

PART FOURTEENTH.

SPLINTS.

Splints are a species of dressing, used either in the treatment of fractures, or such morbid conditions as seem to demand the retention of immobility in the part. They are made of various material and of many shapes, intended to be more or less adapted to the form and contour of the parts, and of sufficient firmness to fulfill the indications. From the earliest times splints have been employed in the dressing of fractures and dislocations particularly, and it is only recently, within twenty-five years—that less importance has been attached to their employment. Many surgeons of experience have entirely discarded them; others use them occasionally, in exceptional cases; and still others only employ them as a primary dressing, applying some one of the immovable dressings after the subsidence of the more acute symptoms. The sole advantage in the splint dressings, is the absolute immobility secured when they are of proper construction and well-applied. The disadvantages are numerous; some of them easily recognized, while others are still somewhat hypothetical.

It is objected to the use of splints, particularly when applied to the lower extremity, that they compel prolonged confinement, by which the general health of the patient will suffer more or less, and convalescence will be unnecessarily prolonged, and the full restoration of function in the part will be delayed. Indeed there are cases noted in which a limb has never regained its function fully, from the

changes induced in the muscles and structures of the joint by long maintenance in one position. It is also objected, that the inability to change the position of the injured member, causes unnecessary suffering and inconvenience, and to a considerable extent prolongs the treatment. That the splints do add, very much, to the painful jerking and twitching of the muscles, none can deny, and many are of the opinion that they are chiefly provocative of the symptoms. At all events, it must be apparent to the most careless observer, that when a strong vigorous man sustains a fracture of the leg, and is at once bound up in unyielding dressings, and all motion, even the most trivial, rendered impossible in the part, the consequences must be more or less serious, and even without positive suffering the unusual confinement, local and general, must be prejudicial. Whatever may be claimed, therefore, for the value of splints as a continuous dressing, in fractures at least—is more than counterbalanced by the objections briefly alluded to above.

From my own experience, which has been somewhat extensive—I am impelled to lay down the following rule: As a *primary* dressing solely, splints may be used when circumstances are not favorable to the "American method" of extension, but they must be removed, and the plaster dressing applied, as soon as the primary swelling and inflammation commences to abate.

Having determined the question of when and under what circumstances the splint should be applied, it remains to make a selection of the kind or variety of splint to be employed, and to consider the manner of application.

Splints are of two general kinds: Patent, or moulded, and improvised. The former are made of various kinds of wood, tin, wire, or gutta-percha, and are manufactured in so

many forms, and for such a variety of purposes, that it would be literally impossible to notice them fully unless a volume were devoted to the purpose. Apart from the space required, I think most surgeons of experience will agree with me—the study would be profitless, as they may be one and all condemned as either positively hurtful, or useless; useless, as far as they may be supposed to possess any value over the improvised dressings familiar to all practitioners. In some conditions, as hip-disease—special splints *may* be needed; but even under such circumstances, I think the best results are obtained from the ordinary improvised apparatus. One obvious reason for this is, that the conditions are continually changing, either through wasting or swelling of the part, or increasing or diminishing deformity, which are more readily met by alterations in the improvised dressing, which the nature of things forbids in the patent or moulded articles. I can say, to the young surgeon, or student, therefore do not waste your money in the purchase of moulded or patent splints; it is an investment that will yield a poor return, and the experienced surgeon will regard your attainments with suspicion when he finds you surrounded by an assortment of these useless appliances.

Improvised splints, may include the following, which will be noticed in the order of their importance, as it appears to me:

1. *Pasteboard* has long been a favorite material, with me, from which to form temporary splints. The method of preparation and application is as follows: After the fracture has been reduced, and the parts ready for the final dressing (*Vide "Emergencies"*), the part must be enveloped in cotton batting, applied evenly, and of no great thickness. The sole use of the cotton is to protect the integument from irritation

from the splint, and, under these circumstances, not to fill up depressions or cover protuberances thickly. If it is applied thickly, and the part made to assume a uniform size, the splint will exercise unequal pressure; here too much and there too little. The result will be that the support will be inadequate, some motion of the fragments be allowed, and the circulation may be interrupted sufficiently to endanger the vitality of the part. Next select a strip of stiff pasteboard, or binder's-board—and make it the desired length and width. Do not cut it, with knife scissors, or it will leave sharp edges that may do mischief; bend it backwards and forwards, until it separates, and the edges will be soft. Dip it into hot water, soaking it enough to make it soft and plastic, and mould it to the part by gently pressing it into shape with the hands. If well done, and the material has been sufficiently softened, we will now have a perfect cast of the part, and each portion of it will sustain the same degree of compression.

