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MENSURATION OF THE DEFORMITY OF HIP DISEASE.

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The object of the present paper is to facilitate methods of recognizing, measuring and recording the degrees of deformity of hip disease. A great advance in the study of this subject was made in 1877 by our Corresponding Member, Mr. Howard Marsh. I reproduce, in Figs. 1–5, the original figures with which he illustrated his first lecture on hip disease at the London Hospital for Sick Children. These figures, modified in various ways, have reappeared many times in the literature of this subject, and to one clinically familiar with these deformities they do not require explanation. Mr. Marsh's lecture contains a complete exposition of the mechanics of the deformity of hip disease, and it will not be easy to add anything to what he has said.[1] I have, however, constructed the movable models represented in Figs. 6–10, in order to make this difficult subject more easy of comprehension.

As seasoned practitioners we appreciate at a glance the clinical significance of abduction or adduction when combined with fixation. Abduction means apparent lengthening and adduction, apparent shortening. Abduction and lengthening, adduction and shortening, flexion and lordosis, are to us mentally interchangeable terms, but it may not have occurred to us all that these factors of deformity may be easily measured and recorded, and that we may thus better appreciate the importance of affording relief

[1] British Medical Journal, July, 14, 1877, pp. 37-39.

and the merits of whatever method we may adopt to remove or prevent deformity. The dolls, in Figs. 6 and 7, were arranged and photographed several years ago. They show graphically the degrees of motion and deformity, but they can not, from the immobility of

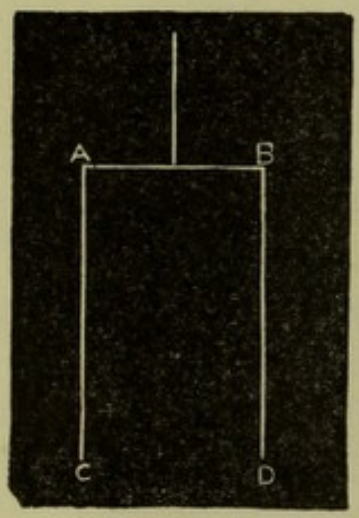

FIGURE 1.

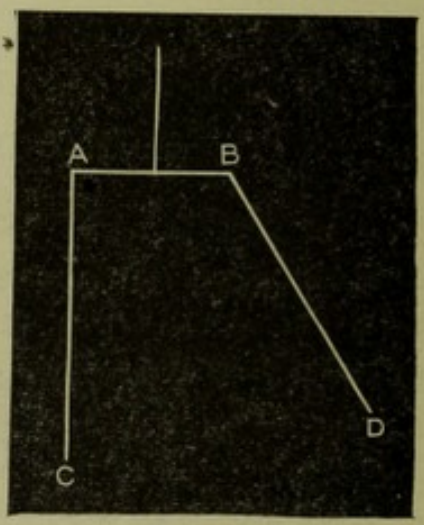

FIGURE 2.

their vertebral joints, show the effect of the disease on the length of the limb or the curve of the spine. These effects are, however, shown in Figs. 8–10, in which figures cut out of press-board take the place of dolls, and are so put together that they exhibit

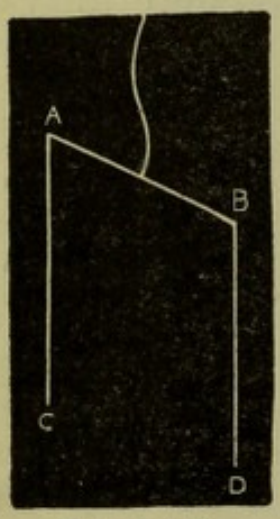

FIGURE 3.

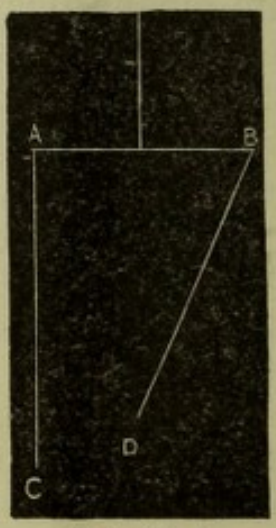

FIGURE 4.

