Original Articles.

TREATMENT OF FRACTURES OF THE FEMUR WITHOUT SPLINTS.¹

BY DR. B. VAN SLYCK, M.D.

FOR more than twenty years I have treated all cases of fracture of the femur coming under my care without splints of any sort, and with results more satisfactory to myself than by the old method with a Liston splint or any of its modifications. Nor have I seen any mode of treatment, with any sort of contrivance or combination of splints, that can at all compare in simplicity, ease of application, efficiency, and uniform good results, with the mode I am about to describe.

As far as I know this originated with, or at least was first given to the profession in print by, Dr. John Swinburn, of Albany, N. Y., who read a paper on the subject before the New York State Medical Society, which published it in its Transactions in, I think, but I am not sure, 1861. Dr. Swinburn reported about forty cases treated in this way with remarkable success.

In the same volume, and in connection with Dr. Swinburn's paper, was another by Dr. Thorne, of Troy, N. Y., detailing a number of cases treated in the same way, and also describing a mode of treating fractures of all the long bones on the same principle, giving cases, cuts of apparatus, etc.

I have had no practical experience in treating by this method any fractures but those of the thigh and certain forms of fracture of the leg, and I shall, therefore, confine my remarks to this branch of the subject, though I am decidedly of the opinion that the same principle might be successfully applied to the treatment of other fractures, and my recollection of Dr. Thorne's apparatus and mode of treatment is that they were very ingenious and philosophical, and his cases very successful.

I have never seen a word in print on the subject since 1861, and as I have abundant reason to be satisfied with my own experience in the treatment of fractures of the femur without splints, I concluded to give the result of that experience to the Society, in the belief that it would prove of interest, and in the hope that useful discussion may result.

The mode of treatment in detail, as I employ it, is as follows:—

The bed should be at least two feet longer than the patient. For children, and many people below medium height, any ordinary bed with hair mattress is sufficient. For adults of ordinary stature I have a sort of bunk, or bedstead of plain boards, which a carpenter or, in an emergency, I myself could make in an hour. It should be about eight feet long, and of a width to fit whatever mattress may be most convenient, though the width of a single bed is better. The side pieces may be about a foot wide, and the foot- and head-boards as much wider as desired or your lumber will permit. Thin strips of board in the corners for legs, coming up to the top of the side pieces; cleats on the side pieces to support the cross slats, and all put together with screws or wrought nails, will make a very simple

and easily constructed bedstead, and with a firm, smooth mattress on this you are ready for business.

Now, for an adult, take a strip of adhesive plaster—preferably Martin's—three inches wide and long enough to reach from the knee down the outside of the leg and back on the inside, leaving an ample loop below the foot. On each side of the plaster tear a narrow strip about three-fourths inch wide down to the malleoli. Apply the middle strips on each side of the leg, and the side strips spirally around the leg over them, so that the traction may be distributed as much as possible around the leg, and draw evenly. This is a matter of some importance, as a single strap at the sides is apt to pull off the skin before the treatment is ended. For the perineal band I like a piece of one and one-quarter or one and one-half inch rubber tubing, though the usual band made wide answers well enough. The tubing is easily kept clean, and soft cotton may be kept under it to prevent chafing, and changed when soiled. Tie to each end of about a yard of this tubing strong cords, which are to be passed through a hole in the head-board and tied around a bit of wood. At the bottom of the foot between the strips of plaster place a short piece of lath, or a bit from a cigar-box, of proper length to prevent pressure on the malleoli; tie a strong cord around the middle of the loop of plaster, and pass the two ends through a hole in the foot-board. Now place the patient so that the extension, counter-extension, and shaft of the femur are in line, reduce the fracture, and secure the cord at the foot as you have already done at the head of the bed. A couple of sand-bags on each side will keep the foot in place with the proper eversion of the toes, and two half-hoops from a small butter-tub, wound and fastened in the middle, and placed over the foot, will protect it from the pressure of the bed-clothes. If the sand-bags do not secure sufficient eversion of the toes, a bandage around the foot fastened to one of the hoops will accomplish this purpose. In the first stage of the treatment but little more extension is needed than is necessary to overcome the spasmodic contraction of the muscles. After the process of repair has fairly begun, say after ten or even fifteen days, the provisional callus is still soft and plastic enough to afford ample time to secure the proper length of the limb by gradually increased extension, while, in the meantime, the patient has become accustomed to confinement, and the perineum toughened and prepared for the increased pressure. If necessary to prevent excoriations the foot of the bed may be raised, and a weight and pulley arranged at the foot, and the counter-extension taken off during the daytime. But this should be only a temporary expedient. As a mode of treatment I consider the weight and pulley, or any elastic extension objectionable, for the reason that they do not prevent the spasmodic contraction of the muscles, and it is impossible by this means to graduate the extending and counter-extending force so as to correspond to the actual resistance. In the treatment described you can measure the limb as often as you please, and have only to tighten the foot-cord to keep the injured limb of absolutely the same length as the other, and it is a very easy matter to keep it so.

