NOTES ON THE USES AND APPLICATION OF THOMAS'S HIP SPLINT.

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THOMAS's splints are at present in such general use that it may be thought an unnecessary task to demonstrate the principles of their application. Such, however, is not the case, and the frequency with which, during the last two or three years, I have been asked to explain at hospitals and Branch meetings their somewhat puzzling functions proves the need of information on the subject. In the present article it will be impossible to do more than briefly run over the main features of the hip splint, without regard to those splints designed for the knee and ankle.

The hip splint is composed of wrought iron, which must be sufficiently malleable to admit of being moulded into shape by suitable wrenches, and sufficiently unyielding to prevent any modification in shape by movements, voluntary or accidental, on the part of the patient. Most surgeons give their instrument makers instructions to make the splint light and narrow, apparently unconscious of the fact that the bed and not the patient has to bear its weight. If the splint be made light, the patient usually soon distorts it, and is cured if at all in a deformed position, while motion is allowed to a joint which requires uninterrupted rest. As each splint should be moulded to its patient, and may frequently require readjustment in conformity to the progress of disease, it follows that splints made of unyielding material, such as steel, will be badly fitting and inefficient.

The splint (Fig. 1), which is covered with leather, consists of three wings, A B C (Fig. 1), and an upright or stem (Fig. 3).

Fig. 1.

Wings.—The top wings extend two-thirds around the chest, at about the level of the nipples. The second extend two-thirds around the thigh, about an inch or two below the groin. The leg wings bear similar proportions, and reach lower than the middle of the calf. They should all be much more easily bent than the upright, and the uppermost should terminate in loops, meant for the reception of

Fig. 2.

bandages, which extend from the top of the stem (Fig. 5, A) and round the shoulders.

Upright or Stem.—It consists of a body portion, a thigh portion, and a buttock bend. The body portion should be parallel to and longer than the thigh portion. This question of direction is extremely important, as any modification of it will invariably tend to the maintenance of deformity, and often to the production of pain. The

Fig. 3.

incline in the buttock bend is variable, and in a case where a trochanter is enormously hypertrophied, it may almost be dispensed with. In that case the body and thigh portions are not merely parallel, but almost complete a straight line.

Measurement.—In measuring for a splint, the distance from the axilla to middle of leg should be stated, with the side affected.

Application.—The buttock bend (A, Fig. 3) should be *in situ* midway between the sacrum and the trochanter major. The body portion of the stem requires in every case a twist with the wrenches (Figs. 10, and 3). This will be readily understood when we recollect that it lies to one side of the spine against the chest, which is barrel-shaped, and the

ribs are only thinly clad with muscles. If there were no twist the inner edge of the stem would cause unbearable pain and soreness. The twist ends at the buttock bend as the gluteal region is flat and

Fig. 4.

fleshy. Fig. 3 shows the process of twisting a splint intended for the left side. The wings have been dispensed with for convenience of demonstration. Obviously the twist should be just sufficient to

Fig. 5.

permit the chest-wall to lie in juxtaposition to the flat surface of the splint. It is important to remember that in the majority of cases there is a strong tendency for the splint to escape to the outer side of the diseased limb, and it is very necessary to counteract it. There are three principal ways of doing this, and in each the wings play their part. It is necessary to adopt a combination of the three methods rather than trust to any one. The methods are (a) making room for the body in a direction calculated to keep the splint towards the spine; (b) fixations of the inner wings; (c) special bandaging.

Fig. 7 clearly shows methods (a) and (b) in action. It represents a transverse section through the trunk, thigh, and leg, with a right splint in position. As the tendency, therefore, is for the splint to escape towards the right, the wings B, C, and G are left open, so that all movements of the body will carry it towards the right side. At the same time this tendency is intensified by our manipulation of the inner wings A, D, and E, which are pressed moderately tight against the body and limb. The splint, therefore, cannot escape without cutting its way through the patient.