FIGURE 5.

motion, and also the arrest of motion, not only at the hip, but also at the vertebral joints.

The figures explain themselves to a certain extent. The joints are made of eyelets not pressed too hard

with the "eyelet-set," and loosely screwed to the background at V in the full figure, and at H in the profile. The piece representing the thorax in the profile is reinforced at the back by a thin piece of brass, as the edges of the press-board were found to wear out against the four screws which act as guides. The spring clip is a "scarf-retainer." The apparatus is easily made, and is useful in class demonstration.

To show the effect of lateral deviation with fixation.—

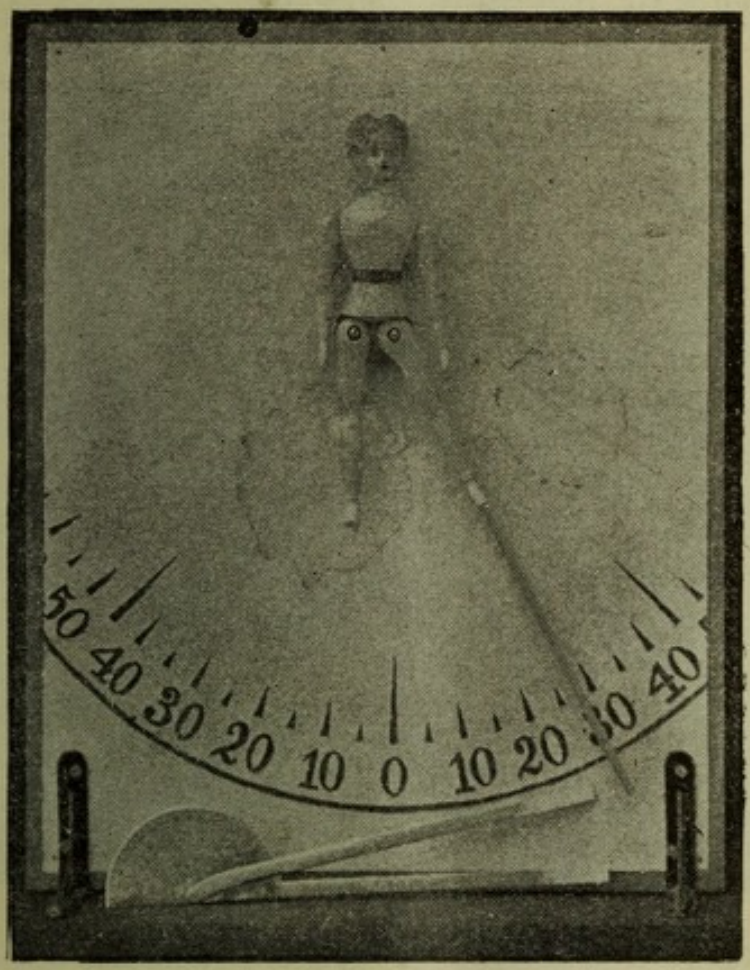

FIGURE 6.

The full figure is first arranged symmetrically as in Fig. 8. The clip applied at A binds together the piece representing the pelvis and that representing the trunk, and thus prevents motion in the vertebral joints, at V, while motion at the hip joint is free. The limb is then drawn into adduction, as in Fig. 9, and the clip is removed from A, releasing the vertebral joints, and applied at B, where it fixes the hip joint,

at H, by binding together the pieces representing the pelvis and the femur. When an attempt is then made to restore symmetry or to make the limbs parallel, the figure exhibits tilting of the pelvis and apparent shortening, as in Fig. 10. In like manner, abduction and fixation may be made to produce apparent lengthening. A fortunate result is that in which the patient recovers with enough apparent lengthening to annul the real shortening caused by loss of bone or unequal growth.

