WAR WOUNDS AND AIR RAID CASUALTIES

The following is one of a series of lectures on the Treatment of War Wounds and Air Raid Casualties recently delivered at the British Postgraduate Medical School

THE TREATMENT OF WOUNDS IN WAR

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Experience gained in previous campaigns is by no means always reliable. We have to be prepared for new types of destructive missiles and different conditions of fighting, with the result that the technique of wound treatment may require considerable modification. For example, the mobile warfare in South Africa over sun-dried relatively sterile soil was very different from the stationary trench warfare in France and Flanders. In South Africa it was found that with the application of the first field dressing and sterilization of the surrounding skin the majority of the wounds healed by first intention. In France the fighting was mainly stationary and over cultivated and highly manured soil. The result was that the men in the trenches were soaked and plastered with grossly infected mud containing organisms of every variety, including the anaerobes of tetanus and gas gangrene. In South Africa the majority of wounds were inflicted by the high-velocity small-bore bullet of the Mauser type and relatively few by shell-fire. In the great war, wounds from high-explosive shells and shrapnel increased to an enormous extent, and wounds from missiles of relatively low velocity, such as trench mortars, bombs, and hand grenades, were added, with exceedingly severe results. The advances made in recent years in mechanization and the power of the air arm will present new problems in the way of medical organization and requirements.

In the field, wounds are inflicted by bayonet, sword, and lance; by high-velocity small-bore rifle and machine-gun bullets; by shrapnel and high-explosive shells; and by bombs, hand grenades, and trench mortars.

Effects of Missiles

Bayonet, sword, and lance wounds are relatively infrequent in modern warfare. Many soldiers are killed outright on the field, and few survive to come into the hands of the surgeons. The wounds may be of any nature, corresponding to the type of weapon employed.

Rifle and machine-gun bullets depend for their effect on the velocity of impact and also on instability. The modern pointed bullet is more unstable than the blunted Mauser type, and inflicts more severe damage on internal organs. That is to say, there are relatively fewer clean perforations of bone and viscera, and more damage is done to the internal organs in the way of laceration and disruption. The small-bore bullets have a fixed weight and shape, and a high initial velocity which is lost slowly. They have great power of penetration and relatively infrequently lodge in the body. They do not tend to carry clothing into the wound. Explosive exit wounds at short ranges are almost invariable. Multiple wounds are uncommon, except when inflicted by machine-gun bullets or when the same bullet traverses several parts of the body. The explosive does not affect the wound.

Shell fragments, shrapnel, etc., have no fixed weight or

shape. They have a lower initial velocity, which is lost more rapidly. They are haphazard in action, often cause multiple injuries, and depend for effect less upon velocity than on the size and shape of the fragments. They have a lower power of penetration and often lodge in the body. They frequently carry clothing and gross dirt into the tissues. Explosive exit wounds are rare. The effect of the explosive is as destructive as the fragmentation (that is, blast).

Infectivity of Missiles

All missiles must be considered as infected. The high-velocity rifle and machine-gun bullets, while they do pass through dirty clothing and unwashed skin, do not tend to carry clothing into the wound, and the infection is, as a rule, more superficial and more amenable to surgical treatment. Shrapnel, shell fragments, and fragments of missiles of relatively low velocity (bombs, hand grenades, etc.) very often carry clothing and gross dirt into the wounds, and all such wounds must be regarded as heavily infected.

Infection of the wound track is a most important factor. Experience has shown that organisms are implanted into the wound track, but do not tend to invade the surrounding tissues for about twelve hours. It is obvious that the application of antiseptics cannot sterilize the tracks of deeply penetrating or perforating wounds. The only effective method of rendering such wounds sterile is by early and efficient surgery, and if this can be carried out as soon as possible, and certainly before the lapse of twelve hours, there is a good chance of eradicating the infection, and in a considerable number of cases the wounds can be closed by primary suture. It must be stressed that these primary sutures take considerable time, and must be done by an experienced surgeon under the best aseptic conditions: in some cases excision cannot be carried out completely for anatomical reasons. To close an inadequately excised wound is to subject the patient to a very grave risk to limb or even life. Primary suture is the ideal treatment.

