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ORIGINAL METHODS FOR DETECTING AND MEASURING ABDUCTION AND ADDUCTION OF THE THIGH.

By PHIL HOFFMANN, M.D.,
OF ST. LOUIS, MO.

Read by title at the Fortieth Annual Meeting of the Missouri State Medical Association, held at St. Louis, Mo., May 18-20, 1897.

Reprint from St. Louis MEDICAL REVIEW, June 12, 1897.

Original Methods for Detecting and Measuring Abduction and Adduction of the Thigh.

BY PHIL. HOFFMANN, M.D., ST. LOUIS,

Chief of the Orthopedic Clinic at the Missouri Medical College.

As every surgeon who has much to do with the treatment of joint affections knows, the detection, correction, and prevention of abduction or adduction of the thigh in tubercular or other disease of the hip-joint, is a far more important matter than it at first thought would appear. The permanent fixation of the limb in either of these two positions, especially that of adduction, constitutes a serious deformity, because of the impediment to locomotion occasioned by the practical lengthening or shortening of the limb, due to the necessary tilting of the pelvis in order to bring the two limbs parallel for walking, and because of the secondary deformity of the spine, which assumes a position of lateral curvature, that with time may become aggravated, on account of the pelvic tilting just alluded to. It is also often of importance for purposes of measurement or anthropometry, to have the two limbs exactly parallel to the central line of the pelvis.

To one not accustomed to the careful examination of joints and the various positions assumed by them during disease, it might perhaps seem obvious that the recognition of the above mentioned lateral malpositions can be accomplished by a mere glance without reference to any particular landmarks. This, however, for the fol lowing reasons, is not true: Abduction and adduction at the hip are not estimated by the relation of the limb to the whole trunk, but by its relation to the pelvis alone. A limb fixed at an acute or obtuse angle to the pelvis may be brought parallel to the general axis of the trunk by the lateral spinal curvature already referred to, so that the eye will not detect these deformities unless aided by anatomical landmarks or instruments of precision. One making a special study of deformities will frequently see cases where adduction at the hip-joint has been mistaken for true shortening of the limb, and that at times, by otherwise competent surgeons. The laity nearly always mistake this deformity as such, and mothers rarely bring their children to the surgeon to have a lateral malposition corrected, but because, they say, "one limb is shorter or longer than the other."

To make clear why adduction simulates shortening, and abduction lengthening of a limb, I shall employ the excellent and simple diagrams, which, I believe, were first given us by Mr. Howard Marsh, of London.

In Fig. 1, A B represents the transverse axis of the pelvis, and A C and B D the long axes of the thighs. In Fig. 2, the thigh A C is shown abducted. Now, if this position of abduction is fixed, in order to bring the

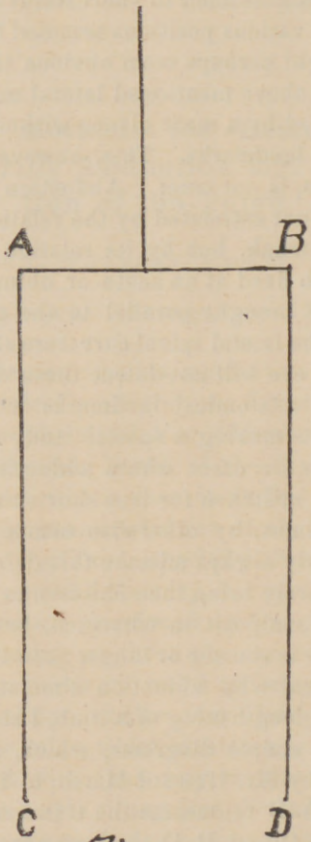

Fig. 1.

two limbs parallel, the pelvis must be tilted downward on the abducted side, as is shown in Fig. 3, which gives that limb the appearance of being lengthened. In Fig. 4, the thigh A C is shown adducted. Here, in order to bring the two limbs parallel, it is necessary to raise that side of the pelvis, as in Fig. 5, which makes the adducted limb appear shortened.

It is for the above reasons that several methods have been invented to aid in the recognition and measurement of these deformities. The one most commonly employed, is to draw a line from the anterior superior spinous process of the ilium on one side to that on the other and observe whether it is horizontal or oblique, the higher corresponding to an adducted limb and the lower to an abducted one. Or, a second line drawn from the umbilicus to the symphysis pubis is made to cross the first; if the two lines form right angles then the limbs are straight; but if the angles are acute and obtuse it means that lateral deviation toward or from the normal axis of the body has taken place. This, however, only tells that the limb is displaced to one side or the other, but not the *amount* of lateral malposition present. It also can only be used in those cases where tilting of the pelvis upon the lumbar spine has occurred, but not to determine position in freely movable joints where we wish to place the patient's trunk and limbs in a perfectly straight line for purposes of measurements, etc.

