

and how much upon the neuropathic inferiority of the individual. It would seem unjust for those who are supposed to be responsible for the condition after it exists to have to be responsible for the neuropathic inferiority.

Now the author of the paper wisely said whether a psychosis develops depends upon the patient. It also depends upon the personality of those who are going to be associated with an individual shortly after the injury is supposed to have occurred.

It is a very good idea for the corporation surgeon who is trying to help not only the company but the patient as well to let the patient know that it is for his interest from the standpoint of his future health that he should get early relief and settlement for claims that seem to exist and get through with it, in order that he may have a better chance to get well.

Dr. Joseph M. Burke, Petersburg, Va.—My experience along the line of general neurosis does not compare with the so-called "traumatic neurasthenia" which we find so frequently as a cause of action against railroads; in fact, cases of psychic and traumatic neurosis in my opinion and experience are found only in the court house.

When I find such conditions as pain in the back, can't sleep at night and the other allied symptoms of a pure nervous condition complained of, if it is with an employee and he employs a doctor other than the railroad physician, who is without cost to him, my diagnosis is that I have a fake case on hand which will give the company trouble.

Personally, I have never seen a case of pure traumatic neurosis or psychic neurasthenia, though I have read of such a case in Dr. Leigh's home city, which, in addition to the traumatism, produced the psychic condition, which predominated. As is frequently the case, if not always so, these neurosis cases get well immediately with the application of a greenback plaster, though the particular case referred to did not get well immediately after settlement, as the psychic element continued for some time thereafter.

I have found that the hotbed of mythical psychic neurasthenias, in so far as the Seaboard is concerned, is at Savannah. Dr. Owen is thoroughly familiar with conditions there. At one time I had his eminent advice and counsel in a so-called physical neurasthenia case. A doctor for the plaintiff in this particular case, and who is nearly always employed and he so admits his employment against corporations, is, to say the least, ingenious in his testimony. He says that the presence of any sudden danger or mental shock associated or not with any physical injury and this shock even occurring with a railroad employee (whom you and I believe and know to be less prone to psychic shock) will produce the so-called traumatic neurasthenia or psychic shock. Dr. Owen was present in court and heard this doctor for the plaintiff say under oath that his interest in the outcome of the case was that if the plaintiff gets a verdict he (the doctor) gets a fee conditioned upon the size of the verdict, or a very fair fee if there is a good verdict in the case.

This so-called case of "psychic neurasthenia" was carefully examined by Dr. Owen, three other physicians and myself, and all agreed that the plaintiff had no symptoms whatever of traumatic psychic neurasthenia.

I have enjoyed the paper of Dr. Casamajor in which he has covered the subject of the diagnosis of traumatic neurasthenia, but it is not the true case that railroads are particularly interested in; it is those mythical cases that we would like to know about so that we may be able to make conclusive diagnosis, sufficiently at least to the satisfaction of juries.

Dr. Casamajor (closing).—The point brought out of the personality of the individual is, of course, the most important thing. Traumatic neurosis does not differ from the occupational neurosis, or the neurosis of a man wanting to get away from his wife, or vice versa; it is the personality. Dr. Moody's remarks are very much to the point, and Dr. Burke's point of view on the thing is in the main in accord with mine.

Dr. Bailey, in an article about three years ago, described his own experiences when he was in a wreck. The train in which he was, hauling over a hundred, was known as "The Bankers' Special," carrying bankers, lawyers and other professional men from the country districts to New York. All of them were too busy to be able to afford a neurosis, and of that large number of men in that wreck (no one killed, but some rather badly hurt) not a single case of traumatic neurosis arose. The element of shock and injury was there. Had these people been day laborers who could have wasted the time, some might have developed a neurosis. Not one of them could afford to have a neurosis, and hence not one of them did.

FRACTURES OF THE LOWER EXTREMITY: THEIR TREATMENT*

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The treatment of fractures of the lower extremity constitutes a most extensive field. The subject matter of this paper comprises a few technical procedures which the author has found of practical benefit.