¹ Read before the Norfolk County Medical Society.

A simple experiment illustrates the principle on which this treatment is based. Take a wooden rod—say a piece of a broomstick, saw it in two anywhere in its length, either transversely or obliquely, surround it with a number of elastic cords fastened at each extremity, so as to allow the middle ends, representing the fracture, to overlap each other. Now make extension and counter-extension, and these ends of necessity fall into opposition and the stick becomes straight. The same experiment may be tried on the cadaver, by dissecting up and separating the muscles of the thigh in their continuity, and breaking the bone, when extension will surely reduce the fracture and all deformity disappear. With the bone surrounded by live muscle in a state of tension, can a better splint be imagined to retain the fragments in position?

If then we have such a splint of nature's provision next the bone where its effectiveness is absolutely perfect, how irrational it is to apply splints and bandages on the outside of the limb with the inevitably evil result of producing, by pressure on the contused and infiltrated tissues, adhesions that prove a serious hindrance to the usefulness of a leg long after the bone itself is substantially sound.

I am aware that the theoretical objection can be raised that some of the muscles—as the adductors—act upon the bone at an angle, and not in the line of the shaft, and that their tendency is to produce lateral deformity. According to my experience the objection does not hold in practice. I think the perineal band has some influence in restraining the lateral traction of these muscles, while the tenseness of the muscles which do directly envelope the bone prevents any displacement. At any rate, I know it as a clinical fact, that when there is no shortening there is no deformity, an argument which will stand against any amount of theory.

Suppose yourself just called to a case of this injury, what do you find? A patient in great suffering, with a crooked shortened thigh, and every fibre of its muscles you can feel under your hand quivering and straining with spasm, as they are gored and irritated by jagged ends of bone at the seat of fracture.

Now let some one grasp the patient under the arms to fix the body, while you seize the ankle of the injured limb, and slowly and firmly draw it down to its normal length, and so fix it till the spasm subsides. What surgeon has not seen in a like case the sudden transition from intense agony to perfect ease and contentment? Still holding the ankle, and maintaining full extension, rotate the leg. Is there any grating of the broken ends of bone together? Not at all, nor does the movement give the sufferer any appreciable pain. The head of the bone rotates in the socket, and the whole limb turns precisely as though no fracture existed, showing that as long as the muscles are held tense, you have a perfectly effective splint immediately around the bone. By reason of this, all through the treatment, the patient, unembarrassed by external splints, enjoys a good degree of comfort and freedom of movement. On one heel and

his elbows, he can raise himself up to use a bedpan, can turn toward the injured side, and assume almost a sitting posture, without pain, displacement of dressings, or injury of any sort to his case. Another important consideration is that the seat of the injury is always open to inspection, a matter of very great consequence in cases of compound fracture. When I have added that in simplicity and ease of execution this treatment surpasses any other, and that I believe it will give far better average results, I may claim to have summed up the case.