It may be necessary to apply the splint to the shoulder, elbow, jaw, or some region in which an angle is to be covered. The preparation of the splint must be modified, some-

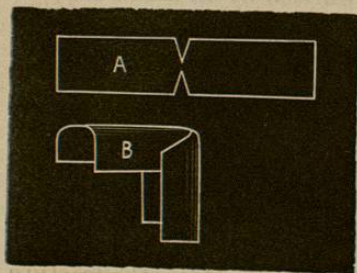


FIG. 70.

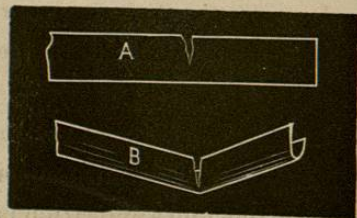


FIG. 71.

what, to meet these special indications. When the angle to be formed by the splint is right-angled, or acute, the strip is to be deeply notched, on each side, quite close to the centre, so that it is almost divided. (*a*). The notched portions are

then to be folded over each other (*b*), and the whole splint moulded into the desired form, as before.

Should the angle required be an obtuse one, as in the case of a partially flexed arm, I have found it to answer better to cut or notch the strip on one side only, and use two pieces to complete the dressing (fig. 71).

The strips having been moulded to the part, are to be held in position by a couple of courses of bandaging, the whole extremity being covered in from the distal extremity to and above the joint above the splint, or as high up as possible. The bandage must be applied smoothly, and with some degree of firmness, so that the splint may be kept in form and shape while drying. In a few hours the bandages may be re-applied, the splint being dry, and the part suspended in a proper sling or laid in an easy position on a pillow.

During the initiatory stage of repair, that is while all foreign material is being absorbed and carried out from between the ends of the bones, the dressings must be undisturbed, except that they must be loosened or tightened as swelling increases or diminishes—but should be finally removed when active repair sets in, say in three or four days—and the plaster dressing applied. In the case of compound fractures, such applications, indeed splints of any kind, I believe, are inadmissible. The extension plan of BUCK'S ("Emergencies"), or simply keeping the parts in position by bags of sand or shot, would be far preferable.

2. *Gutta-percha* is a favorite dressing with many practitioners, but there are two objections to it, viz., its comparative expensiveness, and its imperviousness to the air. The latter objection is a serious one, but the dressing being usually merely temporary, is not insurmountable. If all the indications were as well filled as in the case of pasteboard, the dif-

faculty of procuring the article in sheets, at all times, will permit its general adoption. The method of application is the same as in the case of pasteboard, the degree of heat needed being somewhat greater, and more time being necessary to render it plastic. An objection that I have always met when attempting its use, is that when drying it is liable to warp and twist, and may thus do more damage than good.

3. *Shingle splints* are the typical article, and for a long time have held the first position in the estimation of the general practitioner. They are made of any thin light wood, as cigar-box covers, pieces of shingle, the backing from picture frames, and the like. In general terms they are known as "long" or "short," each variety being subject to many variations in detail, for which consult special fractures in "*Emergencies.*"

The *long splint* is one designed to extend the whole length of a limb, as from the foot to the hip, or even to the axilla; or the hand to the shoulder. They are necessarily made of thicker wood than when designed for application to a less extent, but are straight, in width about the diameter of the part, the length being somewhat greater than the limb for which it is designed. Thus Ferguson's long splint for the lower extremity, is from four and a half to five feet long, de-

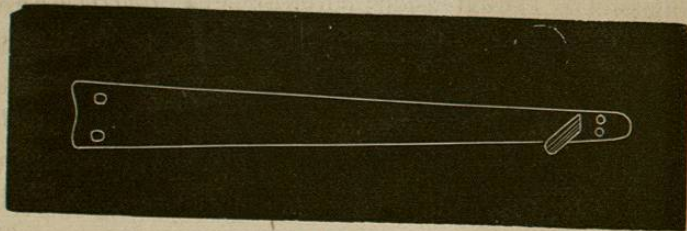


FIG. 72.

signed to reach from the axilla to some six inches below the sole of the foot; they are half an inch in thickness; in width,

they taper from five inches at the upper extremity, to two and a half or three at the lower. They are sometimes provided with a foot-rest, when for the leg—but whether for the leg or arm, two holes are bored in each extremity to receive bands for extension and counter extension.