Surgeons agree that the immediate reduction and mobilization of fractures—that is, within the first two or three hours—is the ideal method of treatment; and furthermore, that such reduction should be made under general anesthesia. Regarding immediate reduction one man has said, that a nurse girl in the park can

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do more toward reducing a fracture just after it has happened than the very best surgeon later on, after swelling has set in. A Hawley table or Lemmon apparatus is of great assistance in obtaining proper reduction. If these are lacking, it is not difficult to obtain the desired traction by improvising with differential pulleys, S-hooks, webbing, a kitchen table, etc.

For making traction on the lower extremity, the ankle sling devised by Dr. Howard D. Collins, of New York, has proven of great value. Full details of the technique are given in Dr. Collins' article in the *Annals of Surgery*, July, 1916, p. 65. Briefly, the ankle is thoroughly padded; the sling is then applied so that it forms two symmetrical Ys,—one on each side of the foot. Traction is made by pulling on the stems of the Ys. Care must be taken to have the slings form Ys, not Ts; in the former case (Ys), as soon as traction ceases, constriction automatically ceases; in the latter (Ts) the slings do not loosen and constriction persists. To assure this automatic relaxation, the angles of each Y must be on a level with the sole of the foot; secondly the Ys themselves should be covered with several turns of bandage material to prevent their becoming incorporated with the overlying plaster and thus hindering relaxation when traction is discontinued.

In the absence of the Hawley, Lemmon or similar apparatus for producing traction, it is customary to rely upon human assistance. Experience has shown that the assistant whose duty it is to pull, very soon tires and so fails to furnish the desired amount of traction. Recognizing this point, Hawley has had the traction strips lengthened sufficiently to meet and tie behind the assistant's back. Now, instead of pulling with hands and arms, the assistant simply leans against this loop—away from the patient—and thus maintains traction with a minimum of effort.

Plaster is applied in the usual manner, covering everything except the projecting stems of the Ys. Traction is of course sustained until the plaster has set, when the projecting stems of the Ys are cut off flush with the surface of the cast. The automatic cessation of constriction is proven by the change of color in the toes from deep blue to the normal pink.

Hackenbruch's turnbuckles constitute

another mechanical contrivance of some value. Suppose a fracture has been put up in plaster and the X-ray reveals a moderate amount of over-riding. Before removing the cast and applying another, the following method may be tried: Make a circular division of the cast at the same level as the site of fracture; distract the two halves of the cast (upper and lower) by means of Hackenbruch turnbuckles, whose foot plates are incorporated in the cases—one on either side—until the desired correction has taken place. This method has decided limitations. I do not believe that shortenings of more than one inch can be overcome because of the danger from pressure necrosis over the tendo Achilles and dorsum of the foot. Mention is made of this method in connection with nail extension (to maintain traction in the presence of delayed union) in the description of cases below.

In the majority of instances, if Buck's extension is applied within a few hours after fracture, shortening is prevented. Here, another practical point may be mentioned, viz: the use of overhead suspension instead of allowing the limb to lie in a cradle on a hardwood track. After the usual adhesive plaster strips, bandage, wooden spreader and traction rope are applied, make strong enough traction to keep the broken limb straight. Now, maintaining this traction, raise the heel so that it clears the mattress 5 or 6 inches and have an assistant place the pulley at such a point that this position of the heel is maintained. The knee will be 3 inches from the mattress. The nurse is instructed that constant traction must be maintained and that if the knee sags, the traction is insufficient and it is her duty to investigate and to correct matters so that the proper amount of traction is once more obtained. As a matter of course, there is counter-extension with a perineal strap, the patient is given a box against which to push with his sound limb, and lastly, the foot of the bed is elevated.

