superficial area, 3 ½ inches by 2 ½ inches. The patient made a straightforward recovery. November 8: Wounds healed. Movement of knee-joint fair. Having massage.

Case 3.—Wound of Knee with Shrapnel Ball and Fracture of Patella: Excision of Ball from Knee.

A private, aged 19, admitted to Northumberland War Hospital October 17, 1917.

History.—Wounded on September 21, 1917, in the left knee by a shrapnel ball.

Note from France.—“Stationary hospital, September 21, 1917: Wound of entry over left patella a little to right of its centre. Joint swollen and painful. Pulse 90; temperature 99°F. X-ray Report.—September 22: ‘Shrapnel ball anterior to internal condyle. No bone lesion.’ Chloroform and ether. Ball removed; joint was full of blood, synovial cavity having been traversed with partial fracture of patella. Joint washed out with saline, and bipp, ½ ounce, inserted; stitched up without drain. October 9: Fit to leave.”

On admission to Northumberland War Hospital, October 17, 1917: Left leg in metal splint. On anterior surface of left knee-joint an irregular, apparently superficial, clean, granulating wound, two inches by one inch. On inner surface of knee, and extending on to the thigh and leg, a curved healed incision wound, six inches long. Slight swelling of knee. No pain nor constitutional disturbance.
X-ray Report (same day): "There is a vertical fracture of the patella. A few loose fragments are seen about its superior margin, but there is no displacement of main fragments."

November 1: Almost healed. A little movement in joint.

Case 4.—Shrapnel Wound of Knee-joint, with Fracture of Internal Tuberosity of Tibia.

A serjeant, aged 22, admitted to Northumberland War Hospital on August 22, 1917.

History.—Wounded on August 13, 1917, by shrapnel. (He had multiple wounds, but that of the knee only will be described.)

Note from France.—"Casualty Clearing Station, August 13, 1917: Left knee-joint: Compound fracture inner edge tibial plateau internal lateral extension of synovia and knee-joint proper ruptured. Knee-joint irrigated with salt and alcohol. Capsule repaired and closed with one thickness of bipp inside. Fracture cleaned, treated with carbolic, alcohol and bipp and ligamentous capsule closed over it."

On admission to Northumberland War Hospital, August 22, 1917: The left leg was in a Thomas knee splint. On anterior surface of left knee-joint was a gourd-shaped wound, 4½ by 1½ inches, apparently superficial, with a little bipp on its surface. The knee-joint was swollen and contained some fluid. Patient well. No pain. Rebipped.

X-ray report (same day).—"Inner tuberosity of tibia hidden by bipp. No fracture seen elsewhere."

Recovery from all wounds (which also had been bipped) straightforward. October 16: Convalescent. Flexion of knee to a right angle.

Case 5.—Rifle Bullet Wound of Knee-joint: Fracture of Upper End of Tibia.

A private, aged 19, admitted to Northumberland War Hospital November 10, 1917.

History.—Wounded in the left knee on November 3, 1917, by a sniper’s bullet (range about forty yards).


"General Hospital, November 5, 1917: Glove drain removed."

On admission to Northumberland War Hospital, November 10, 1917: Left leg in metal splint. On outer surface of left leg just below knee-joint a vertical incision wound four inches long, closed at either end with silkworm gut sutures. Wound edges not in perfect apposition. Clean. On
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antero-internal surface, at same level, a vertical incision wound, 2½ inches long, entirely closed by sutures. There is considerable swelling of, and some fluid in joint but no pain or constitutional disturbance.

X-ray Report.—November 13, 1917: “Gutter in tibia at level of head of fibula. No fracture through the bone.”

November 28.—Inner wound healed, outer wound almost healed. Sutures removed. To have daily spirit dressing.

Fractures.