My first opportunity to put in practice the method above described was in the United States service, at Fredericksburg, Virginia, in 1863, after the battles of the Wilderness. The mortality after amputations on the field for gun-shot fractures of the thigh was so great that these cases were ordered to be sent to general hospital and primary amputation forbidden. The sufferings of these poor fellows in transportation was so great that, at my request, all such cases in the cavalry hospital were assigned to me, and I made rude bunks, similar to the one I have described, with projecting sides for handles, and of a size to fit an ambulance. After removing all loose pieces, as well as the sharp points of bone in the wound, the men were placed in these bunks, extension applied, and they were carried to their destination in the greatest comfort. Spasmodic action of the muscles was controlled, the sharp ends of bone no longer gored the tender flesh with every jolt of ambulance or car, and, as many a poor fellow expressed it, he felt as though in a new world. After this I managed to improvise some sort of extension and counter-extension for these cases even on the field, with only a stretcher to work with, and was amply repaid for my trouble, by seeing how much more comfortable these cases were.

Since then I have treated in private practice, without splints, twelve cases of fractured femur, two cases of fractured tibia, two cases of fractured tibia and fibula—one of the latter compound.

I had intended to give these cases in detail from my notes, but I should exhaust your patience and will only give results. Of the femur cases, nine were fractures at different points in the shaft of the bone, and in eight the results were perfect, no deformity in any, absolutely no shortening in five, and not more than half an inch in three.

The ninth was an exceedingly unmanageable case—a very nervous and excitable woman, sixty-six years of age—fracture at the upper third. She could not bear a perineal band at all, and I depended on the weight and pulley, and elevating the foot of the bed, and I found out afterward that whenever she thought the extension uncomfortable, she made her daughter put a cricket under the weight. There was two and a half inches shortening, and considerable deformity.

In the other three cases the fracture was intracapsular, and they were treated with weight and pulley extension, without perineal band. All were women. In the first, aged sixty-five, there was good union, and a useful limb, with one and a half inches shortening; walked without crutches in thirteen weeks.

The other two cases, aged respectively sixty-eight

and seventy-four, recovered with as good results as could have been expected. At the end of eight weeks, when extension was discontinued, the limbs were of equal length, but shortening began at once, and at the end of a month amounted to three inches. Both wore crutches the rest of their lives, being cases of non-bony union.

In the eight typical cases, extension was discontinued in from four to seven weeks; they were on crutches in from five to eight weeks, and cured in from six to eleven weeks.

The last case, treated in October, 1883, illustrates the special advantage of this treatment in a marked manner. B. W., a boy of nine, suffered an oblique fracture of the femur at the lower third, by being run over and kicked while witnessing a football fight. He was sufficiently quiet by day, but perfectly unmanageable at night. He would toss about in his sleep, have night terrors, scream, and kick with his well leg and try to do so with his broken one, and would often be found with his head and part of his body hanging over the side of the bed. This was almost a nightly experience with his parents for three weeks, yet extension was discontinued in four weeks. He was on crutches at five, and walked without in seven. To-day it would be impossible to tell which thigh was broken.

The fractures of the leg were all above the middle, and were treated previously as the thigh case, and with perfectly satisfactory results.

I apply in all cases a silicate of potash bandage before letting a patient out of bed.

CASE OF CHRONIC DIFFUSE NEPHRITIS AND AMYLOID DEGENERATION OF THE KIDNEYS, COMPLICATED, TOWARD THE CLOSE OF LIFE, WITH GLYCOSURIA AND INOSITURIA.¹

BY EDWARD S. WOOD, M.D.