These preventives are fortified by another very simple expedient, which consists in making a small hole in the bandage, and passing through it the outer of the thigh wings, and rolling it under the thigh and round the limb, so that a pull is instituted upon the appliance in the direction opposite to its tendency. These three methods in combination render outward displacement impossible. And now is a favourable time to draw attention to the correct and incorrect methods of bending the body wings. As the chest is not quite circular, it is necessary that the body wings should not be made circular, else, in addition to grievous mechanical blunders, much soreness may result. By closely examining Fig. 7 this will be seen. The part

Fig. 6.

between A and B, upon which the patient lies, is but very slightly curved, and this allows the body to travel easily towards the outer side B, which has been shown to be a mechanical necessity. Fig. 5, which is correctly modelled, may be compared with the diagram Fig. 4, which represents the almost circular erratic body wings.

Where there is a tendency to adduction combined with genu valgum, Fig. 6 displays a small bar of iron fixed from the tip of the outer

thigh wing to that of the calf. The knock-knee can then be bandaged to the outside bar, and the deformity gradually accommodated.

Fig. 7.

But we frequently have to combat a deformity requiring more watching than adduction, and that is abduction, where the body forms a concavity to the inner side of the stem, and where, in advanced cases, the stem lies altogether to the outside of the body. Fig. 2, which is a right splint, illustrates the manner of meeting this complication. The body wing to the inside of the disease is drawn well down, and pressed firmly against the body convexity in order to get leverage upon the spine sufficiently low not to be counteracted by the mobile character of the vertebral column. Sometimes with the same end in view an additional wing is fixed, shown in dotted lines on Fig. 2. The outside body wing, to enhance the effect of its opposite, is drawn upwards to allow the body to return into normal shape.

A splint may be either too large or too small, and it is important to modify or increase its length. This is quite simply done. If the splint is too large, draw both body wings towards the abdomen; if too short, draw body wings towards the neck. The dotted lines (Fig. 1) will illustrate this.

One great drawback in the treatment of hip disease in children is their strong efforts in the absence of overlookers to hobble across the ward or to another room. This is now quite overcome by Mr. Thomas in his appliance known as the "nurse" (Fig. 8). In all the diagrams

Fig. 8.

attached to this paper will be noticed two small dots just above the leg wings, which represent holes found on perforating the leather covering in that vicinity. The "nurse," which is merely an iron bar, also has two holes, and it is affixed by screws to the under extremity of the hip splint. The advantage of this is obvious, as it prevents any attempt at placing the leg on the floor.

The hip splint may fulfil several other functions apart from that of treating morbus coxarius. Amongst these may be mentioned its use in psoas abscess, in sacro iliac disease, in fracture of the neck of the femur, and in the reduction of old hip-joint deformities. In fractures of the neck of the femur it is of great service, as it admits of easy nursing, so important in the case of old people; and the rest it secures is almost complete.

When there is double disease, a splint similar to Fig. 9 is often

Fig. 9.

used, but this pattern is of more service in the reduction of deformities. Malpositions which will not budge to any amount of extension yield very readily to the powerful (from its uninterrupted character) lever-

Fig. 10.

age which bandaging to this appliance entails. Fig. 11 illustrates a case of extreme rachitic deformity undergoing resolution.

I have purposely said nothing regarding the methods of using the pair of wrenches, one of which I have illustrated (Fig. 10). This is

Fig. 11.

because I believe no amount of writing will serviceably describe it. Suffice it to say that it enables the surgeon to accurately fit the patient without taking the splint off. Mr. Critchley, of Liverpool, who makes these splints for most people, is instructed to give the upright or stem the appropriate twist which I have said is so necessary.

In conclusion, I need but briefly draw attention to the fact that at a certain stage of joint disease the patient can transform his bed splint into a walking splint, by crutches and a patten on the sound foot. The annexed diagram (Fig. 12) illustrates this.

Fig. 12.

The most common errors result from making splints too light, and the following practical instructions may be useful:

For an adult of about 6 feet the upright should measure $1\frac{1}{2}$ by $\frac{1}{4}$ inch.

For an adult of about 5 feet 6 inches the upright should measure $1\frac{1}{2}$ by $\frac{1}{4}$ inch.

For a youth or woman the upright should measure $1\frac{1}{2}$ by $\frac{3}{8}$ inch.

In a boy of 10 the upright should measure $\frac{3}{4}$ by $\frac{3}{8}$ inch.

For a child of 5 " " " " $\frac{1}{2}$ " $\frac{1}{4}$ "

For an infant of 2 " " " " $\frac{1}{4}$ " $\frac{1}{8}$ "

The wings should be the same width, and about of the thickness of the body wings.