# SPLINTS USED FOR PERIPHERAL NERVE CASES AT THE U. S. ARMY GENERAL HOSPITAL NO. 11

ROBIN C. BUERKI, M.D.
BOISE, IDAHO

Shortly after patients from overseas began to arrive at the U. S. Army General Hospital No. 11, it was decided that the splints which had been applied to the nerve cases had numerous disadvantages. They were heavy and cumbersome, and in a large number of cases were retarding rather than aiding recovery. With these faults in mind, each lesion was studied from the standpoint of splints, and a special group of splints was designed for each type of case. These were then tried out and the one found, by actual practice, to be the most satisfactory was adopted as a standard splint for a given lesion. The following descriptions, pictures and diagram cover the splints now in use.

## SPLINT FOR FOOT DROP

This splint has been adopted as a standard splint for patients who are able to wear shoes, for it is sightly, simple and servicable. It is sightly because the bronze spring wire running along the sole of the shoe blends with the russet leather, while the spiral leggings completely hide the upper part of the splint. They also give added security. It is simple because it is made of two pieces of wire weighing but 2⅓ ounces, and when applied has no point of uncomfortable pressure or of constriction. It is serviceable because it not only holds the foot well extended at all times, but also aids in walking, as it gives the foot the normal flexibility which is lacking in all of these cases.

Pieces of bronzed spring steel wire, 25 inches long, have loops (¾ of an inch long) bent on each end, in opposite directions (Diag. 1). The lower loop is for aid in attaching the wire around the shoe, while that at the top protects the clothing from the sharp wire.

To give the splint flexibility, the wire has a 1¾ turn coil ¾ inch in diameter, bent into it 6 inches from the lower end (Diag. 2). This coil, when in place, is directly opposite the junction of the sole and heel of the shoe.

Two wires, bent as described above, are held in place, one on either side of the shoe, by four pieces of fine piano wire; one piece under the instep, another around the heel at the junction of the upper and heel; a third under the sole, connecting the lower extremities of the wire; and lastly, a piece around the toe between the sole and the upper. The last piece binds the splint permanently to the shoe. It is best to apply the wires in the above order (Diag. 3).

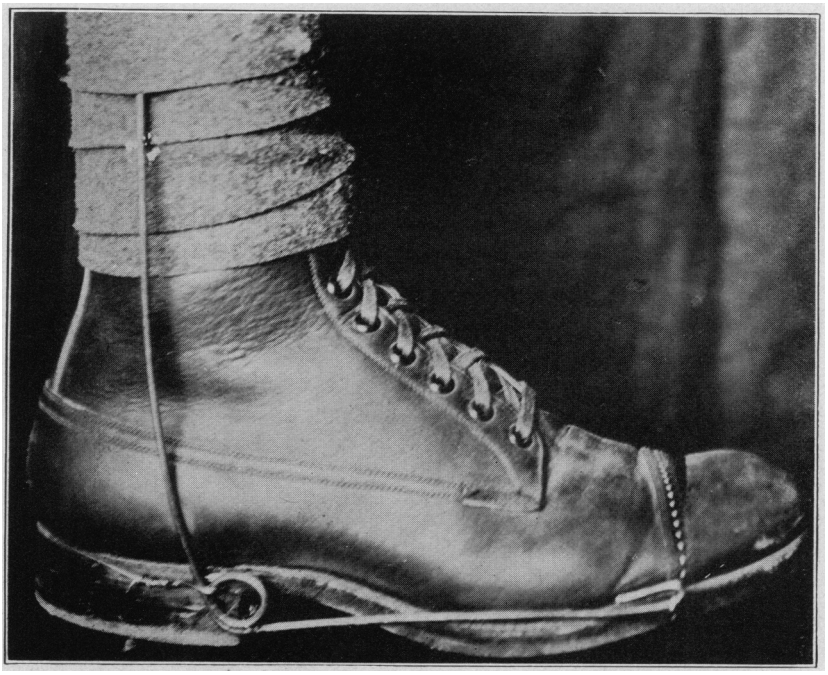

Fig. 1.—Splint for foot drop made of No. 11 spring steel wire and held to the shoe with four pieces of piano wire. The splint is held to the leg by a canvas band passing around the calf between the two wires.