In preparing the splint for application, cut a piece of muslin the shape of the splint, but greater in all directions by about three inches. With small tacks attach one edge of the muslin to the long edge of the splint, on the under side, when the splint is ap-

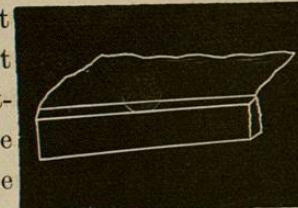


FIG. 73.

plied. Next attach the muslin in a similar manner to the foot, and for two or three inches up the other side, not drawing it tightly across. Stuff cotton in firmly, or curled hair, or the like—when full tacking down two or three inches more; and crowding in more filling. Continue this until the whole splint has been well-padded, smoothly and evenly, without knots or projections. When completed,

tack the muslin firmly around the holes in the head and foot, and cut it away so that they can be utilized. The splint is now ready for use.

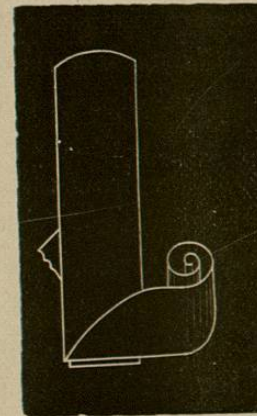


FIG. 74.

The *short splint*, is designed to extend only up a portion of an extremity, and is made of much lighter material. For the arm, they are made to extend from the elbow to the shoulder; for the forearm, from the tip of the fingers to the elbow, etc. They are prepared for use by laying on them a thick layer of raw cotton, or cotton batting; place the initial end of a

roller on the under side of the splint at one extremity, carry the roller down under the end, and up over the face, making a reverse turn to carry it around the splint, and by continuing the spiral turns, overlapping at least, one-third at each turn, cover in the whole splint, fastening the end with a pin on the under surface. A reverse turn may be made at the other end, in finishing off, which by passing over the end will give a neater finish to the splint, and serve to better confine the padding. The splint is now ready for application.

Either splint being in use, the mode of application is as follows: After the fracture has been reduced, if of the simple variety (that is without a wound leading down to the bone), lay the splint on the side of the limb which presents the least inequality of surface, as the palmer side of the forearm,—and examine the part to see that all parts of the surface are in contact with the splint, so that when the bandage is applied the bone will not be distorted or bent out of shape. All depressions of that kind are to be filled up with raw-cotton, so that the pressure is evenly distributed. In applying the long splint to the leg, the outside of the member must necessarily be selected. After properly adjusting the part, retain the splint in position by two or three courses of bandaging, from below upwards. The tips of the fingers, and the toes also—had better be left uncovered, so that symptoms of strangulation may be early detected, and the proper treatment applied. The limb may then be suspended in a sling, or arranged in a comfortable position on pillows, and remain undisturbed, unless the bandages are loosened on account of swelling—until the time arrives to apply the permanent dressing.

The question is much debated, or has been until very re-

cently—whether a bandage should be applied to the part before the splint is applied or not. I think the weight of testimony is against it. As far as I am able to judge, there are no very obvious advantages in the custom, and certainly some very serious objections. The swelling of the limb will cause less discomfort if there is no bandage under the splint, and should circumstances require loosening of the dressings, it is easier to accomplish it, without disturbing the position of the fragments, than if the splints had to be removed, and the bandage on the part to be cut or otherwise taken off. Without arguing the question further, I will lay it down as a rule, that the splint is to be applied to the naked member.

4. *Leather splints*, in one of two forms, are somewhat extensively used, but do not possess any advantages over the pasteboard or gutta-percha. Indeed they are in every way inferior to either of them. In the first method, strips of sole-leather are applied as gutta-percha or pasteboard, by soaking in hot water until pliable. They can never be softened so that they can be as accurately moulded to the parts as the others, and when dry, are liable to wrinkle more or less. Their lack of perfect adaptability necessitates the use of cotton to fill up inequalities, and this, it is obvious, must, to a very large extent, render the support very unequally distributed. Unless no other material can be obtained, I should never employ the leather.

The second form is made as follows: Take a piece of leather, soft and pliable, of a suitable size to completely encircle the part without overlapping. On the *outside*, glue a number of narrow strips of wood, of cigar-box covers—quite close together, extend-

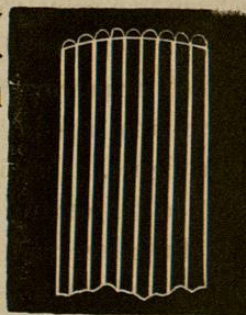


FIG. 75.

ing the whole length of the splint. The objection to the dressing is the same that attaches to all the splints classed under the "shingle" head, *viz.*, that the limb requires to be well padded. In the case of small parts, however, as the fingers—this splint may answer a good purpose; but in the case of larger limbs it should never be used.