Next to the knee-joint, fractures have been the worst lesions to treat. Such frequent dressings as were necessary from profuse suppuration and the painful movements necessitated, have developed a great output of skilfully devised splints in the endeavour to overcome some of these difficulties. None of them were wholly satisfactory. We are now able so to modify the infection as to leave fractures undressed for weeks, and have returned to the use of very simple splints. Syme is reported to have said that fractures required only a skilful and careful surgeon, Gooch splinting and a penknife for their treatment, and this is as true as most aphorisms are.

Case 1.—Fracture of Both Bones of Forearm in Upper Third.

A private, aged 49, admitted to the Northumberland War Hospital on October 3, 1917.

History.—Wounded on September 20, 1917, by a bullet in the left forearm.


“South African General Hospital, September 23, 1917: Wound dressed bipp. September 29: No temperature since admission. Arm was swollen, now better.”

On admission to Northumberland War Hospital, October 3, 1917: Over radial border of left forearm just below elbow-joint a large, clean, apparently superficial wound, three inches by two inches, with bipp on its surface. Over ulna border, slightly lower level, another similar wound, about same size but deeper and packed with bipped gauze, but also clean. (Packing removed.) Obvious fracture of both bones in bad position. Loss of sensation in median distribution. Radial pulse normal.

X-ray report.—“Radius and ulna comminuted fracture with inward and backward displacement. The foreign bodies at the wrist are (I believe) all in splint.”

Operation.—October 10, 1917: Wounds explored and bipped. Arm put up in good position with forearm fully supinated, in two Gooch splints reaching from the elbow to the finger tips. The anterior splint was turned with wooden convex surface down, to avoid circular compression...
of the bones. Supination of the forearm was maintained by an angular aluminium splint (Treves) extending from the shoulder along the back of the arm to the hand. November 3: Dressed for first time (one month after operation). Dressing almost dry. A small piece of shell was picked out of a little hole in the ulnar wound. The radial wound was apparently superficial; some bipp in the middle of it. Arm of good shape and firm bony union. Rebipped and put on metal splint only.


**Case 2.—Fracture of Both Bones of Forearm with much Displacement. Fracture plated.**

A private, aged 25, admitted to Northumberland War Hospital, August 26, 1917.

_History._—Wounded on July 31, 1917; by a shell.


On admission to Northumberland War Hospital, August 26, 1917: Bowing shortening and much deformity of right forearm. Over extensor surface of right forearm at its upper third, and extending on to ulnar border, an elliptical incision wound, clean and deep, packed with bipped gauze. Packing removed, and the lower fractured end of the bare ulna could be seen protruding from the lower end of the wound. Good deal of swelling round elbow. Arm on angular splint. No nerve nor vascular injury. Rebipped.

_X-ray Report (August 26, 1917)._—"Fracture of both bones 1\(\frac{1}{2}\) inches below elbow. Ends of ulna are in apposition but at an angle with convexity backwards. Radius lower fragment displaced far backwards with shortening."

_Bacteriological Report._—"Staphylococcus aureus and Gram-positive bacillus. Fine and short, also club-shaped thick Gram-positive bacillus. Gram-negative bacilli and _B. coli._"

_Operation._—August 31, 1917: No reposition of displacement could be effected by manual efforts. Wound enlarged down back of ulna, and the whole rebipped. The ulna was wrenched into good position with two Lane forceps, and retained there by a Lane plate with three screws at each end. The pricker, the plate and the screws were all smeared with bipp. The gaping wound was drawn together as far as possible by thick sterilized silk sutures, smeared with bipp. This covered and hid the plate but there was a granulating gap, one inch wide at the upper end where skin was lacking. The forearm, fully supinated, was supported by two Gooch splints,
the anterior with the wooden side next the forearm, and the whole was fixed by an aluminium (Treves) splint reaching down the back of the arm to the hand. Anti-tetanic serum 500 units. September 7: The patient has had no trouble nor constitutional disturbance and was up and around the ward three days after operation. Anti-tetanic serum 500 units. October 13: Wound dressed for first time (six weeks). Some caked blood on dressing, almost dry. The wound was closed except for a small superficial, granulating area at the centre. The silk sutures were sticking out like stumps of trees in a burned dry forest, and were removed. Granulating area rebipped.