In simple fractures a week or ten days old having from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches shortening, such shortening can not be satisfactorily overcome by Buck's extension or Hodgen's suspension. The question remains whether to reduce such a fracture by an open operation or by some simpler, less formidable method. According to

the author's experience, as long as false motion is present (as long as the fragments can be angulated), even as late as four weeks after fracture, nail extension will effectively overcome shortening.

The employment of nail extension or its modifications such as the Ransohoff-Syms ice tongs, or the Finochietto stirrup, narrows still more the small group of cases in which open operation is indicated (interposition of soft parts, persistent malposition of fragments near joints, etc.). For details of nail extension technique the reader is referred to previous articles by the author (*Amer. Jour. of Med. Sciences*, August, 1913, p. 157; *Journal of the A. M. A.*, October, 1916, p. 1142) and to Steinmann's original monograph in the *Neue Deutsche Chirurgie*, 1912.

OPEN OPERATION

Lexer's X-ray studies of changes in the local blood supply during the healing of fractures have a direct bearing upon the technique of open operations. In a series of recently fractured limbs, the animals were killed at different periods and the main artery of the limb was injected with an emulsion of mercury and turpentine. Subsequent X-ray pictures showed great congestion of the blood vessels in the soft parts around the fracture. This local engorgement reached its maximum at the end of three weeks and then subsided in another week or so, as consolidation became established. The vessels in the bone close to the fracture-line showed no such degree of congestion as that seen in the adjacent soft parts. In the experiments where the periosteum was removed, the blood supply to the bony tissue was greatly reduced. According to Lexer, the main blood supply reaches the bone through the periosteum and therefore *greatest care should be taken to leave undisturbed the relationship between soft parts and periosteum*. For this reason he makes a long, ample incision down to and through the periosteum, using a large knife so that all soft part layers are practically undisturbed. The periosteum (in undisturbed contact with the soft parts), is then stripped from the bone for several inches above and below the site of fracture—according to Lexer as long as the periosteum-soft part relationship is intact; nutrition is assured; in other words, one need have no fear of

non-union after extensive subperiosteal denudation of bone. As additional proof of his ideas, Lexer cites the well-known fact that X-ray pictures taken after plating operations for fracture often show plenty of callus on the side opposite the plate and very little on the same side. He says that in the usual operation the soft parts are first separated from the periosteum-covered bone (thus depriving the periosteum of its main blood supply); after this the periosteum is divided, pushed aside, and the bone thus exposed. On the side of the bone opposite the wound the operator can not reach the tissues except with much difficulty. Hence the periosteum-soft part relationship is not disturbed and the subsequent nutrition and repair are much less hindered.

I shall not speak of Lexer's application of this principle applied to the treatment of non-unions. Those interested in the subject will be amply repaid by reading the original article in the *Deutsche Zeitschrift für Chirurgie*, Vol. 133, p. 170.

A procedure which facilitates the freeing of fragments at open operation preliminary to their reduction is to kink the limb at the site of fracture (a bone hook is inserted into each fragment and they are pulled apart as freeing goes on and angulation is increased). In the case of the femur, the leg and lower half of the thigh are allowed to drop over the side of the operating table so that finally the two fragments of broken bone project from the wound practically parallel to each other. In this way the soft tissues situated on the far side of the fracture (the side opposite the operative wound and covered by the bones in the normal position), are exposed and dissection and control of hemorrhage are rendered safe and easy.

After exposure and adequate freeing, complete reduction may be accomplished by external traction with the Hawley table, the Lemmon table, the Lambotte perineal crutch, or by some procedure within the wound, applying a suitable clamp (Lowman, Lambotte or similar type) to each fragment. Now, on the one hand, if the fracture is a recent transverse one, the fragments are kinked until they can be freely moved, their corresponding edges are coapted and the fragments are then straightened out. On the other

hand, if the fracture is oblique, the clamps on each fragment constitute fixed points against which turnbuckles may exert distraction until reduction is accomplished and immobilization is assured by the application of a plate, bone graft or other fixation method.

