RAILWAY SURGERY

THE IMMEDIATE AND AFTER-TREATMENT OF RAILWAY INJURIES.*

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The prompt treatment of railway injuries comes under the general designation of urgent surgery. So much has been said, written and done concerning first aid to the injured in corporate civil practice, as well as in military life, that it is needless to dwell at length on this phase of the subject on this occasion. Its importance and necessity are generally recognized.

Railway injuries generally are correctly defined as contused, lacerated and mangled, and much more prone to infection than smooth and cut wounds. They therefore demand more skill, care and detail in treatment and management. The intrusion of dirt, clothing and splinters into such wounds is common.

The circumstances, conditions and environment are unfavorable to the best treatment; so tentative measures, such as the external application of peroxide of hydrogen and iodine with dry sterile gauze is usually sufficient until the patient is in a hospital, or under conditions at least more favorable to clean dressings, proper surgical treatment and consequently prompt healing of wounds.

In case of fracture of the extremities, some temporary fixation dressing to prevent angulation at the seat of injury is essential to the safe and more comfortable transportation of the patient to place of permanent treatment. Severe or continuous hemorrhage is about the only condition which would justify immediate exploration on the spot in order to arrest grave impending danger. Probing is seldom justifiable under any conditions.

Meddlesome surgery—the pretentious effort of doing something without sufficient knowledge of the nature of the injury, and without adequate preparation, is nothing less than surgical affectation,

though it may be well intended. With the conditions surrounding these accidents, and especially those attended with hemorrhage, unconsciousness and shock, the encouragement and the temptation to do something positive or effective at once is very great. There are few, if any, conditions more trying to the necessary self-control and balanced judgment of the surgeon; and if he is inexperienced, none in which he is more likely to adopt an unjustifiable procedure, due to what he imagines is expected of him amidst the confusion and embarrassment of unfavorable conditions and environment. Unnecessary medication and premature operation are the too frequent result.

As a rule, severe railway injuries are of such a character and nature that hemorrhage, though severe for a moment, soon ceases. The lacerated intima retracts and the lowered blood pressure soon results in localized thromboses, which are conservative in effect. Very tight bandaging to a badly damaged extremity is usually unnecessary, and an elastic bandage to prevent or control bleeding is dangerous to the integrity of the limb and to the constricted part for the use of flaps if amputation should be necessary. This bandage, if used for but a short time even, invites tissue necrosis and subsequent sloughing of the parts.

Shock is probably more unfairly and unscientifically treated than any other emergency condition incident to railway traffic. Whether it is due to the vasomotor exhaustion theory, or to the more recently accredited theory of biologists—Hadane, Porter and Yale Henderson—of a deficient dioxide content of the blood, is of little practical interest to the average railroad surgeon. He knows, doubtless, that the blood pressure is dangerously low and the blood stagnant in the venous trunks and capillaries. The practical question is, how is the condition treated, and how should it be treated? No man can possess surgical judgment unless he knows when to operate, when not to operate and how to operate. Mere technic, however fascinating, is mechanical art, but by no means the summum bonum of surgery, and may be devoid of

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both skill and judgment as to the necessities and principles involved. Shock too frequently is not treated at all, but the patient is rushed to the hospital, where an amputation or severe operation is done while the patient is still in severe or profound shock, with the result that some never recover consciousness, and others, after a doubtful struggle, finally react. Skilled surgeons, if they do not witness, are at least cognizant of such occurrences every year in the corporate operations of the country. Strange as it may seem, there are many men doing surgery who do not seem to realize the importance and necessity of securing good, substantial reaction before performing severe and capital operations.

Some learn little from books, teachers, instructions, and even experience, in this class of cases. The useless and unnecessary sacrifice of life is my excuse for speaking plainly concerning it.

Dry heat to the body—hypodermoclysis—and rectal saline and sugar solutions are safe and conservative methods that should be used before any patient in shock is subjected to anesthesia and operation. In case of much loss of blood, only, is blood transfusion necessary. Hemorrhage induces collapse and intensifies and prolongs shock.

If the injury is abdominal, with or without laceration of the wall, and shock is profound and protracted, rupture of viscera or slow, continuous hemorrhage is probable. An anesthetic under such conditions is not only extremely hazardous, but too frequently fatal. When operation is imperative, in order to save life, under such conditions, local anesthesia is the method of choice—with nitrous oxide and oxygen in reserve. To give a general anesthetic, as I have reason to believe is not infrequently done, especially in bad wounds of the extremities and within the abdomen with the patient in severe or profound shock, is indefensible. To add surgical shock to that of injury will hasten and may determine the fatal issue.