Bacteriological Report of Smear from Dressing.—"Staphylococci and streptococci."


Note.—I expected to have to remove this plate at the first dressing and do not know what may be required later. Meanwhile it is causing no trouble and is left alone.

Case 3.—Fracture of Skull. Fracture of Radius. Wound of Right Thigh.

A private, aged 33, admitted to the Northumberland War Hospital, September 27, 1917.

History.—Wounded on September 16, 1917, by shrapnel.


"X-ray Report.—Comminuted fracture of lower end of radius—with bipp.

"General Hospital, September 19: (1) Head wound had been stitched; a little pus at anterior end. (2) Looks fair; plug in. (3) Looks fair; plug taken out. September 21: Scalp wound; no more pus. Slight headache. (2) Plug removed from back of wrist—fracture of radius runs into wrist-joint. (3) Thigh wound healthy."

On admission to Northumberland Hospital, September 27, 1917: Over dorsal surface of left wrist-joint an irregular oval deep granulating wound, 2 inches by 2½ inches, showing bipp. Over radial border of left forearm, 1½ inches above wrist, a small granulating wound. Deformity of wrist like a bad Colles. (Details of other wounds omitted.)

X-ray Report.—"Fracture of radius just above wrist-joint with forward displacement of lower fragment and numerous small foreign bodies. Backward dislocation of arm at wrist."

Operation.—October 8, 1917: Fracture reduced—good position. Wounds rebipped. One thick silk bipped suture in dorsal wound; anterior and posterior Gooch splints. October 27: Dressed for first time since operation (twenty-four days). Dressing almost dry. Wounds healed but for super-
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ficial, granulating area, size of a split pea. Arm in good shape and bone firm. Splints removed. To have daily spirit dressing.

Bacteriological Report of Smear from Dressing. — "Staphylococci and streptococci."

November 12.—Sent convalescent. Having massage. Not quite healed.

Case 4.—Gun Shot Wound. Left Humerus, Left Thigh and Left Foot.

A serjeant, aged 24, admitted to Northumberland War Hospital, October 3, 1917.

History.—Wounded September 23, 1917, by a shell.


On admission to Northumberland War Hospital, October 3, 1917: Left arm: A large H-shaped incision on left upper arm on inner anterior and posterior surfaces—anterior, vertical and transverse limbs of H, each about 3½ inches long, were closed with sutures. The posterior vertical limb, about same length, was gaping, but clean. No radial pulse on left side. Could move and feel fingers but complained of "pins and needles" in them. The arm was on a Jones arm splint. (Details of other wounds omitted.)


Case 5.—Fracture of Radius: Ulna grooved.

A private, aged 19, admitted to Northumberland War Hospital, October 17, 1917.

History.—Wounded on October 9, 1917, by machine-gun bullet.

Note from France.—"Casualty Clearing Station, October 9, 1917: Through-and-through wound of left wrist. Radius fractured. Ulna grooved in front. Wounds enlarged, cleaned and bipped. General Hospital: No interference; progress satisfactory."
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On admission to Northumberland War Hospital, October 17, 1917: Over the middle of the radial border of the left forearm was an elliptical, clean wound, two inches by one inch. Over ulnar border, at same level, was a similar wound. No nerve or artery injury.

X-ray Report.—"Fracture of radius only, three inches to four inches above wrist. Some backward displacement of lower fragment. Two small detached pieces, possibly sequestra."


Wounds of Legs:

Case 1.—Sterile after First Dressing.

A private, aged 19, admitted to Northumberland War Hospital on October 3, 1917, with shell wounds of both legs.

History.—Wounded on September 20, 1917, by a shell.


