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CIRCULAR LETTER NO. 23

Care of Battle Casualties

The following instructions are supplemental to Manual of Therapy, ETC, 5 May 1944; Circular Letter No. 71, 15 May 1944; Circular Letter No. 101, 30 July 1944, and Circular Letter No. 131, 8 November 1944, Office of the Chief Surgeon.

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1. Transfusion Instructions

a. (1) The following test will be found useful in making differential diagnosis between pyrogenic and hemolytic transfusion reactions. It can be employed with accurate results as early as fifteen (15) minutes after the appearance of symptoms.

(2) Procedure

(a) Draw five (5) ccs of blood from the patient, employing a clean, dry syringe.

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(b) Remove the needle from the syringe and eject the blood gently into a clean, dry test tube.

(c) Centrifuge immediately for five (5) minutes at three thousand (3,000) r.p.m.

(d) Read grossly for presence of free hemoglobin in the serum.

(3) The presence of hemoglobin in the serum is indicative of intra-vascular hemolysis. The presence of as little as ten (10) milligrams per hundred cubic centimeters will produce a faint pink tinge and can be detected in this manner.

b. Alkalinization

Alkalinization is useless in cases in which there is no intra-vascular hemolysis, and will not be carried out in those cases in which the above test is negative.

c. Deaths from transfusion

Analysis of reports received shows that one of the major causes of death following transfusion is cardiac overload. The cardiac reserve of patients who have suffered wounds and prolonged shock is definitely lowered. Anuria may also result from prolonged shock. In the attempt to produce diuresis by the administration of intravenous fluids the cardiac reserve is sometimes exceeded. Ordinarily three thousand (3,000) cubic centimeters fluid intake daily is sufficient. In the presence of hyperpyrexia this may be proportionately increased. Blood and plasma received must be taken into account in calculating the total fluid intake.

d. Sodium

When sodium salts (citrate) are given to produce alkaline urine, the administration of sodium chloride (physiologic salt) is to be avoided. Dextrose in distilled water may be used to maintain adequate fluid intake. The administration of excess amounts of sodium may produce an alkalosis of a degree resulting in itself in anuria, or the excess sodium may be taken up by the tissues and result in edema.

e. Care of blood in hospitals

(1) Blood will be stored in refrigerators at temperatures ranging between two (2) and six (6) degrees above zero centigrade (35.6 - 42.8 degrees F.).

(2) Blood will not be heated before transfusion.

(3) Blood left unrefrigerated for more than 30 minutes will not be used for transfusion.

2. Orthopedic Surgery

a. Notes for disposition boards

Under the present evacuation policy to the Zone of the Interior, very few simple or compound fractures can be rehabilitated to full duty in this theater. Among the exceptions may be certain fractures incurred by key personnel occupying sedentary positions. A fracture of the clavicle, an undisplaced fracture of the head of the radius or of the lateral malleolus, some fractures of the metacarpal bones, metatarsal bones or phalanges are cited as examples of fractures that may be returned to full duty within the present evacuation policy. There may be a few other instances of minor fractures which will require careful evaluation in order to determine whether there is any possibility of salvaging the officer or soldier involved for further duty in this theater within the time allowed.

Patients requiring elective surgical procedures for internal derangement of the knee joint or recurrent dislocation of the shoulder joint should almost invariably be returned to the Zone of the Interior for this surgery. The utmost care should be exercised in arriving at a diagnosis of either of these conditions. A sprain of the knee joint which may be rehabilitated should not be confused with an internal derangement. A recurrent dislocation of the shoulder joint should be thoroughly authenticated before this diagnosis is made.

Osteo-arthritis of a major joint with definite disability as a result, should be returned to the Zone of the Interior.

b. Amputations

Skin traction on amputation stumps must be instituted immediately and maintained adequately and continuously except as stated in par 5d, of Circular Letter No. 101, this office, subject: "Care of Battle Casualties", dated 30 July 1944. In general hospitals this traction may be advantageously maintained by a weight suspended over a pulley. This form of traction must also be continuous. The most effective means of maintaining skin traction on the amputation stump during transportation has been described in par 5e, Circular Letter No. 101, Office of the Chief Surgeon, 30 July 1944. This skin traction should be inspected in each medical unit charged with the care or the evacuation of the patient, and if found to be inadequate, it should be reapplied immediately.

Closure of amputation stumps by suture or skin graft is not authorized in this theater. Amputees should be evacuated.

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to the Zone of the Interior as promptly as possible with skin traction maintained throughout all stages of their journey.