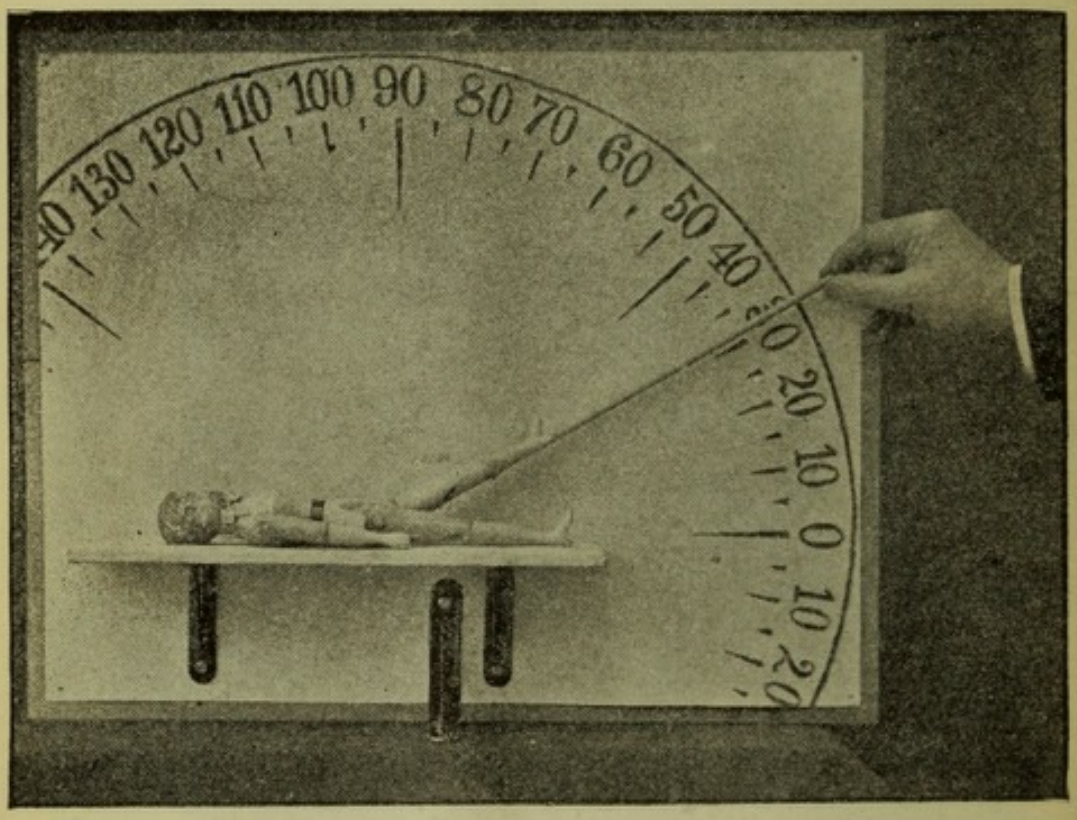

FIGURE 7.

To show the effect of flexion with fixation.—The cuts may be turned sideways so as to present the profile recumbent. The clip applied at A, as in Fig. 8, binds together the pieces representing the pelvis and the trunk, and thus prevents motion in the vertebral joints, V V, while motion at the hip, at H, is free. The limb is then raised in flexion, as in Fig. 9, and the clip is moved from A to B, releasing the vertebral joints, and fixing the hip joint. When an attempt

is then made to reduce flexion or lower the limb to the table, the result is lordosis, as in Fig. 10.

It is interesting to note, by observing the transverse dotted lines, that the patient's height is increased by either adduction or abduction, and decreased by flexion when either is combined with fixation. The height is diminished in lateral curvature of the spine by the sigmoid curve, in Pott's disease by kyphosis, and in hip disease by lordosis. The deformity of hip disease may readily and with sufficient accuracy be measured by the use of the gonio-