On admission to Northumberland War Hospital, October 3, 1917: On posterior and internal surfaces right calf, about centre, an oval clean wound exposing muscle, 4½ inches by 2½ inches, showing bipp. No nerve nor blood-vessel damage. Rebipped. Left leg: on posterior surface of calf, a little above centre, an irregular clean wound, 1½ inches by ¾ inch, showing bipp. Rebipped. Face: Small healed wound left cheek. Flame-shaped haemorrhage outer quadrant left eye.

Operation.—October 6, 1917: Wounds curetted, rubbed with dry gauze, mopped with spirit; dried and bipped. Sutured with interrupted thick bipped silk mattress tension sutures with india-rubber tube and interrupted thick bipped silk sutures for edges. October 17 (eleven days later): Wound dressed for first time. Dressings dry, sutures all in position.

Bacteriological Report of Smears.—"No growth."

October 27: Dressed for second time. Wounds healed except at the upper end where one rubber tube had cut in on the right side. November 8: Sent convalescent.

Case 2.—Gunshot Fracture of Fibula.

A private, aged 36, admitted to Northumberland War Hospital on October 3, 1917.

History.—Wounded September 27, 1917, by a shell.
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Note from France.—“Australian Casualty Clearing Station, September 29, 1917: Large wound on outer side of calf. No foreign body present. Bipp and excision.”


X-ray Report.—“Fibula fractured three inches down shaft—alignment perfect. One foreign body lies external and posterior to fibula.”

On admission to Northumberland War Hospital, October 3, 1917: Over outer surface of left leg in upper half a large elliptical, deep, clean wound, 5\(\frac{1}{4}\) inches by 2\(\frac{1}{2}\) inches, exposing the divided peronei muscles, and through the gap the extensor muscles. Bipp on surface. No nerve nor vessel damage. Operation.—October 6, 1917: Wound cleaned and bipped. Muscles sutured with thick catgut mattress sutures. Wound closed as far as possible by interrupted thick tension mattress sutures over drainage tubes and interrupted thick-silk sutures for edges. Leg put up in two lateral Gooch splints. October 17 (eleven days later): Wound dressed for first time. Very little discharge on dressing. Wound not healed and surface covered with coagulated blood.

Bacteriological Report of Smear.—“Staphylococcus aureus and streptococcus.”

October 27 (ten days later): Second dressing. Little discharge on dressing. Bipp sticking on small granulating surface in centre where wound could not be closed. Sutures removed.

Bacteriological Report.—“No growth.”

November 8.—Sent convalescent.

Case 3.

The following case, though not military, conveys such useful surgical lessons that it is included. It proves the value of a knowledge of first aid, the importance of promptitude and efficiency in a country doctor, and illustrates an important point in blood-vessel surgery.

History.—Mr. A., aged 29, was out shooting with his brother on the afternoon of Saturday, October 27, 1917. He gave his gun to a boy to hold while he crossed a stream six feet wide. In handing the gun back the boy presented it muzzle first, and accidentally touching the trigger caused it to discharge. Mr. A. realized what was happening and in order to clear his body jumped up, and received the charge in his left thigh.

