COMPLICATIONS

Three patients had pulmonary fistulae. Two had been drained previously by trochar and catheter which were unsatisfactory. In two cases the site of drainage became infected and caused some leakage of the irrigating fluid. (The body there is protected by heavy coats of vaseline.) One case had pericardial effusion in which absorption took place. Three cases had clubbed fingers from long-standing infection. Two cases developed phlebitis, one in the forearm and the other in the inner aspect of the thigh. One patient, a Negro, had pus accumulation bilaterally in the chest cavities.

COURSE OF THE DISEASE AND END-RESULTS

In a few cases a rise of temperature occurred some days after drainage was instituted and on examination it was found that the tube had slipped out far enough to make drainage unsatisfactory, or that side pockets had formed near the fistulous tract. These drained voluntarily into the original pocket. There was no mortality in this series of cases. There was no evidence that it would be necessary to do secondary operative work. There was no case of rib necrosis from tube pressure, and there were no sinuses.

OBJECTIONS TO THIS METHOD

1. This mode of treatment would be troublesome in small children, due to the child's desire for great latitude of movement of the body. For the small child I would suggest the same treatment minus the attached drainage tube leading to the siphon bottle, and would suggest clamping the end of the drainage tube which is held within the dressings. The irrigations can be made through this tube and drained out at the same sitting, care being taken not to allow a quantity of air to enter the chest cavity.

2. Cases where multiple pockets are shown by skiagram can be drained more adequately by an opening in the chest wall sufficient to admit of one or more fingers for the purpose of converting two or more cavities into one common pocket through the destruction of adhesions.

FACTORS FAVORING THIS METHOD OF TREATMENT

1. This drainage is easily accomplished with the aid of local anesthesia only.

2. Coughing is reduced to a minimum; whereas in costectomy the cough is painful and excessive for a few days.

3. There is positively no shock; while the shock in rib-resection is due to a collapsed lung and to disturbance of the natural pressure on the healthy side caused by the mobile mediastinum. However, if the mediastinum is thickened by adhesions, the normal relation of pressure in the healthy side is maintained.

4. There is not the added danger of secondary infection in a large chest wound exposed often for dressings.

5. The patient is more comfortable and cleanly, and there is total absence of odor in the ward.

6. It is possible to drain both cavities simultaneously if desired.

7. By virtue of this method of drainage and the proper use of the blow-bottle, and other lung exercises during convalescence, decortication of the lung will be rarely or never necessary.

8. Dakin's gives better results when confined in the cavity for ten or fifteen minutes. This can not be done under the open method.

The most important lesson taught by the recent epidemic is not to drain a pleural empyema until the body has developed a tolerance for the infection, or in other words until anti-bodies have been formed.

THE TREATMENT OF GUNSHOT FRACTURES OF THE EXTREMITIES*

By ROBIN F. MASON, M.D.,
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In the treatment of compound fractures, in which class all gunshot fractures fall, there are three main considerations.

These, given in order of their importance, are: (1) the saving of life; (2) the saving of limb; and finally (3) the preservation of function, the other two conditions having been met.

The thing of prime importance, first, last and always, in the treatment of this type of fracture, or, for that matter, any type of fracture, is a free, unstinted, intelligent use of the x-rays.

*Read before the West Tennessee Medical Association, Dyersburg, May 29, 1919.

Bones fractured by gunshot or other missiles should be fluoroscoped from as many different angles as the surgeon deems necessary in order to locate and localize all foreign bodies, as well as to get a good idea of the bone condition.

After foreign bodies have been localized and the skin properly prepared, the wound of entry should be opened and a thorough debridement operation done. Every particle of bruised skin, muscle tissue, fascia and all foreign material, as well as unattached bone fragments, should be removed with the knife and scissors, leaving, if possible, a smooth-walled, conical-shaped wound, the sides of which do not drop together upon removal of the retractors. In other words, you should try to leave a wound which will drain of its own accord, a wound containing no devitalized tissue left to die there and poison the patient, and a wound with no tendency toward the formation of pus pockets should infection take place. The very careful removal of small, loose bone fragments can not be too strongly urged, since such are purely and simply foreign bodies and will cause unending suppuration in case of infection. Here I might say that devitalized muscle can best be told by its loss of contractility. Muscle slow to contract or non-contractile, especially if a little off color, had best be removed. Needless to say, a due regard should be had in doing these operations for essential nerves and blood vessels.

Having cleansed the wound thoroughly, the next consideration is the proper setting of the bone, and the necessary antiseptic dressing.

I use the word antiseptic purposely, as these fractures should, in the overwhelming majority of cases, be regarded as infected. You will seldom be wrong in that assumption.

The infective process may be slight, indeed, and usually is if a proper debridement has been done, but few are there that can be safely closed.

Joseph Blake says this in substance:

"These compound fractures, unless produced by a rifle or shrapnel ball, which do not as a rule entrain clothing or other foreign material, are regarded as infected a priori.