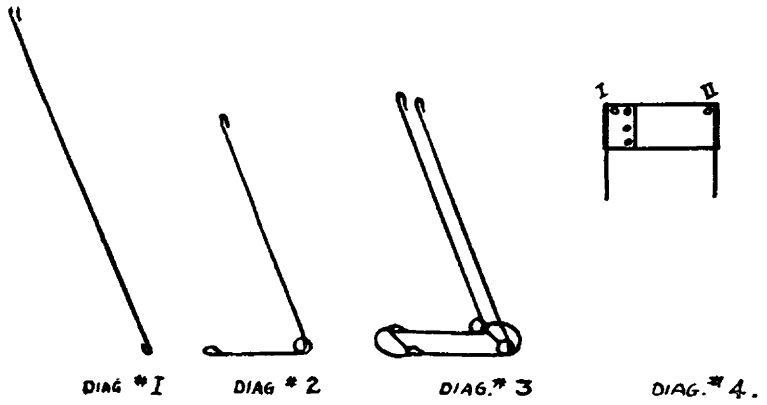


Fig. 2.—Details of splint for foot drop.

The splint is completed by a piece of double ply canvas, 6 inches wide and 4 inches long, and held together by five rivets placed as shown in Diagram 4. Rivets I and II keep the splint from slipping through the canvas. The canvas is slipped over the upper end of the splint, around the calf, and the whole is held in place with a spiral legging.

It takes thirty minutes to make and attach the splint, and it lasts from two to three months.

### SPLINT FOR CASES OF WRIST DROP

A wrist drop splint, which is 100 per cent. effective, must perform five definite and distinct functions. First, it must extend the hand on the wrist. Second, it must extend the proximal phalanges on the metacarpal bones. Theoretically, all of the phalanges should be extended, but by actual measurement the small amount of relaxation thus

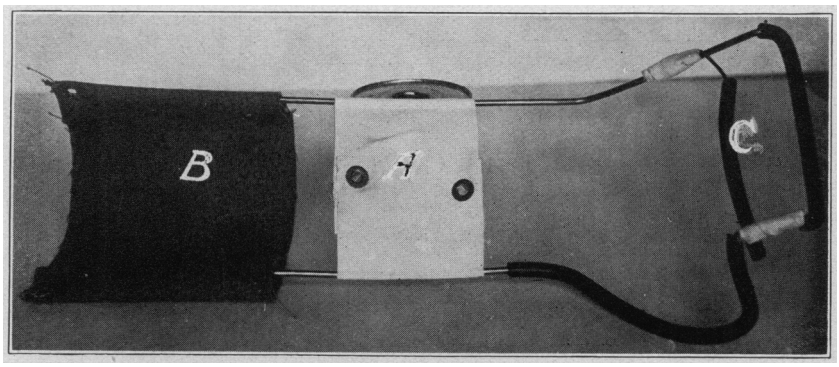


Fig. 3.—Splint for wrist drop with extra piece to support palmar arch. A, adhesive band which fits on dorsal surface of wrist; B, removable canvas band which fits on anterior surface of forearm; C, palmar piece to maintain palmar arch held to the main splint by adhesive plaster.

obtained was decided to be less important than the maintenance of normal mobility of the distal joints by permitting free movement. Third, it must extend the thumb, and by extension is meant a position in a plane with the other fingers. Fourth, it should maintain the palmar arch. Finally, it should be light, simple and comfortable, and should give the part as much freedom of motion as is desirable.

The old aphorism that multiplicity of methods proves lack of a satisfactory one, certainly holds true for the splints used in cases of wrist drop. In the past few months no less than sixteen different types of splint, from home and abroad, have found their way into this hospital. According to our standards, none of them have been even theoretically 100 per cent. efficient, and but few attain over 40 per cent.

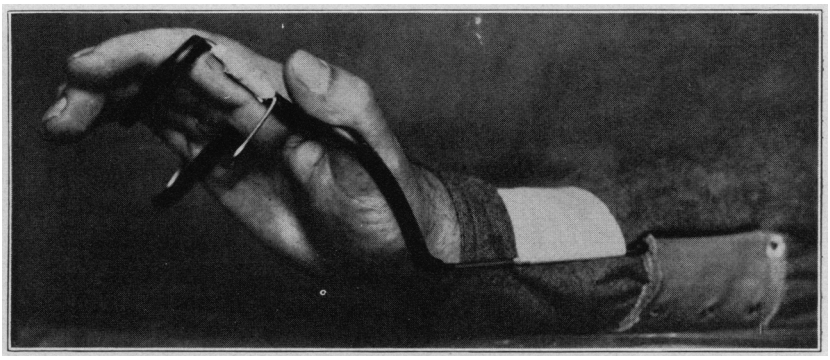

Fig. 4.—Wrist splint drop applied. Thumb is held extended in a plane with the rest of the fingers; distal two phalanges are left free so as to permit normal movement. No bandages are necessary to hold the splint in place.