Instantly there was profuse haemorrhage and he fell. The day was wet and cold, but fortunately he was wearing a waterproof coat. His brother, who had a good ambulance training, at once ripped open his breeches at the top and controlled his femoral artery by pressure in the groin. He kept up this pressure until Dr. Brookfield Fox arrived, thirty-five minutes later. The time of the shot firing was accurately established, because Mr. A.’s watch had stopped at 2.17. The doctor who ‘saw’ at once that serious damage had been done to large blood-vessels, plugged the wound...
cavity firmly with sterile gauze which he had brought, applied a tight bandage and having sent for the ambulance started an hour and a half later to bring the patient into a private hospital. Meanwhile the patient, in spite of such wraps as could be found, had got very cold lying on the ground. As soon as he started the doctor sent a telephone message to the hospital stating the nature of the case and asking that everything should be ready for operation. The patient arrived at 7 o’clock and was taken straight to the operating theatre. On admission he was fully clothed, pallid cold and sweating but conscious, and with a radial pulse easily felt. He was anaesthetized at once, undressed, and the wound was examined. On the anterior and inner side of the thigh over the line of the femoral artery, commencing about four inches below Poupart’s ligament, there was a lacerated wound about four inches long, extending towards the inner part of the thigh. Some bleeding was still going on through the bandage and plug, but not actively. The femoral artery was compressed and the bandage and plug were removed. The wound was covered by a compress wrung out of 1-20 carbolic lotion and the skin of the thigh was cleansed with the same. There was a great spurt of blood as soon as pressure on the femoral artery was relaxed. The wound was extended to about eight inches long above and internally, so as to allow of free access, and the femoral artery was then seen, bare all round and running like a thick cord down the thigh. There was an opening in it about the size of a split pea at the junction of the upper with the middle third of the bared portion of vessel. A catgut ligature was tied above and below the opening and the pressure on the artery was relaxed. Between the two ligatures and close to the opening free haemorrhage followed. It was then found that a large muscular branch was given off close to the opening in the main trunk. Ligature of this vessel and division of the femoral artery between the ligatures arrested all serious bleeding, but many vessels in the torn muscles oozed and in the depths of the wound a large branch of the profunda bled and was tied. There was no vein discoverable, and it seemed probable that the femoral vein had been completely destroyed. The sartorius and adductor muscles were torn through and much lacerated. Further examination showed that the main trunk of the profunda femoris was intact and that the charge lay almost under the skin on the outer side of the thigh, and was felt by my hand introduced through the inner wound. A large opening was made on the outer side of the thigh over the charge, from which a quantity of clothing, wads and pellets of No. 6 shot was removed. During the operation normal saline (1 dram of salt to 1 pint of water) temperature 100° F., when entering the vein, was given, but the radial pulse disappeared to reappear again later—when 3 pints had been introduced. Both wounds were cleansed as far as possible with the fingers, then scrubbed out with a long strip of sterile gauze pulled to and fro, then by a similar strip of gauze soaked in spirit used in the same way, and finally by a gauze strip covered with bipp, which was scrubbed into the wound surfaces by pulling the
strip from one side to the other. Slow oozing still continued from the lacerated muscles, and to stop this a gauze plug smeared with bipp was packed into each wound. Except where these protruded both wounds were closed by thick, deep, interrupted sutures of silk, soaked in tincture of iodine. The wounds were dressed with sterile gauze and abundant cotton-wool, 500 units of anti-tetanic serum was injected into the chest wall, the patient was put into a warm bed and an enema of one pint of coffee with a tablespoonful of sugar was administered.

After progress.—Next day the patient had entirely recovered from shock and complained only of pain in his leg. The circulation in it was good, but there was obviously serious damage to the sciatic nerve. Four days later the dressing was removed for the first time and the plugs were taken out. The wounds looked free from any redness or swelling, but the patient's temperature (see chart) indicated a mild infection. Two days later pus escaped from the inner and anterior wound, and about half an ounce could be squeezed out. Daily dressing was ordered, and suppuration from the inner wound in gradually diminished quantity continued until November 28, when only a small granulating area was left unhealed. Fourteen days after the injury the silk sutures used to close the wounds were removed. They had caused no irritation, and the sutured portion of both wounds healed per primam. He still has some pain, numbness and lack of power in the leg, but it is improving so rapidly that his complete recovery is almost certain.

This case allows me to draw attention again to the importance of an observation I made early in the War and which I published in the British Journal of Surgery (No. 10, 1915), and also in my "Contributions to Surgery," p. 491, as an illustrated article.

The point made was that "The escape of an artery from a bullet is due to its elasticity and mobility. At points where branches arise the artery is tethered by them so that it becomes fixed and is pierced by the impact of the bullet, and the branches are either torn through or caught and divided."

I have never seen a more clear demonstration than this case offered,
but our experience of aneurysm and secondary hæmorrhage from damaged
vessels fully confirms it.