J. McA., thirty years of age, single, born in Glasgow, Scotland, and a stonecutter by occupation, was admitted to the nervous and renal service of the Boston City Hospital October 22, 1884, when the following history was obtained, which I have copied substantially from the Hospital Records:—

Family history good; not addicted to drink; has never had venereal disease; when quite young, and at various times since, has had abscesses in the neighborhood of the right hip; has also had necrosis of the tibia, according to his own statement. Four weeks ago the patient was admitted on the surgical side with a hard mass below Poupart's ligament on the right side, which finally broke, and a large amount of pus was discharged. There is now (October 22d) slight œdema of the legs and feet, and some ascites, which were noticed four weeks ago; the patient said he had had the same trouble six years ago in London. There is also slight swelling of the scrotum, considerable headache, no cough, some pain in the chest, palpitation upon exertion, poor appetite, bowels constipated, great thirst, and frequent micturition day and night.

¹ Read before the Boston Society for Medical Observation, January 5, 1885.

October 23d. Was given tinct. digitalis.

October 24th. Analysis of urine: Amount of urine, 1,420 cub. cent. Color, pale. Specific gravity, 1,014. Reaction, acid. Amount of sediment, much. Urophæin, diminished. Indican, much increased. Chlorides, slightly diminished. Sulphates, normal. Urea, diminished. E. phosphates, slightly diminished. Uric acid, normal. Alk. phosphates, diminished. Albumen, about one-half per cent. Sugar, not tested for. Bile pigments, absent. Sediment, numerous hyaline and granular casts, some of which have fatty renal epithelial cells adherent. An occasional waxy cast. Free fatty renal epithelial cells.

November 2d. Cardiac sounds very faint. No murmur. Liver dulness diminished. Obscure fluctuation of abdomen.

November 5th. Analysis of urine: Amount of urine, 1,450 cub. cent. Color, pale. Specific gravity, 1,012. Reaction, acid. Amount of sediment, much. Urophæin, diminished. Indican, much increased. Chlorides, slightly diminished. Sulphates, normal. Urea, diminished. E. phosphates, slightly diminished. Uric acid, normal. Alk. phosphates, diminished. Albumen, between one-fourth and one-half per cent. Sugar, not tested for. Bile pigments, absent. Sediment, hyaline, granular, and fatty casts. Fatty renal epithelial cells. No waxy casts detected at this examination.

November 7th. CEdema diminished.

November 18th. Analysis of urine: Amount of urine, 2,395 cub. cent. Color, pale. Specific gravity, 1,012. Reaction, acid. Amount of sediment, slight. Urophæin, diminished. Indican, much increased. Chlorides, diminished. Urea, diminished. E. phosphates, diminished. Alk. phosphates, diminished. Albumen, about one-half per cent. Sugar, not tested for. Bile pigments, absent. Sediment, hyaline and granular casts. Few fatty and waxy casts. Fatty renal epithelial cells. Total amount of urea, 21.50 grm. Total amount of chlorine, 6.46.

November 19th. Analysis of urine: Amount of urine, 2,118 cub. cent. Color, pale. Specific gravity, 1,012. Reaction, acid. Amount of sediment, considerable. Urophæin, diminished. Indican, increased. Chlorides, diminished. Urea, diminished. E. phosphates, diminished. Alk. phosphates, diminished. Albumen, between one-fourth and one-half per cent. Sugar, present, 0.3 per cent. Bile pigments, absent. Sediment, hyaline and granular casts. An occasional fatty and waxy cast. Numerous fatty renal epithelial cells.

The peculiar behavior of this specimen of urine with Fehling's copper solution, when testing for sugar, led me to suspect the presence of inosite, or muscle-sugar, also. Therefore, the total amount of urine received the next day was analyzed for that substance. The urine was first freed from albumen by heating upon a water-bath until the albumen had coagulated, and filtering. The filtrate was then precipitated completely with a sugar-of-lead solution, filtered, and the warm filtrate treated with a solution of basic acetate of lead so long as any precipitate occurred. This precipitate, which contained any inosite which was present in the urine, was washed, suspended in water, and decomposed by a current