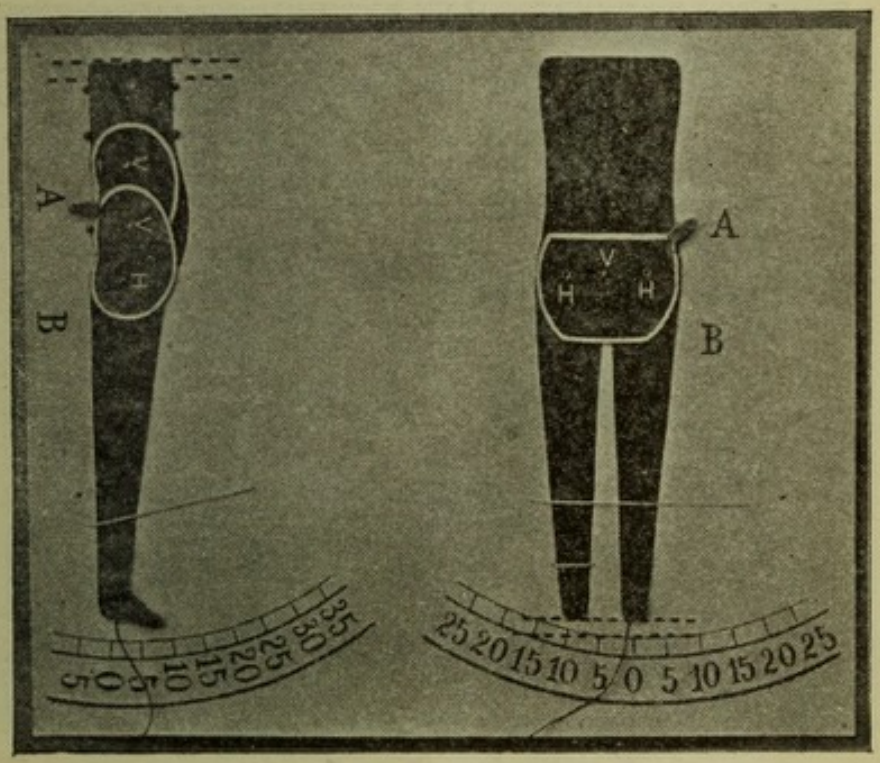

FIGURE 8.

meter, two forms of which are shown in Figs. 6 and 9. This instrument is simple in construction and may well be in frequent clinical use. The one shown in Fig. 9 is made by attaching arms to a protractor.

To measure adduction or abduction.—The limb is slowly moved in the direction of adduction and abduction alternately until, after repeated trials, it is seen that when it is held at a certain point in the arc of lateral motion the iliac spines are at right angles with the axis of the trunk. One arm of the gonio-

meter is then held parallel with a line connecting the iliac spines. If the table is against the wall of the room, it is convenient to see that the iliac spines are at right angles with the wall, and then the arm of the goniometer may be directed point blank at the wall. The other arm is then made to coincide with a line parallel, as near as may be, with the axis of the limb, which may, for this purpose, be considered to extend from the middle of Poupart's ligament to the middle of the heel. If the axis of the thigh only is considered, the incidental presence of genu valgum

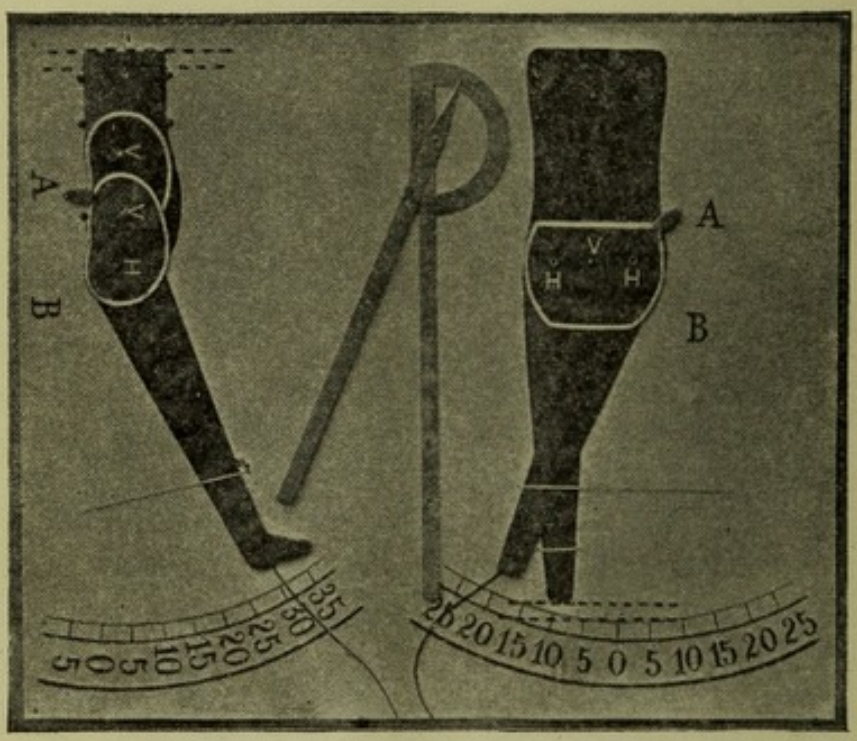

FIGURE 9.

or varum would impair the value of the observation. The degrees may then be counted on the scale of the protractor.