A second point concerns the treatment I adopted in this case. Was it
the best that could be done? I believe not, because though the result has
been all that could be desired, we ran risks from prolonging the operation,
and did not entirely succeed in preventing wound infection, because the
wound treatment could not be made thorough enough. With this expe-
rience, and in a similar case, after opening and cleansing and giving
ordinary surgical attention to the wounds I would now fill them up with
A. E. Morison's magnesium sulphate cream 1 and dress them, leaving the
dressing untouched for four days. Then I would bipp them and sew
them up.

It is with great diffidence that I venture to suggest this as the most
suitable scheme for military injuries which I have only had to treat in the
later stages.

In any case, in these serious wounds with shocked patients, some
readily applied first dressing, if it has been proved effective, should take
precedence of more elaborate schemes. The report in the Lancet of
November 3 by Captains L. Collidge and Hamilton Drummond and
Lieutenant R. Worthington, on proflavine, and suggesting it as a first
dressing, also appeals to me.

The advantages of such a first dressing, apart from its ease and the
short time required to apply it, are that the objections to my method of
treatment would no longer have importance. The most serious of these,
because it is true, is that both iodoform and bismuth interfere with satis-
factory X-ray examination. The X-ray examination could be fully made
before their application if the method I have suggested were employed.

The second objection is that poisoning may follow as a result of bipp
treatment. In the early days when wounds were filled with bipp, a few
cases occurred, showing absorption. There have been no deaths from this
cause in the Northumberland War Hospital, and for the last year no case
in my wards has shown any sign (except a blue line round the necks of
teeth, especially dirty ones) of this trouble. It may be that absorption
occurs more readily from fresh wounds than from those of a few days'
duration, though I have seen no evidence of this, or it may be that too
much bipp has been left in the wound, or what appears to be a likely
explanation is that bipp improperly made up has been used. We have
had several samples obviously defective. When it is properly prepared
and rubbed in a thin smear sticks to every portion of tissue so treated.

1 Method of Preparation of the Magnesium Sulphate Cream.—One to five pounds of
mag. sulph. exsiccatum are mixed with eleven ounces of glycerine acid carbolic (1 -10).
The dried mag. sulph. is in the form of a fine white powder which contains twelve per cent
less water than ordinary mag. sulph. The glycerine acid carbolic is put in a hot mortar
and the mag. sulph. added slowly, stirring and mixing with a warm pestle all the time.
The result is a thick white cream, so hydroscopic that if exposed to the air it rapidly
absorbs moisture and becomes fluid. To preserve it in a jar is essential.
SUMMARY OF TECHNIQUE.

(1) Under an anesthetic, usually open ether, cover the wound with gauze wrung out of 1—20 carbolic acid, and clean the skin and the surrounding area with the same lotion.

(2) Open the wound freely and, if possible, sufficiently to permit of inspection of its cavity. A guide—a finger is the best if the size of the wound permits of it, and if not a thick probe—should be introduced to the bottom of the wound and held there and fully exposed. In doing this special regard must be paid to nerve trunks and muscular branches of nerves, since the division of blood-vessels, excepting the largest, and of muscles themselves does little harm as compared with that of the disability following nerve damage. Cleanse the cavity with dry sterile gauze mops, Volkmann's spoon, etc., and remove all foreign bodies.

(3) Mop the surrounding skin and the wound cavity with methylated spirit and dry it.

(4) Fill up the whole wound with bipp, rub it well in with dry gauze. Then remove all excess, leaving only a thin smear covering over the wounded surface. Dress the wound with sterile gauze and cover all with an absorbent pad. This dressing requires no change for days or weeks if the patient is free from pain or constitutional disturbance. Should, however, discharge come through, the stained part must be soaked in spirit and a gauze dressing wrung out of the same applied as a further covering.

Redressing is very simply done. After removal of the old dressings the wound is covered with a dossil of wool soaked in spirit, and the sticky, dirty-looking discharge is wiped off the surrounding skin until it is clean.

I am indebted to Colonel Adams for leave to publish the military cases.