So it is rather a test for the detection of pelvic tilting, which generally accompanies abduction or adduction of

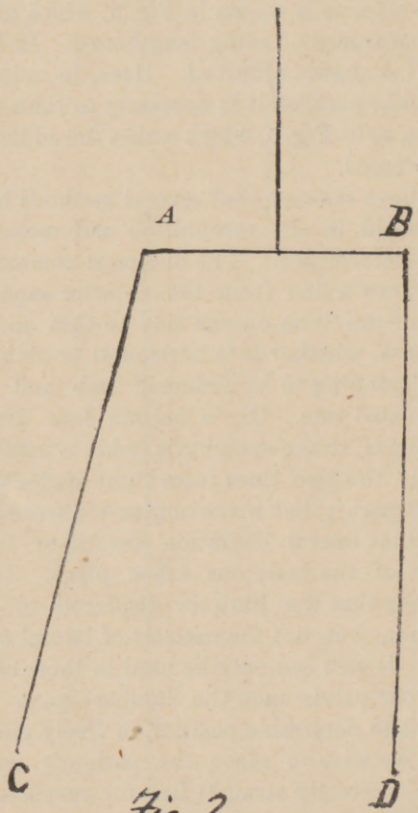

Fig. 2.

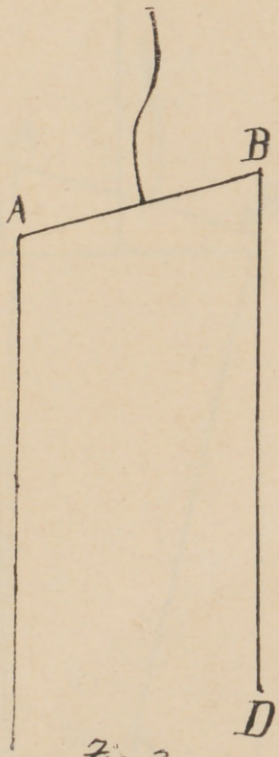

Fig. 3.

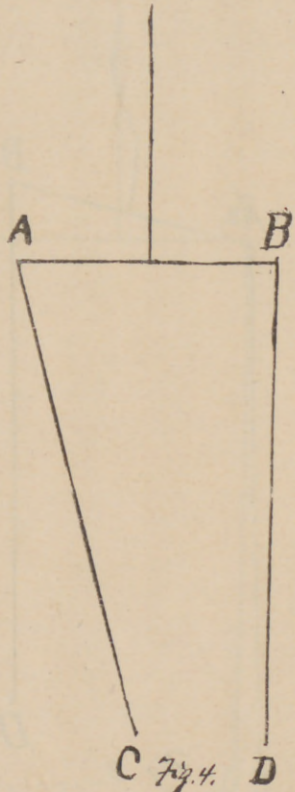

Fig. 4.

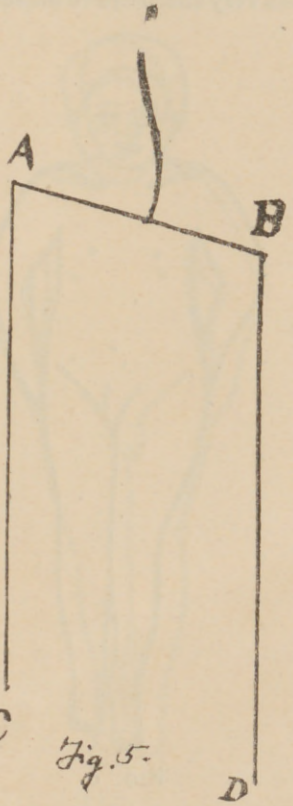

Fig. 5.

the thigh, than for detecting these positions themselves. It also requires a very sharp eye to detect obliquity of the

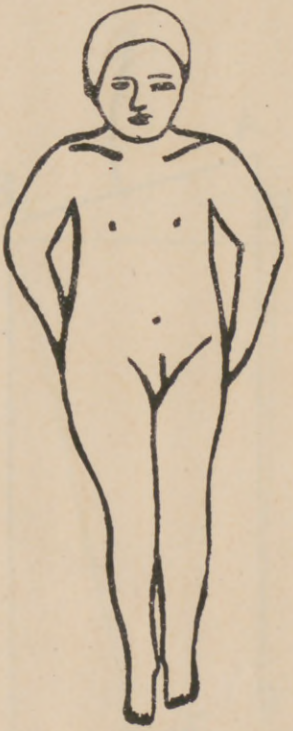

FIG. 6.

inter-spinous line, or deviation of the relationship between it and the cross line from a right angle, when only a small amount of lateral deformity is present.