In case of fracture of the long bones, the immediate consideration is fixation. If it is a closed fracture, the ordinary dressings by splints and extension in the hospital will usually be sufficient. If the fragments can be adjusted without operation, it is better not to operate. All direct

methods of fixation in acute fractures retard osteogenesis, prolongs convalescence and undoubtedly increase the risk of infection. If the fracture is an open one, it is not, today, considered advisable to use any direct fixation appliance to the fragments under ten days or two weeks, even if necessary, nor then, I would suggest, if the fragments are in good apposition with little or no overlapping. No matter what method is used, scrupulous care should be given to the line of axis of the limb. Casts should not be used until after the immediate swelling has subsided. Silicate of soda solution makes the lightest and neatest of all casts. The fact that it dries more slowly than plaster of paris is not a serious objection in most cases. If extension is deemed necessary, it can be applied to the limb before the cast is put on and maintained temporarily or permanently as desired. When reasonably good adjustment of the fragments can not be had or maintained by the methods suggested, then it may be advisable to resort to one of the methods in general use, such as Lane plates, clamps, chromic gut, or wire; or, now, the autogenous bone graft, which is rapidly coming into favor. In my opinion its chief place and value is in delayed and non-union. It is undoubtedly a better stimulus to osteogenic action and has the distinct advantage that it is not a non-absorbable foreign body, and, consequently, is not likely to have to be removed on account of infection.

Mangled feet and hands and fingers from car wheels and bumpers in coupling and uncoupling of cars and in braking is a common occurrence, notwithstanding "safety first" instructions. There is no more urgent field for skillful, conservative surgery than in these injuries. The loss of a hand, or the index finger and thumb especially, is as serious to the laborer as it would be to the surgeon. Besides the need of preservation, it is a costly loss to both employee and employer. Lacerated tissues are more liable to infection, more dangerous, and heal more slowly. It is necessary to preserve intact by anastomosis when severed of tendons, and nerves whenever possible, using such plastic procedures as each case may demand. With careful attention to drainage, to cleanliness and to detail in the

daily dressing and management of these cases, surprisingly good results are frequently obtained. They are hospital cases from the first aid dressing to the conclusion. Such wounds of the extremities, involving muscles and tendons, require early passive motion in order to prevent fixed adhesions, and in consequence impaired motion and function.

To a damaged blood vessel of consequence, compression is a temporary expedient only; usually first aid or during reaction from shock, or while being transported to a hospital. The final treatment should be, if equipped for it and conditions are favorable, preferably suturing the vessel end to end, or the older method of ligation of both sides of the injured vessel. The first consideration would apply to such vessels as the axillary, the brachial, the femoral and popliteal.

It is bad surgery to sew up torn and lacerated wounds, though it is not infrequently done on the spot. It is a sure harbinger of infection, and the work will have to be undone. The open method with free drainage and the application of hot sterile solutions is best and safest until the blood supply is assured. As long as the chief blood and nerve supply are intact, the member can usually be saved, regardless of fracture and considerable laceration and confusion of muscles and tendons. More skill and surgical judgment—more patience and time—are required for the successful treatment of such injuries than in those which are so self-evident in character as to imperatively demand only one course of procedure. No operations are more successful than the anastomosis of muscles, tendons and nerves. Infection being more common in these injuries, imperils every effort that is made for the regeneration of damaged tissues and the preservation of most useful parts and members, while complete functional repair as modern surgery skillfully administered could effect is most important. The prevention of infection is, therefore, the first requisite

and it is often determined by the first treatment as well as by the nature and circumstance of the injury.

Scalp wounds, however extensive, are not usually attended with severe shock and heal primarily, kindly and promptly.

The most insidious and dangerous injury to the skull is a small punctured fracture. It is peculiarly susceptible to infection and to be followed, at a later date, by brain abscess and its evil consequences. Every such wound demands early exploration and the removal of all fragments of bone and debris, or serious results are likely to follow.

Fractured ribs with punctured lung and pneumothorax present a dangerous condition that requires absolute rest and the most conservative management.

I have endeavored to consider only some of the most important accidents incident to the operation of the railway service. They should receive full and fair investigation and the best treatment at the hands of the surgeon in order that impartial justice may be rendered the patient, the employer and the medical department, which shares the obligation and the responsibility.

DISCUSSION.

Dr. W. L. Brown, El Paso, Texas.—I do not think any improvement could be made on that paper. I think it is one of the best papers I have ever heard of on the subject. I think it would be too bad, after the doctor came such a great distance to read such an excellent paper, for us not to give it any discussion at all.

Several of the points are a little different from anything we have had today and are well worth our consideration. Knowing Dr. Grant to be a fine and conservative surgeon, we can follow his advice on almost any subject.

The transplant of bone interested me. Of course we know that that is for delayed unions and ununited fractures. In other words, that the bone transplant is not to be used as a mechanical appliance for the holding of bones in position. A bone transplant will not resist a continued effort at displacement, because one of the things that happens to the transplant is that as it becomes vitalized it becomes soft and a continued effort at displacement will finally pinch it in two.