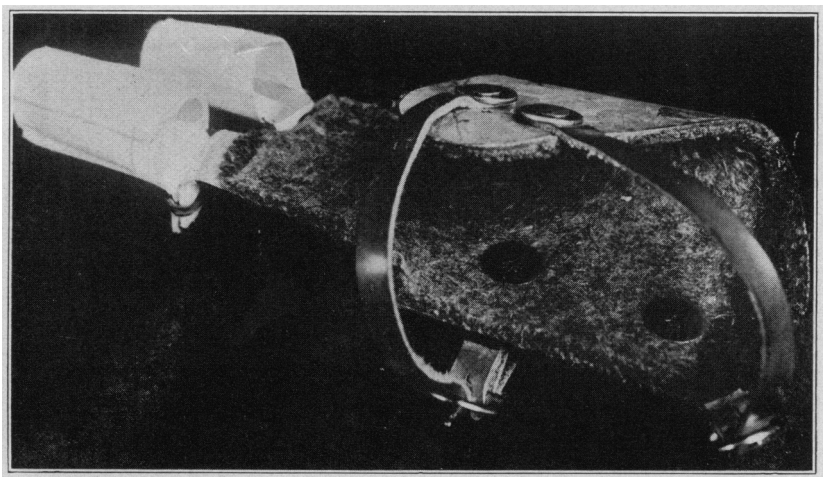

Fig. 5.—Splint for ulnar paralysis. It is made of galvanized iron, padded with felt. The felt is stuck to the iron with sealing wax. Four copper rivets hold the straps in place. The whole is then fitted to the ulnar side of the hand. A forward bend of the finger extensions corrects the tendency to hyperextension. The finger pieces made of galvanized iron padded and surrounded with adhesive tape are held to the main splint with rubber bands which produce the required extension.

Spring steel wire covered with rubber tubing at all points of pressure and properly bent has been found to make a light and comfortable splint. It will meet the requirements and overcome some of the objections of other types. This splint is made from a piece of No. 11 spring steel wire, 35 inches long.

It is best to start bending the splint on the ulnar side of the forearm. Nine inches from the end, the wire is bent upward to form an angle of 140 degrees. This is the angle at which the hand is extended on the wrist. From this point the wire extends forward to the junction of the proximal and middle phalanges of the little finger, where it is bent at a right angle in the same plane. Three quarters of an inch

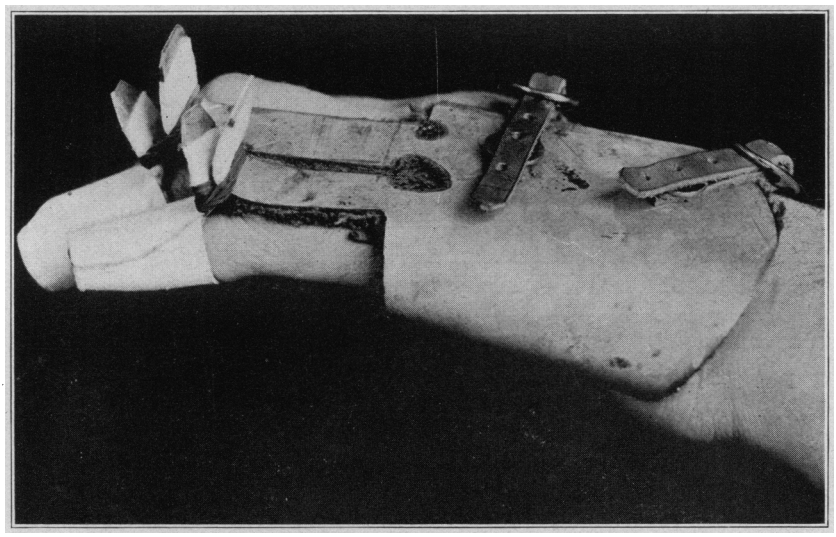

Fig. 6.—Splint for ulnar paralysis applied.

from here it again receives a right angle bend, but this time in a plane at right angles to the previous one. This bend causes the wire to run across the palmar surface of the fingers and thereby extends the proximal phalanges on the metacarpal bones. A right angle bend in the same plane, at the outer side of the first finger, and three quarters of an inch farther on another one in a plane at right angles to it completes that part of the splint which keeps the hand in place. The wire then runs backward along the outer side of the first finger until it reaches a point opposite the base of the distal phalanx of the thumb, where it is bent outward at right angles to extend the thumb on the first metacarpal bone. When it reaches the outer side of the thumb the wire is curved downward and inward to the wrist, following the