In cases received later than twelve hours, or when satisfactory excision of the wound track cannot be carried out, the method of delayed primary suture is most useful. This consists in excision of the damaged skin edges and track as completely as possible, removal of any foreign bodies, and efficient haemostasis. The wound is left open and packed with gauze soaked in flavine or some mild antiseptic. If progress is favourable, such wounds can often be closed by secondary suture three or four days later. Incidentally, cases treated by this method stand transport quite well and can be evacuated as soon as they have recovered from operation. To give these operations the best chance of success it is essential to get the patients to the operating centre as rapidly and in as good condition as possible for operation. Therefore, the principles of early treatment are: the control of haemorrhage, the prevention of shock, and rapid evacuation.

In cases received late, when gross infection has already occurred, or in wounds which have broken down and in which frank suppuration is present, the Carrel-Dakin method of irrigation is of great value. This consists in

opening up the wound in all its recesses and pockets, removal of foreign bodies and dead tissues, and efficient haemostasis. The Carrel tubes are laid in the wound to reach all the surfaces, which are protected by a layer of gauze; the wound is lightly packed with gauze and instillation of Dakin's fluid is carried out two-hourly. In appropriate cases the wounds may be closed subsequently by secondary suture. This form of treatment also requires meticulous attention to detail, and must be preceded by efficient surgery. It is not drainage in the usual sense of the word: no dependent openings or counter-incisions are used, and the success depends on the hypochlorite solution gaining access to the whole wound surface. The instillations are carried out at short intervals (two hours), as the activity of the antiseptic tends to wear off.

Plaster-of-Paris.—Many good results have been reported from Spain from the immobilization of infected fractures and wounds of the limbs in plaster on the lines of the Winnett-Orr treatment for osteomyelitis. Immobilization is of very great value in the treatment of war wounds. I am of the opinion that this form of treatment should be reserved for the base hospitals and not be used in the early stages, when there is any possibility of an anaerobic infection.

At the Dressing Station

In the field rapid evacuation is contraindicated in certain cases. These are cases in which shock is likely to develop or be aggravated during transport. Operation is therefore advised at dressing stations:

1. To control haemorrhage.
2. For the removal of crushed and mangled extremities. This can be carried out satisfactorily with local anaesthesia and often without an anaesthetic at all, as the limbs are frequently in a condition of "local" shock and sensation is absent.
3. Suture of gaping or valvular pneumothorax. This is most useful in cases where there are large open wounds into the pleural cavity. The tissues of the thoracic wall down to and including the muscles can be drawn together with temporary sutures to close the opening. This gives great relief to the respiratory distress of these patients, and can quite well be done with local anaesthesia or even no anaesthetic at all. If it is not possible to suture such a wound, packing the cavity with a large pad of moist gauze and approximating the wound edges with strapping will also afford considerable relief.

The treatment of gunshot wounds involves first aid and operation. First aid is given to tide over the immediate necessities of the patients, to relieve their pain, and to put them in as good a condition as possible for operation. Operative treatment will be necessary for all the more severe types of wounds if time and conditions permit. The principles of first-aid treatment are: the control of haemorrhage; the application of a protective dressing to the wound and the immobilization and extension of fractures; and the prevention and treatment of wound shock.

Control of Haemorrhage

Tourniquets are not nearly so frequently necessary as might be imagined, and a tourniquet can be a very dangerous weapon. Every patient on whom a tourniquet has been applied must be clearly labelled with the time of application. The pressure needed is only equal to that of the blood pressure. The dangers are: (1) Local infection, which almost invariably follows the prolonged use of a tourniquet. Massive gangrene of limbs has occurred on many occasions. (2) Tissue damage and shock. (3) They are very painful. Tourniquets are more dangerous on the upper than on the lower extremity.

Fractures

The immobilization and the extension of fractures at the earliest possible moment are of the utmost importance. Immobilization during transport adds very greatly to the comfort of the patient and is of much assistance in the prevention of shock. Considerable swelling may appear in a wounded limb within a few hours, from either haemorrhage or inflammation. Such swelling occurring under a firmly applied splint may cause pressure effects varying from a local pressure sore to complete gangrene of an extremity. It should therefore be the rule (at a dressing station) to take down and examine any splinted limb in which there is excessive pain or in which the circulation of the extremities appears to be impeded.