### c. Wounds involving the knee joint

These wounds have been most satisfactorily treated in the following manner:

(1) A thorough exploration of the joint is performed through adequate medial and/or lateral incisions. A bloodless field should be insured by the use of a tourniquet if there is no associated damage to the femoral or popliteal arteries. The joint is completely irrigated with saline solution which should remove all blood and debris. With adequate retraction, a careful debridement of all damaged tissue, bone, cartilage and synovia is performed with removal of all foreign bodies from the joint cavity. If a meniscus is detached or damaged it should be excised. After further irrigation the synovia and capsule are snugly closed with a single layer of interrupted sutures. If there is loss of capsular substance, the closure may require, in some instances, the utilization of a fascial flap.

(2) After closure of the capsule 10,000 units of penicillin in 5 cc of normal saline are injected into the joint cavity. The tourniquet should be released and hemostasis insured by the ligation of all bleeding vessels. The knee joint should be immobilized by means of a plaster of paris spica bandage, knee slightly flexed, with a window over the joint. The joint is aspirated 48 hours after operation, gently washed with saline solution and another 10,000 units of penicillin instilled into the joint cavity. This procedure may be repeated several times at intervals of 24 to 48 hours if necessary. Parental penicillin therapy is carried on throughout this period. The skin wounds may be closed 5 days after primary surgery if there is no evidence of infection.

### d. Compound fractures

(1) Supracondylar fractures of the femur with sharp spicules of bone which may damage the popliteal vessels should be immobilized with the knee flexed at 20 - 25 degrees to minimize the danger of this complication. At the time of primary debridement if there is found to be direct pressure against the popliteal vessels by a sharp spicule of bone, it should be excised. The excised piece of bone should be replaced at the fracture site and not discarded.

### (2) Internal fixation of compound fractures

A recent report from the Office of the Surgeon General on the condition of battle casualties returning from the ETO has been received February 1945. The consensus of opinion expressed by qualified chiefs of orthopedic sections, chiefs of

surgical services and consultants in nineteen named general hospitals in the Zone of the Interior was that metallic internal fixation of compound fractures resulted in infection in 25 to 50% of the cases so treated. The metallic fixative agent in all of these infected cases had to be removed. Delayed or non-union has resulted in many of these patients.

In view of the adverse report on the progress of these casualties, internal fixation of compound fractures is prohibited as a routine procedure. It should be resorted to only after a thorough trial of skeletal traction has failed to secure adequate reduction, and after healing of the skin has been accomplished by suture or skin graft. The concurrence of the local orthopedic or surgical consultant will be secured in each instance where internal fixation of a compound fracture is deemed necessary. Combined injuries involving compound fractures and peripheral nerves present special problems. These will be treated at specialized hospitals designated for neurosurgical problems.

### 3. Penicillin Therapy

The following abrogates those parts of Circular Letter No. 71, 15 May 1944, with which it is in conflict.

- a. Penicillin therapy will begin at clearing stations.
- b. Penicillin therapy will be given to all casualties except those with very minor battle wounds.
- c. The use of penicillin locally in all wounds is not required, but its local use in joints and chests is necessary for best results.
- d. Data concerning dosage will be recorded on E.M. Tags and F.M.R.
- e. The distilled water in the plasma set should not be used as the vehicle for injecting penicillin, since it contains citric acid which inactivates penicillin. (Citric acid may inactivate other substances, and the distilled water in plasma sets should not be used except as a vehicle for dried plasma).
- f. The rate of withdrawal of penicillin from supply depots indicates that all wounded are not receiving penicillin as per Circular Letter No. 71. This must be corrected, since there is no more striking advance in the treatment of battle casualties than the relative freedom from infection. In this penicillin may play a dominant role.

4. Sulfonamides

The dusting of a sulfonamide powder into open wounds has proven harmful to early closure of the wound and adds little to the ability of the body to defend itself against bacterial invasion. Such use of sulfonamide powder is condemned hereafter unless there be special indications.

5. Hernia

Under the present evacuation policy all direct and recurrent hernias should be evacuated to the Zone of the Interior. Exceptions are for key personnel only.

6. Chronic Suppurative Otitis Media

Radical mastoidectomies will be done only on patients in whom there is imminent danger from a spread of infection. This danger is indicated by severe pain around the ear, labyrinthine imbalance, or severe metastatic infection. Other cases of chronic suppurative otitis media and mastoiditis which cannot be treated so that they can return to full or limited duty in this theater within the present evacuation policy will be returned to the Zone of the Interior.