A number of modifications of the turnbuckle method have been put on the market. Most of them have the inherent mechanical defect that the distracting mechanism is set half way up the shaft from the bone. This subjects the mechanism to enormous bending strains as soon as force is applied. On the other hand, if the distracting force is applied close to the bone, these strains are minimized.

IMMOBILIZATION AFTER OPERATIVE REDUCTION

Both Lane and Lambotte immobilize femoral fractures for a period of a week or so with the knee in acute flexion—the heel touching the buttock—using bandages and gauze, but no plaster. At the end of this time—as soon as the skin has healed—a temporary splint is applied and daily massage and passive motion are begun. This is a more reasonable treatment than the customary six weeks' immobilization in plaster, for it certainly favors better nutrition of the tissues. Lexer, the foremost advocate of operative reduction of fractures in Germany, is opposed to plates. He uses bone grafts exclusively. He begins massage and passive motion during the third week.

COMPOUND FRACTURES

The commonly seen fracture of this sort in which the skin is barely broken, if promptly treated,—cleansed, flooded with iodine, reduced and immobilized,—usually heals without suppuration.

An entirely different problem presents itself in the compound fractures filling the military hospitals of Europe. Contrary to expectation, the so-called first aid measures (iodine and dry sterile gauze) proved of practically no value for preventing suppuration in wounds which were extensively contaminated. The only way to prevent a fatal sepsis was to establish free drainage by a most thorough and radical revision of the wound, so that all gross foreign matter was removed, and every nook and cranny was widely opened. At the first aid stations all they can do is to immobilize the limb (most of

the modern armies have excellent skeleton splints for this purpose) and prevent further contamination of the wound. The revision and establishment of drainage is to be done in an operating room, preferably under general narcosis.¹

One requisite of the Carrel-Dakin method is that a competent chemist make up the solution fresh every 3 to 7 days. If this is not feasible, an excellent antiseptic solution is that used by Mayer, a surgeon in the French army. According to D. H. Stewart, of New York, this is made up in two stock solutions: one contains chlorinated lime 1 part, acetic acid (6%) 20 parts; the other contains Epsom salts (Mag. Sulph. 2 parts, water 20 parts). Equal parts are mixed when needed.

The shortening present in bad compound fractures is best overcome by nail extension or one of its modifications. The report of Hey Groves,² of Bristol, England, is of interest in this connection. His series comprised 60 compound fractures of the femur, all septic. They reached him at least one week after injury. Six died. In 75% of the 54 remaining, he was able to obtain good function and no shortening by means of nail extension which he calls transfixion. It is rational that the less one disturbs septic tissues, the better. Hence metallic extension is to be preferred to plating operations in septic cases.

THE TREATMENT OF MAL UNIONS is undergoing great changes. Let us suppose there is a fracture which has consolidated and in which the shortening amounts to two and one-half to three inches. Formerly, what did the surgeon do? He cut down upon the fracture and found the upper end of the lower fragment so soft and cheesy that he could pare it with a knife; the contraction of the soft parts was so well established

1. Since the reading of this paper it has been the writer's fortune to hear at different times from Drs. H. H. M. Lyle, Charles Powers and George Hawley concerning the Carrel-Dakin sterilization of wounds. There can be no doubt that the few men who actually follow every minute detail of this treatment have been able to obtain the same excellent results as its originators. It is the method of the future in traumatic surgery,—in fact, in the treatment of all suppurations.

2. Hey Groves: British Journal Surgery, Vol. III, No. 12, April, 1916, p. 606.

that to completely overcome it during the limited time at the operator's disposal would have required a dangerous amount of force with probable harm to arteries, nerves or muscles. Hence the surgeon had to content himself with resecting enough bone from both stumps so as to properly align the now shortened fragments; and the patient had a permanent shortening. Nowadays, with nail-extension at his disposal, the surgeon exposes and re-establishes the fracture. He then closes the wound and by means of the powerful traction furnished by nail-extension, is able to overcome shortenings of as much as 11 cm. within a week or ten days. With the limb again at its proper length, consolidation generally takes place. Even should there be non-union, this can be remedied by subsequent bone grafting.