Prevention and Treatment of Shock

Without going into the pathology of wound shock, there are several points in the treatment of the wounded which undoubtedly do prevent shock or assist in its treatment. These are:

Warmth.—It is essential to keep the patients warm, but not overheated, as this will cause excessive loss of fluid by sweating. A patient on a stretcher must be protected with a waterproof sheet, and blankets underneath as well as on the top. Artificial heat can be employed in the way of hot bottles, electric cradles, etc. Ambulances must be warmed.

Restoration of Fluid.—In gunshot wounds the patients are often suffering from a shock-haemorrhage complex. Therefore haemostasis and the restoration of fluid to the tissues are of vital importance. For those who can take fluid by the mouth, hot sweet tea is an excellent means of restoring fluid and warming the patient. Other means are intravenous infusions and the transfusion of blood.

Relief of Pain.—The injection of morphine ($\frac{1}{4}$ to $\frac{1}{2}$ grain) is an excellent sedative: whenever morphine has been given it is essential that a record should be made of the dose and time of injection, and this must accompany the patient.

Some Useful Points

As already mentioned, the immobilization and extension of fractures are of the utmost importance. Patients should be handled and moved gently and placed in as comfortable a position as possible—for example, flexion of knees in abdominal wounds. Unnecessary changing of dressings should be avoided.

The following are a few points in the early treatment of some special cases.

Wounds of the Spine.—Fractures and wounds of the spine should be transported in the prone position on a stretcher, with the exception of wounds and injuries to the cervical vertebrae. In these the patient should lie on his back with a stiff pillow or support under the neck to avoid flexion. The above will apply especially to cases with spinal injuries from falling masonry or from being buried in trenches. In wounds of the spinal cord with paraplegia no attempt should be made to pass a catheter: the bladder should be allowed to distend and overflow, or expression may be tried. The most satisfactory method of preventing infection of the urinary tract in these cases is by a suprapubic cystotomy, which should be done at the operating centre.

Wounds of the Jaws.—Danger of suffocation is most commonly due to loss of control of the tongue. In this condition posture is of vital importance, and the wounded man should be placed on the stretcher in the prone position with the head hanging downwards over the end of the stretcher. It is essential to keep the tongue forward in these cases, and many lives might in this way be saved.

by stretcher-bearers and others. Correct posture will also tend to lessen haemorrhage by keeping the tongue in a forward position; but it may be necessary to plug wounds external to the mouth and to apply digital pressure.

Emergency tracheotomy in the dressing stations has been much employed by the Japanese surgeons in China. This enables the oral cavity to be thoroughly packed so as to check haemorrhage, and is spoken of as a "life-saving" measure. They have a special emergency tracheotomy appliance.

By the courtesy of the President I had the opportunity of discussing the following points at a Committee composed of four members of the Council of the Royal College of Surgeons.

The Thomas Splint.—In the Army we rely on the large-ringed Thomas splint for the evacuation of the majority of lower-limb fractures from the front line to the casualty clearing station. The splint is applied over the boot and clothing, and the ring is packed anteriorly and laterally with tow or wool to retain it against the tuber ischii. The fracture is supported with Gooch splinting or Cramer's wire: extension is obtained by means of a skewer through the waist of the boot or a clove-hitch round the ankle and tied to the distal extremity of the splint. The splint is suspended to a bar fitting over the stretcher. Many modifications of the Thomas splint have been suggested, such as collapsible splints, half-ringed splints, etc. It was agreed that for the evacuation of casualties in the early stages the original Thomas model was the most satisfactory. As one member of the Committee put it, "a Thomas splint altered is a Thomas splint spoiled." Cramer's wire splinting would form a useful support for arm fractures and fractures of the foot and ankle.

Skeletal Traction for Fractures.—It was agreed that internal traction by pins and wires was unsafe unless one was certain of first-class aseptic conditions—that is to say, skeletal traction is completely ruled out in dressing stations; and probably even in a casualty clearing station from which patients are evacuated by ambulance train it is safer to rely on skin traction.