"Where the wounds of entry and exit are in fractures produced by rifle bullets, they may be considered as uninfected for the reasons given above. When produced by shrapnel ball, judg-

ment gained from experience must be used even when wounds of entry and exit are small and even then if aseptic operation can be done, it will do no harm, but may do good."

Shrapnel wounds of course have no place in civil surgery, and so they deserve no particular consideration. The rifle bullet referred to by Blake was the rifle bullet used in war, which is a hard metal bullet, whereas the bullet most often seen in civil surgery is of the soft-nosed type. Hence, it would seem that the rifle bullet of private life should at least be looked upon as a suspicious character and promptly ejected.

For the treatment of infection, nothing so far as I know has ever approached in usefulness the proper use of Dakin's solution applied after the method of Carrel and adapted to the individual case. Let me stress at this point that unless the Dakinization is done properly with the utmost precision and regard for details it is a waste of time and solution.

Improper application and poorly-prepared solution are responsible for 90 % of failures in the use of this marvelous agent. I can not go into the details of the proper use of this solution, but will simply mention some of the main considerations in its use. To begin with, one must divorce himself absolutely from the old ideas of drainage when using Dakin. I refer especially to counter-drainage, as, for instance, in a case of through-and-through thigh wound with fractured femur. If all foreign bodies have been removed, it is better if you allow one of the wounds to close and apply all your solution to the other.

In other words, you do not want to put your medicine in one side and let it run out of the other. You want to puddle the solution in the wound, allowing it to seep into every crack and cranny. The solution can be conveyed to the wound by whatever kind of tube you may think best suited to the situation. Remember always that it is not necessary but harmful to deluge the patient and keep his bed soggy in your enthusiasm to give enough Dakin. It makes the patient miserably uncomfortable and frequently causes an unnecessary dermatitis. Use just enough to fill the wound and no more. I may have stressed the use of Dakin's solution too much, but in my eyes it is our sheet an-

chor in pus surgery where there is bone involvement. The solution should be applied every two or three hours till the wound is bacteria-free or so nearly so that a closure can be done and the fracture converted into a simple one.

During the period of Dakinization such splinting should be used as best serves to hold the fragments in proper alignment without interfering with the antiseptic measures.

In femur fractures the Hodgens or Thomas splints are best during this period. They should be used in connection with the Balkin frame or some other overhead type of support. Plaster-of-Paris may be used after a closure has been effected.

Frequent x-rays should be taken with the patient in bed and in splints in order to correct such displacements as may occur. As a general rule as regards position, abduction should be increased in femur or humerus fractures, the nearer the fracture is to the socket.

The reverse is also true. All femoral fractures require, with rare exception, extension which can be applied by Buck's method or some other, depending upon the case.

Compound fracture below the knee, especially when both are involved and the fracture is in the lower third, require some method of extension.

The Sinclair skate usually meets all the requirements of such a fracture. Of course some splinting must be used in addition to the extension. The Thomas or Hodgens acts very nicely in conjunction with the skate and especially while Dakinization is going on. Plaster is the very thing in this locality after closure of the flesh wounds, or at least after some consolidation has taken place. If wounds are only partially closed windows can be cut in the cast and dressings done through them. No wet dressing works well with plaster-of-Paris unless the plaster has been well paraffined.

For humeral fractures the Jones traction splint will be found most useful where the fracture is not above the insertion of the deltoid.

In these latter high fractures some form of abduction or aeroplane splint serves best.

Fractures of the forearm are easily

handled on right-angle, internal-lateral splints made of wire arranged after the fashion of a ladder. These splints should extend from axilla to finger tips.

The x-ray should be consulted frequently in all these types of fractures.

As regards wounds to joints, I shall speak only in a general way, as each joint is a law unto itself, and consequently requires individual treatment.

For instance, in the elbow, free movement may be most desirable, while in the knee carrying power is most essential, even at the expense of mobility.

Fresh joint wounds should be treated exactly in the same manner as the wounds of soft parts accompanying function. All devitalized tissue, synovia included, foreign material and bony fragments should be cut away, and, most important, perfect hemostasis made.

The synovia should then be closed with catgut sutures and the remaining peri-articular structures either closed or left for delayed suture, depending upon circumstances. In those cases great care should be taken to drain the wounds to bones forming the joint itself; otherwise in case of infection the wound may attempt to drain itself through the joint rather than the other way around. No drain of any kind should be put in the joint, as it does more harm than good.

Motion, passive at first, should be started within the first three days, followed after that time by active motion, even in joints that are discharging.

Needless to say by way of conclusion, all patients suffering with gunshot fractures should have at weekly intervals from two to three injections of anti-tetanic serum.

PRE-OPERATIVE AND POST-OPERATIVE TREATMENT

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There are diverse views of pre-operative and post-operative treatment, due probably to a lack of a general co-ordinated effort at standardization, that would admit of becoming harmonized by a mere active and general study of the needs of the situation that can not be met by any one man's experience.

We are accustomed to think that so