CASE REPORT

The following case illustrates this point:

A boy of 13 came to me four months after having sustained a transverse fracture of the middle third of the femur with a shortening of between $2\frac{1}{2}$ and 3 inches. There was solid union. The fragments were chiseled apart and nail-extension was applied, using 25 pounds traction. Within 17 days the shortening had been overcome. At the end of four weeks there was some callus, but no union. A plaster cast was accordingly applied to the limb, leaving fenestrae around the nail ends. It was divided opposite the site of fracture and by means of Hackenbruch clamps the distraction of the fragments was maintained. The nail was then removed and the nail holes healed kindly. At the end of $9\frac{1}{2}$ weeks there was a firm consolidation with a huge callus. He was accordingly discharged from the hospital with an ambulant splint and told to report weekly or oftener. There was no shortening at the time. He neglected to report for eight weeks; in fact, not until a police officer called at his house. He then had developed an external angulation. The parents refused any operative correction, but permitted him to be sent to an orthopedic hospital in the country. He returned six months later with firm union and $\frac{1}{2}$ inch permanent shortening. In spite of the patient's own neglect, the result was a distinct improvement over the original condition. This case indicates that in nail-extension we have a method for overcoming shortenings of long standing in old mal-unions, without danger of trauma to the soft parts, by virtue of continuous traction. This is much more effective as well as much safer than the necessarily sudden, brief distractions at open operations.

IMPROVISATION

Numerous methods of applying trac-

tion directly to the bone by means of some metallic contrivance are in existence. In addition to the Steinmann method, the Ransohoff-Syms ice tongs, the appliance similar to this evolved by Hey Groves (almost identical with an illustration in the front of Steinmann's monograph), the calcaneus stirrup of Finocchio (used with great success by Chutro, the Argentine surgeon who has made such a brilliant name for himself by his work in Paris), have all proven of unique value in the hands of competent surgeons. If one does not have the regular outfit at hand, it is not difficult to improvise with long steel drills or with a light pair of ordinary ice tongs such as I have seen applied in a case of femoral fracture by Dr. Martin Ware, of New York.

AUTHORS' ABSTRACTS

Military, Railway and Emergency Surgery

Remarks on the Treatment of Burns with Paraffin Mixtures as Developed by the Experience of the Present European War. Rudolph Matas, New Orleans, La. New Orleans Medical and Surgical Journal, Vol. 69, No. 10, April, 1917, p. 677.

In so far as there has been so much written in the lay and medical press, giving glowing accounts of rapid recoveries with the "Ambrine" treatment this was introduced by its originator, Dr. Barthe de Sandfort of Issy-les-Moulineaux, a review of the subject is of timely interest.

The observations of Major A. J. Hull, of the Medical Corps of the British Army in France, confirm the claims made for Ambrine, which is essentially a paraffin compound.

1. Burns heal with rapidity.
2. Constitutional symptoms rapidly abate.
3. Pain is reduced to a minimum.
4. Scarring appears to be obviated to a far greater degree than with other treatment, or is not apparent.
5. The need for grafting large burns appears to be avoided.
6. Patients free from sepsis.
7. Mild cases heal quickly and severe cases recover, which would have been unlikely by the ordinary methods of treatment.
8. Paraffin method superior to the older methods.

The excellent results obtained would appear to be due to mechanical causes: the protection of the burn from the air, protection of the recently-formed granulations from damage, the splint-like effect of the wax in holding the damaged tissue immobile and at rest. The heat of the applications and the conservation of heat to the surface may encourage the lymph flow, determine the supply of blood to the new capillaries and favorably affect healing.

The relief from pain and the rapidity of healing is due to the fact that the burn is held at rest