5. *Double-inclined plane*, is a term applied to a form of splint that is very useful in compound fractures of the leg, when extensive, counter-extension, and retention of the fragments in position are made without the application of bandages, leaving the parts open to inspection at all times. It is made as follows: Have a light piece of board, of the kind

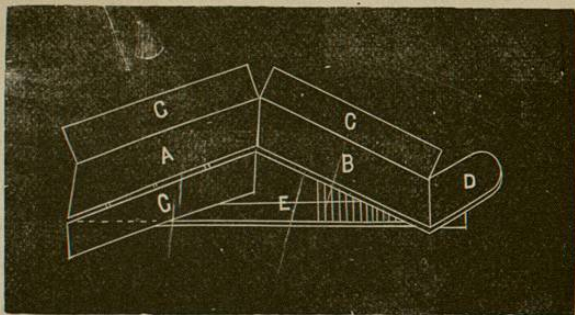


FIG. 76.

known as "siding," cut to reach from the tuberosity of the ischium to a point three or four inches beyond the heel. It should be at least five inches wide, and deeply scored, or notched, or narrow battens nailed on—for one-third of its length from the lower extremity. This is shown at "e" in the figure. Cut another piece the length from the tuberosity of the ischii to the centre of the popliteal space, (a) and attach it to the upper end of the long board by hinges. Cut a third piece, (b) to reach from the centre of the popliteal space to four inches below the heel, and unite it by hinges to the piece "a." At the foot of this last piece, securely

fasten, with screws, an upright piece (d), a little larger than the sole of the foot. The splint is completed by attaching four pieces of wood (c), by hinges, to the edges of the two shorter ones, (a-b), about four inches wide, that which comes on the inner side of the thigh to be deeply scored to avoid pressure in the groin. The splint should now be well padded, or old muslin may be spread on it, and the injured leg extended on it at full length, the sides being folded down, and the splint extended straight. To the foot and ankle, which should be covered smoothly with a layer of cotton batting—button on a snug fitting gaiter, to which strong tapes have been firmly attached. The fracture being reduced,

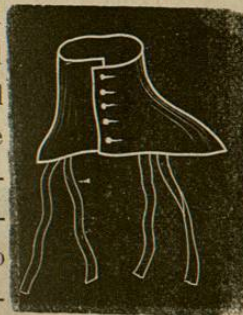


FIG. 77.

and the limb put in a comfortable position, attach the tapes on the gaiter firmly to the foot board. This makes the necessary extension. Now take the splint by the middle, under the knee, where it is hinged—and raise it to the required angle, the foot end being secured from slipping by the notches or battens on the under-board. This increases the extension, and weight of the body makes counter-extension. The greater the angle, the greater the tension, and hence the angle should not be so great as to cause pain. A number of long narrow muslin bags should be prepared, two or more the length of the thigh, and a similar number the length of the leg. Their diameter should be about three inches when filled. Fill them with dry sand, or clean bran, and lay them on each side of the leg, throughout its whole length. Next bring up the side pieces, and secure them by tying tapes around the whole splint. On re-dressing a limb thus treated, it is only necessary to let down the sides,

remove the bags, and replace with clean ones, when the sides are again put up and secured. The heel must be carefully watched for excoriations, and the pressure relieved, if any injury appears, by inserting fresh cotton, or cutting away the part of the gaiter that is at fault. The wound may be dressed with *Calendula* and absorbent cotton, and as soon as firmly healed, the apparatus is to be removed and a plaster bandage applied.

6. The *fracture-box*, is made like the last, except that it is only designed to enclose either the leg or thigh, and has no hinge in the middle. It is provided with folded sides, and

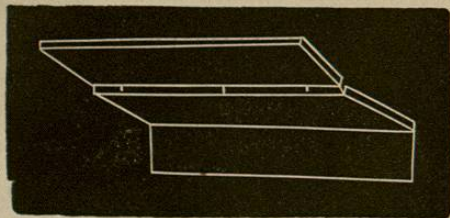


FIG 78.

is a very useful apparatus in treating compound fractures with little or any displacement. Its mode of application is the same as in the case of the double inclined plane, but the extension and counter-extension are made in the usual way.

This includes a description of all the splints or immovable dressings that are at all essential, or that surgeons generally employ. While many varieties or modifications of splints are recommended by different writers, particularly in our journals. I am of the opinion that their use is mainly restricted to the "inventor." The accomplished surgeon will scarcely need to go outside of the list given, and in exceptional cases he must rely upon his ingenuity to adapt his dressings to the circumstances of his case. Of course an intelligent application of any apparatus can only be had by a knowledge of the

end to be attained, and the principle that govern the repair of fractures, and the general pathology of the subject. This cannot be given in a work like the present, and the student is referred to the volume of this series on "*Surgical Emergencies*."