Plaster-of-Paris.—In the form of supporting slabs this would be of great use in casualty clearing stations. The encircling of compound fractures with circular plaster bandages is dangerous in the early stages.

Blood Transfusion.—That extensive use would be made of blood transfusions, and that stored blood in refrigerators could be used in the dressing stations and forward area. That "drip transfusion" would be of great value in the casualty clearing stations.

Advanced operating units are not advised, as it is considered better to get the patients to the casualty clearing station, where they could be operated on and remain for some days and be nursed under better conditions. Patients do not stand evacuation well after serious operations.

Anaesthetics.—It was agreed that gas-and-oxygen is the most suitable anaesthetic for the serious cases, and should be reserved for these. This involves the use of heavy and cumbersome cylinders, the supply of which might be difficult. For many cases ether may be used, and should be regarded as the standard anaesthetic. The employment of the barbiturates for patients already in a condition of shock is definitely dangerous. This also applies to spinal anaesthesia.

Immunization against Tetanus

With regard to tetanus, steps are now being taken to protect the Regular Army by means of active immunization with tetanus toxoid. This is administered in two doses of 1 c.cm., given at six-week intervals, and affords a degree of immunity which, so far as can be deduced from animal experiments, is more than sufficient to prevent infection. Although definite information is not yet available it is believed that the immunity produced in this way

is of long duration. As our knowledge of the subject is as yet somewhat incomplete, this measure is being regarded as an additional line of defence, and it is proposed to give immunized soldiers who have received potentially infected wounds a single dose of 3,000 units of tetanus antitoxin. The necessity for this procedure may be in some cases rendered imperative by absence of information regarding previous active immunization.

THE PSYCHOGENESIS OF SCHIZOPHRENIA

LONDON LECTURE BY PROFESSOR JUNG

Professor C. G. Jung of Zurich addressed a large gathering at the Royal Society of Medicine on April 4, his announced subject being the scope and limitations of the genetic factor in psychoses. Dr. H. Crichton-Miller, president of the Section of Psychiatry, who was in the chair, described Professor Jung as standing in psychology for the opposition bench. In England the critical attitude towards psycho-analysis had been very much helped by Jungian opinion. One could differ from him without parting from him, and that could not be said of all leaders of medical psychology.

Schizophrenia and Neuroses Compared

In opening his address Professor Jung recalled that it was just twenty years ago since he read a paper on this same subject of the genetic factor before the Royal Society of Medicine. At that time the late Professor W. McDougall, whose recent death they all deplored, presided. It was difficult to say anything new on the subject. During those twenty years his experience had increased and his views had matured, but he could not say that his standpoint had undergone any radical change. Psychogenesis was still a modern, even an ultra-modern, problem.

Concerning schizophrenia, it had been agreed that it had an essentially organic aetiology, although for a long time specific destruction of the brain matter could not be proved. Even now the question how schizophrenia could destroy brain cells was not satisfactorily answered, much less the more specific question how far primary disintegrations accounted for the symptomatology of schizophrenia. The great majority of the symptoms were of a secondary nature and chiefly due to psychical causes. There were certain noteworthy analogies between schizophrenia and the neurotic condition, but the fundamental difference turned upon the maintenance of the potential unity of the personality. In schizophrenia the "splitting" was not relative but absolute. The hysterical patient might suffer from a sort of persecution mania very similar to early paranoia, but the difference was that in the case of hysteria the delusion could be brought back under the control of consciousness, whereas it was impossible to do that in the case of early paranoia. The dissociation in schizophrenia was not only far more serious than in a neurosis, but very often it was irreversible. It was no longer fluid, but was more like something which had been broken into splinters. The complexes had become disjointed fragments. The split figures in the personality dissociation of schizophrenia no longer co-operated with the patient's consciousness, they were not "tactful," they tortured the ego in a hundred ways. They had liberated themselves from the control of the ego to such an extent that their original participation in the patient's mental make-up had vanished beyond recognition. Dissociation had been carried to a degree unheard of in the sphere of the neuroses. The very foundations of the personality were injured.