To measure flexion.—With one hand the limb is slowly raised and lowered until, after repeated trials, it is found that, when the limb is held at a certain point, the lumbar spines press gently on the fingers of the other hand placed under the back. One arm of the goniometer is then held horizontally by the hand released from under the back, while the other

arm is made to coincide, as near as may be, with a line parallel with the axis of the mass of the limb. The degrees then read off on the inner scale of the protractor are degrees of flexion. Although its determinations are, from the nature of the case, only approximate, the goniometer is an instrument of precision, and easily makes itself useful in practice.

Writers on this subject have usually viewed deformity as the result of immobilization of the hip joint. The figures and models referred to in this article have been constructed with that view. As

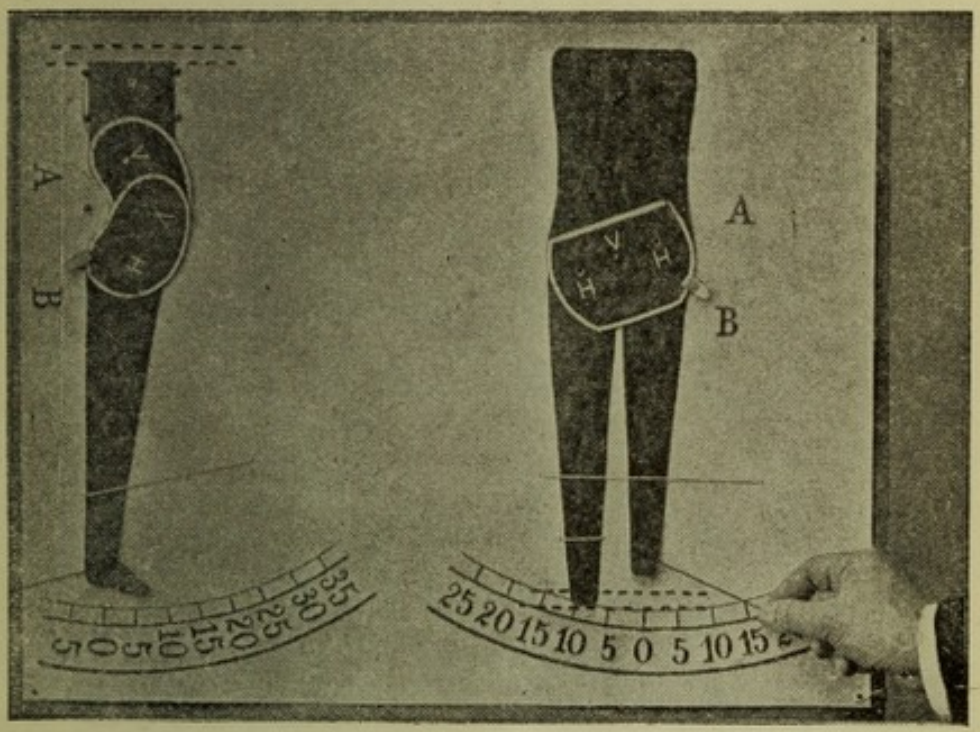

FIGURE 10.

a matter of fact, however, few cases present absolutely immovable joints at any stage. There is almost always considerable motion. In the acute stage the joint, which at the first glance appears to be motionless, is found to yield through an arc of many degrees in response to gentle force rightly applied. Later in the course of the disease many cases show wide and free passive motion in different directions, and the point at which motion is arrested often varies from day to day. And even in after life the

position of the limb is subject to considerable variation. The use of the goniometer facilitates recognition of these phenomena. Further observation in this direction may add to our knowledge and to the efficiency of treatment.