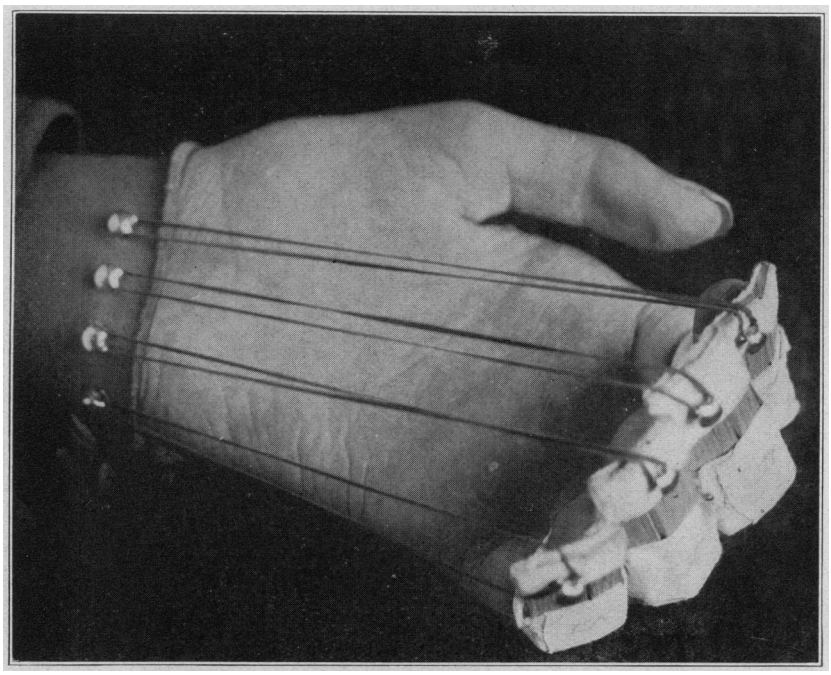

Fig. 7.—First position of twelve hour splints for cases of fixation of the fingers. The splint is worn in this position for twelve hours out of the twenty-four.

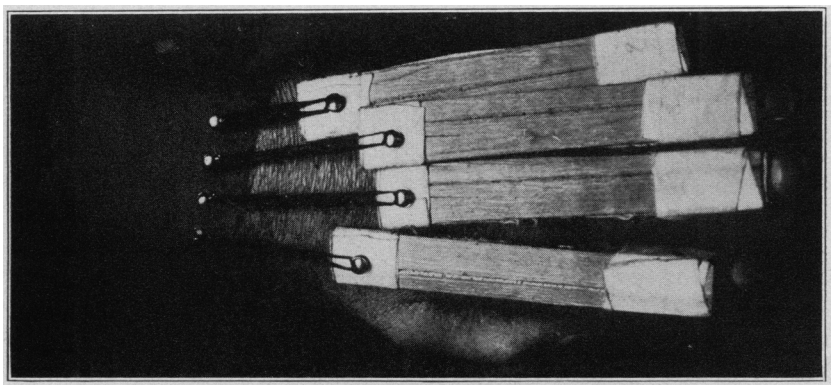

Fig. 8.—Second position of twelve hour splints.

thumb as nearly as possible in its extended position. The wire is now bent so that it runs parallel to and in the same plane as the wire on the ulnar side of the forearm. The two rubber tubes which protect both the fingers and the thumb from the splint are now slipped into place, and then the ends of the wire are bent on themselves, thus protecting the patient from the sharp ends. The palmar arch support is made from No. 20 spring steel wire, covered with rubber tubing, and is attached to the splint by adhesive plaster. The ends are one inch long and are bent in opposite directions from each other to increase the stability of the palmar attachment. The wire first extends downward away from the splint for an inch on each side and then by a slow curve extends upward to support the palmar arch. A piece of adhesive plaster is now placed on the splint just above the wrist and folded on itself so that all of the sticking surface is covered. Finally, the canvas

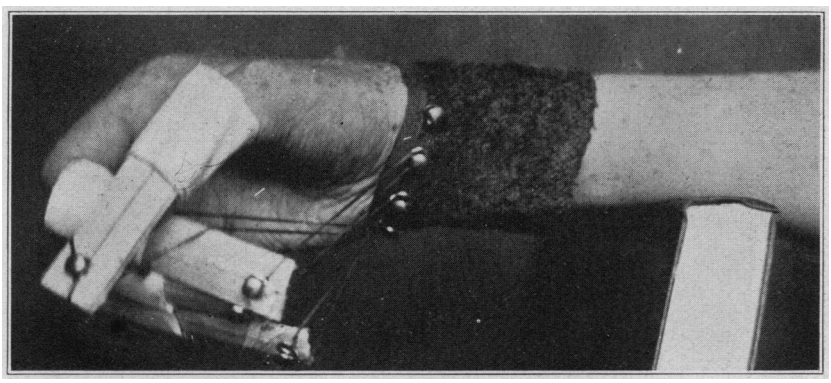

Fig. 9.—Splint for median paralysis applied. Finger pieces are made of thin board held together by strips of adhesive tape.

band is slipped over the ends coming in contact with the flexor surface of the forearm.