Sometimes the amount of malposition is estimated by the goniometer, an instrument, according to Dr. Robt.

Fig. 7.

W. Lovett, "not often at hand and always clumsy and inaccurate."[2]

Dr. Lovett[3] himself has very ingeniously constructed a table, based upon profound mathematical calculation by means of which the number of degrees of abduction or adduction can be determined after finding the difference between the real and apparent shortening of the limb and the distance from one anterior-superior iliac spine to the other. The results are accurate enough, but the great objection to it is that it requires the use of the aforementioned table, which, like the goniometer, is not always at hand and is not easily learned by heart.

FIG. 8.

For about three years I have made use of two methods that I have found to be simple, accurate, and always at hand. The first is a test for instantaneously detecting abduction or adduction, but not to determine the amount. Placing the two limbs together, it will be observed if one side is adducted that the furrow at the bend of the thigh on that side will be deeper and longer than the one opposite; but if abducted the furrow will be shallower. The genitals and the fold between the buttocks

will always point toward the adducted and away from the abducted thigh. This can be observed in Figs. 6 and 7. Here it is seen that the left limb is adducted and apparently shorter than the right. So a mere glance at these folds is enough to determine the presence or absence of either of these two positions. See Fig. 8, which was photographed from life. Here, also, the right limb is abducted and the left adducted.

The second test, used to measure the *amount* of lateral deviation, for the purpose of keeping accurate record, is as follows:

By means of a tape-measure find the distance from one anterior-superior iliac spine to the other, and exactly midway between make a dot with ink or aniline pencil. Make another mark directly over the symphysis pubis, which can readily be found by feeling for the junction of the pubic bones; or, in the female, it corresponds to the anterior extremity of the cleft between the labia majora (anterior commissure), and in the male to the center of the root of the penis. You now have two fixed points in the central line of the pelvis. Run a string or thread (do not use a tape as it is too broad and may lead to error) from the upper to the lower mark and on down the thigh and leg to below the soles of the foot. Now, if the limbs are in a straight position, as in Fig. 9, the string should fall midway between the two inner condyles and internal malleoli. If either limb is abducted, both the condyle and malleolus will be situated outside the string; if adducted they will be inside. Fig. 10 shows this plainly. It also shows the pelvic

tilting and compensatory spinal curvature. An accurate estimation of the amount of deviation and daily increase

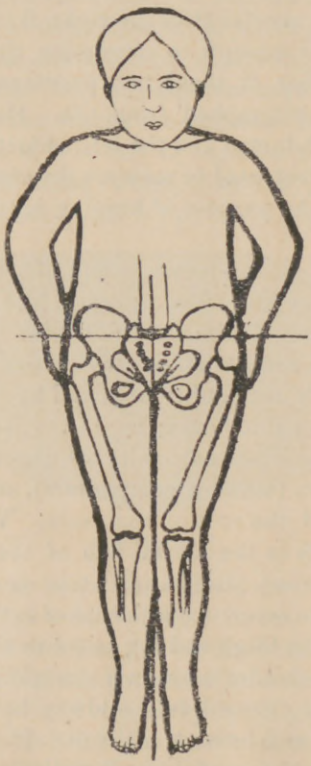

FIG. 9.

or decrease can be had by measuring the distance between the internal malleolus and the string and from

day to day recording any change. This, of course, does not express the amount of angular deformity in degrees,

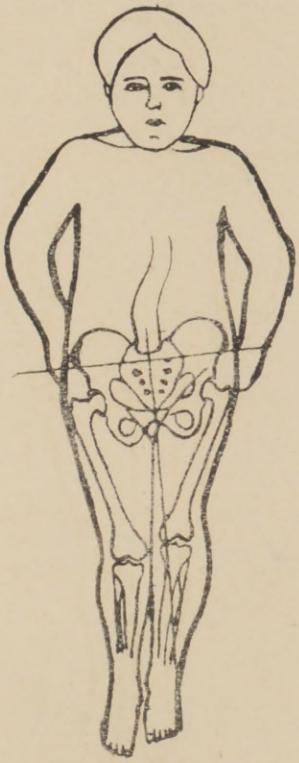

FIG. 10.

but it tells, what is perhaps more important, how far the lower end of the limb is from the normal axis of the

body. The angle can, however, be estimated where, for purposes of description, etc., it is desirable to do so, by the relation between the string and the inner aspect of the limb.

I am much indebted to Dr. R. J. Terry for his kindness in preparing the accompanying diagrams.

[705 North Channing Avenue]

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[2]Boston Medical and Surgical Journal, March 8, 1888.

[3]Ibid.