7. Peripheral Nerve Injury

a. Primary suture of major nerve trunks in war wounds is undesirable and should never be attempted. The contusion of the nerve which invariably accompanies such wounds, precludes accurate trimming of the ends without unnecessary sacrifice of tissue. However, when nerve ends can be identified they should be approximated as nearly as possible with a single through and through suture placed not more than 1 cm from each end. Preferably a fine metallic suture should be used in order that subsequent x-ray examination may visualize the site of the lesion. This fixation-suture is important in that it prevents retraction of the nerve ends.

b. The optimum time for definitive suture is three weeks. Usually at this time it is possible to trim the nerve ends accurately to normal tissue before suture, and the perineurium is sufficiently toughened to permit accurate approximation with fine interrupted sutures.

8. Gunshot Wounds of the Spine with Neurological Involvement

Patients with spinal cord injury are the most difficult of all nursing problems. Facilities at the evacuation hospital are not ideal for their care. Therefore, early evacuation to fixed hospital installations is always desirable. The following rules for the care of these patients should be adhered to wherever possible:

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a. No gunshot wound of the spine should be operated upon in an evacuation hospital when it is possible to transport the patient to a special treatment hospital for neurosurgery within 36 hours from injury. When such evacuation facilities are not available, the neurosurgeon of the evacuation hospital may perform a laminectomy when it is indicated after consultation with the chief of the surgical service and the orthopedic surgeon.

b. Through "holding units" these patients should be sorted for early evacuation to the nearest special treatment hospital.

c. No body cast will be applied in an evacuation hospital solely for the spinal injury. All patients (except those with injury to the cervical cord) will be evacuated in the prone position, care being taken to protect pressure points, especially about the iliac spines. An indwelling catheter will be used until the patient reaches a general hospital.

d. In those cases subjected to operation in evacuation hospitals, movement to a general hospital for nursing care will proceed within 48 hours, condition of the patient and evacuation facilities permitting.

e. These rules do not apply to patients with associated injuries, i.e. chest, abdominal and serious extremity wounds, where the associated lesion may take precedence in treatment over the spinal injury.

f. Cervical cord injuries will be handled according to instructions in the ETO Manual of Therapy, and Circular Letter No. 131, Office of the Chief Surgeon. Traction by either Crutchfield Tongs or Halter is not indicated unless there is fracture-dislocation of the cervical vertebrae. Simple gunshot wounds involving the lamina or the body of the cervical spine do not often require traction.

### 9. Abdominal Surgery

#### a. Colostomies

(1) Wounds of the large bowel should be treated by simple exteriorization of the involved portion, except the rectosigmoid, where the wound in the bowel will be closed and a "loop" colostomy performed above and at the top of the "free" loop. In this instance there must be complete diversion of the faecal stream, and it is advisable to divide the exteriorized bowel transversely and completely at the time of the operation. The distal end may be occluded by a clamp or a suture, as indicated.

(2) The Mikulicz type of procedure has been unsatisfactory in the experience of ETO surgeons and should be abandoned.

It has been found to be the cause of post-operative obstruction and much intra-abdominal discomfort. The spur has rarely been sutured over a long enough area, and it is unsatisfactory for complete diversion of the faecal stream. Moreover, Mikulicz developed this operation as an emergency procedure in the early days of abdominal surgery. It is not satisfactory for young people who must live with it for forty years. In the repair of colostomies in base areas, most surgeons have come to complete exteriorization of the lesion and end to end suture in the operative wound. Infection has not resulted from this procedure and late results are far better than with the Mikulicz type of procedure.

b. Wounds involving the caecum alone or the caecum and ileum require repair of the ileum and caecostomy, i.e. exteriorization of the defect. Ileostomy should be avoided, and double-barrelled opening of ileum and caecum has been proven unwise and undesirable.

c. In concurrent injuries of head and abdomen the abdominal injury takes precedence.

#### 10. Vascular Surgery

Every attempt must be made in forward hospitals to repair vascular defects, first by direct suture, secondly by use of improvised tubes or the Blakenore sets. If an extremity can be given some blood for two or three days, even if greatly diminished, collateral circulation will usually develop and save the limb. The repair of the original lesion or an improvised method of getting some blood through the injured vessel need only function therefore for perhaps 48 - 72 hours.

#### 11. Notes on Radiology

a. Unexposed x-ray film can be fogged in many ways. Two important causes are:

(1) By stacking the paste board x-ray boxes flat, either in depots, medical supply departments of hospitals or in x-ray departments. This presses the boxes open and prevents using the bottom film boxes in turn as new ones arrive.