This splint can be made in fifteen minutes. It is applied without bandages and can be readily removed or put on by the patient, without assistance.

### SPLINT FOR ULNAR PARALYSIS

A very satisfactory ulnar splint, which not only aids in extending the fingers but also allows them free motion, is made from a piece of galvanized iron cut from a pattern, but shaped to the hand of each individual so that it closely grasps the ulnar half of the hand. It is held in place by two straps, one just below the hypothenar eminence and the other just above the web between the thumb and the first

finger. To give additional comfort, the splint is lined with blanket material stuck to the galvanized iron with sealing wax. The forward projections are of such length that when one half inch is turned up the projections extend just beyond the first phalangeal joint. Another piece of galvanized iron one half inch wide and one and one half inches long is bent at right angles so that one half inch of it corresponds to the half inch upward bend on the projection of the main splint. Around the remaining one inch adhesive tape is wrapped so as to form a cap for the end of the finger, the inner part of this cap being lined so that it can be removed or applied at will. A rubber band binding the two upright extensions together completes the splint.

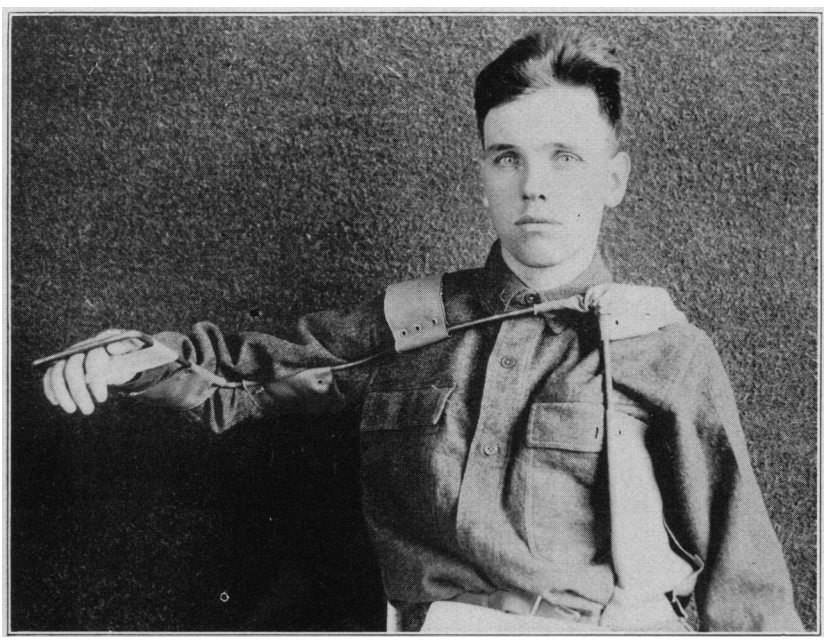

Fig. 10.—Splint for brachial plexus cases applied. It transfers the weight to the opposite shoulder and to the thigh of the same side. The splint proper is made from 3/16 iron. The canvas straps are held in place with eyelets.

### TWELVE HOUR SPLINT FOR BRACHIAL PLEXUS CASES IN WHICH THE FINGERS HAVE STIFFENED IN SEMIFLEXION

Wooden coaptation splint material is used. Short strips are cut, the ends being protected by adhesive plaster. Rings of adhesive plaster, lined so that they do not stick to the skin, are stuck to one end of this splint and fitted to the fingers. A shoe hook is set in the other end of the splint. The shoe hook is then fastened by a rubber band to a corresponding shoe hook placed in a canvas wrist band.

The patient is supplied with a long and a short set of these splints, and is told to wear them interchangeably — the short set to produce flexion and the longer ones to produce extension.

### SPLINT FOR MEDIAN NERVE CASES

The splint for the median nerve case (inability to flex the thumb and fingers) differs in no way from the flexion service used in the twelve hour splint, except that it includes the thumb.

### SPLINT FOR CIRCUMFLEX NERVE CASES

This splint was copied from one sent from the Lakewood Hospital. It is made from $\frac{3}{16}$ inch iron, and is much lighter and very much less disagreeable to wear than the old aeroplane splint formerly used for these cases. The points of pressure in this splint are the sound shoulder and the hip of the affected side.

410 Overland Building.