(2) By storing films near a source of heat which is either severe for a short time or above 90 degrees F. for a longer period of time. Cold does not injure x-ray film.

b. All x-ray film will be stored at all times on edge and away from excessive heat.

c. Many kinds of glass can be depicted in the body by regular type of examinations. When glass from mines or other

sources is suspected and needs to be located, x-ray examination should be requested. Since radiographs made properly dense with lower kilovoltage will depict still more kinds of glass than high kilovoltage technique, the radiologist should be notified when glass is suspected. Fragments from plastic or wooden mines cannot be depicted by x-ray examination.

12. The Care of Immobilized Patients (avoidance of decubiti).

a. Patients who are unconscious or paralyzed, or who are immobilized as the result of serious injury to the buttock, chest or extremities, need special care. Such patients cannot move themselves, and unless moved frequently, serious pressure sores and permanent disabilities will ensue. Pulmonary congestion resulting from immobility increases the risk of serious pulmonary complications.

b. Lessening of the disabilities entailed by lack of movement may be accomplished through instructions to personnel to shift the position of these patients frequently. Deep breathing exercises can be conveniently given at the same time that the position is changed. The attendant nurse or enlisted personnel should move the patient by gently shifting the position of his pelvis. Where there is a large buttock wound or heavy cast, more than one attendant will have to assist in such movement. The patient can be slightly rolled to one side, alternating the side on which his weight rests. Such movement not only relieves the local pressure which gives rise to decubiti, but shifts the depth of respiration. It often, therefore, assists in clearing the respiratory passage through the coughing which may follow such a change in position.

13. Maxillo-facial Casualties

a. Litter Evacuation

In the litter evacuation of fresh maxillo-facial casualties adequate attention occasionally has not been paid to the proper position for such cases. Improper position may result in fatality during evacuation. Instructions on this matter should be provided all personnel handling fresh casualties. Severe cases should be arranged in a prone position on the litter with the head supported by blankets. Such position gives the greatest assurance that the airway will be maintained and provides against the danger of aspiration of blood and oral secretions.

b. Jaw Fixation for Evacuation

Par 1, Circular Letter No. 122, Office of the Chief Surgeon, "Preparation of Maxillofacial Casualties for Evacuation by Sea or Air", 7 October 1944, is amplified as follows:

(1) In preparing casualties for evacuation inter-maxillary elastic traction should be reduced to only that amount required to hold the lower teeth in gentle contact with the uppers when the jaw is at rest. (Two elastic bands on each side are usually enough to accomplish this end).

(2) The traction should be applied in such a manner that it will definitely and immediately be released by pulling down on a suture passed through the lumen of the elastic bands.

#### 14. Thoracic Wounds

##### a. Resuscitation

(1) Grave thoracic wounds as seen in forward hospitals are commonly associated with severe pain and shock. In addition there may be a sucking wound, and a laceration of the lung or diaphragm. The cough mechanism may consequently be inadequate in clearing the tracheo-bronchial tree of blood and secretions.

(2) These patients are dyspnoeic and present signs of anoxia. Course tracheal rales may be present. Palpable rales are often felt over the affected lung. Secretions should be aspirated immediately, preferably through a bronchoscope or by means of an intratracheal catheter. Many of these patients are apathetic or semicomatose and do not need an anesthetic. The patients should be moved as little as possible and aspiration through a bronchoscope or intratracheal catheter should be done with the patient in a semi-sitting position on the stretcher. Oxygen administration is desirable before and after aspiration. When the bronchoscope is used the flow of oxygen should be directed through the sidearm of this instrument after the glottis has been passed.

##### b. Sucking Wounds

(1) Debridement of thoracic wounds is aimed at excision of devitalized tissue and removal of foreign bodies, including pieces of splintered rib. This procedure must be done meticulously if the objective of primary closure is to be obtained and if infection of the pleural cavity is to be avoided. The operation should be performed under endotracheal gas-oxygen-ether anesthesia. The wound should not be prepared before the endotracheal tube is in position. Wounds complicated by shattered ribs invariably become sucking during the removal of rib fragments.

(2) The fractured rib ends should be trimmed smoothly and rib fragments bare of periosteum removed. All blood should be aspirated and clots evacuated from the pleural sac. The pleural space should be examined and all foreign bodies removed since they usually will cause empyema. Missiles seen in the x-ray film at the level of the 12th rib are frequently in the costophrenic sinus.

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(3) It is desirable to remove foreign bodies from the lung and suture lacerations of the latter when the patient's condition permits. Adequate exposure for this purpose can almost always be obtained without additional rib resection by enlarging the wound and making an intercostal extension.

(4) Drainage of the pleural cavity should be established through a stab wound in an intercostal space at the level of the inferior angle of the scapula in the mid-axillary line, (never through the operative wound). Under field conditions it has been found that the conventional sized catheter becomes occluded quickly. A size 26 or 28 F catheter, or tube, is considered preferable. The tube should be sutured to the skin and connected to a sterile water seal system. It should be removed in forty eight hours.

(5) The wound should be closed in layers.

(6) Instillation of penicillin, 40,000 units in the pleural sac and aspiration of air from the latter are the final steps in the operation. Air is aspirated preferably from the second interspace anteriorly with the patient lying on his back.

### c. Thoraco-abdominal Wounds

(1) Late complications are common in this group when the right side is involved. These include liver abscess, sub-diaphragmatic abscess, empyema, and diaphragmatic hernia. They can best be prevented by proper drainage of the spaces involved.

(2) Wounds of the liver are usually best managed by packing. The packing should be exteriorized through the most accessible point of the body wall below the level of the costophrenic sinus. Foreign bodies in the liver commonly cause abscesses. When accessible they should be removed.

(3) The diaphragm should be repaired with modium silk.

(4) Intercostal drainage as described in b. (4) above should be established.

### d. Hemothorax

Hemothorax is the most common complication requiring further treatment in rear areas. Frequent aspiration without air replacement is the best prophylaxis against clotting and infection. Following the first operation, 40,000 units of penicillin should be instilled in the pleural space. Patients having a hemothorax should have a final attempt at aspiration before they are evacuated if there is reason to believe residual blood or fluid is present. Aspiration of hemothoraces is often neglected in hospitals passed through in the chain of evacuation. Many aspirations are attempted

at too low levels. The most satisfactory point for aspiration is usually at the level of the inferior angle of the scapula at the posterior axillary line. Later, because the lung may become adherent posteriorly, it is commonly necessary to aspirate in the axillary area or anteriorly.

c. Empyema

(1) Many patients are reaching general hospitals with empyemas which are already chronic. This is usually due to too prolonged treatment with aspiration and penicillin instillation, to inadequate drainage, or because of retained foreign bodies.

(2) Empyema is best treated by rib resection drainage at the most dependent portion of the cavity. The most advantageous site for drainage is usually the ninth rib at the posterior axillary line. Mediastinal fixation sufficient to make open drainage safe occurs within ten to fourteen days after wounding.

(3) Post-operatively the patient should sit up at once and be made ambulatory at the earliest possible date.

f. Intercostal Nerve Block

The relief of intercostal pain associated with thoracic wounds contributed to a more satisfactory convalescence. The raising of secretions is facilitated and less morphine is required. This can be accomplished by intercostal injections of 1% novocaine. During the course of operation readily accessible nerves may be crushed to accomplish this purpose.

g. Thoracotomy

(1) Necessity for intra-thoracic operative procedures usually occurs in patients having sucking wounds. Such operations can almost always be performed by enlarging the original wound as described in par b (3) above.

(2) A formal thoracotomy is rarely necessary except in thoraco-abdominal wounds where it is planned to perform both the thoracic and abdominal operation through a single incision.

15. Closure of Wounds of the External Genitalia

Experience has shown that wounds of the genitalia, especially the scrotum, tend to break down when they are tightly closed primarily. It is desirable either to leave the wounds open or to suture them loosely.

16. Eye Casualties

a. Atropine Sulphate

To prevent the formation of posterior synechia whenever possible, all casualties with evidence of intra-ocular trauma will be treated with one (1) percent sterile atropine sulphate solution or atropine ointment three times per day. Regardless of the evacuation status of the patient this treatment will be continued until ordered otherwise by an ophthalmologist.

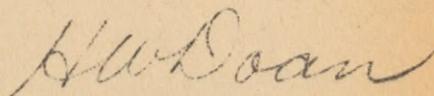
b. Penicillin and Sulphadiazine in Non-battle Injuries

Systemic administration of sulphadiazine and/or penicillin are indicated in penetrating injuries to the eyeball or orbital contents exactly as used in other wounds or injuries of the body.

17. Records

F.M.R.'s must contain all pertinent clinical factors relative to pre-operative and post-operative care. Inadequate records hinder proper care in general hospitals after evacuation of patients from Army areas.

By order of the Chief Surgeon:



H. W. DCAN,  
Colonel, Medical Corps,  
Executive Officer.

