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THE UTILITY OF A CERTAIN CHART FOR THE DETERMINATION O FPELVIC ASYMMETRY FROM A SIMPLE METHOD OF EXTERNAL PELVIMETRY.*

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Pelvimeter.

I employ the pelvimeter shown you in Fig. 1, and which I devised several years ago. Although graduated in centimeters, the centimeter marks are so widely separated that it is possible to read fractions of a centimeter, even to two-tenths of a centimeter. The points are not spherical or conated, as is usual with pelvimeters, but they are disk-shaped. The disks are held between the thumb and a finger of each hand and pressed firmly but not painfully upon the patient and the distance read during the application.

Method of Measurement.

1. Apply the disks of the pelvimeter at those points on the outer side of the iliac crests where I can effect the greatest diameter.

2. Locate the two anterior-superior iliac spines and place the disks of the pelvimeter on the outside of each, but very near the anterior termination of processes.

3. Place one disk of the pelvimeter in the median line at the lumbo-sacral junction and the other at the most prominent anterior point of the pubes. By the most prominent point is meant the point at which the greatest diameter is obtainable.

All measurements are made with firm but not painful pressure of the disks of the pelvimeter during the reading.

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Allowance for Obesity.

With women of about normal weight I have recorded the measurements as read from the pelvimeter, but for obesity I have usually de-

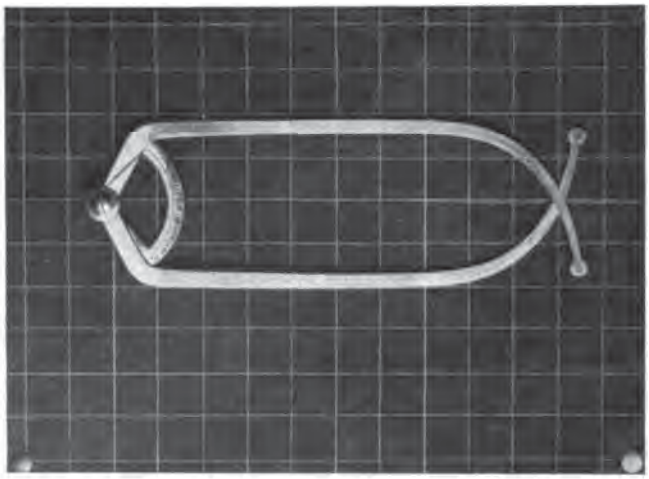

Fig. 1.

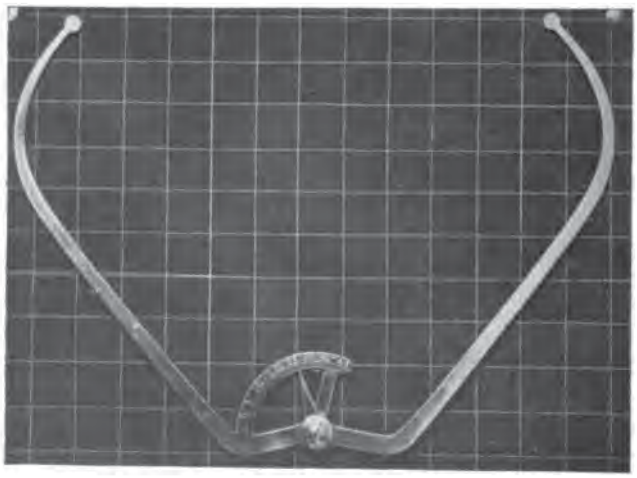

Fig. 2.

ducted one centimeter from the reading, and at least two centimeters from the external conjugate for *very pronounced obesity.*

A deduction of one-half or one centimeter from intercrest and interspinous readings is all the allowance I have made on account of obesity or very pronounced obesity.

Several years since I began and industriously continued to make and record the distance between the iliac crests, the anterior-superior iliac spines, and the sacrum and pubes, of almost all women who presented in obstetric or gynæcologic practice. A small percentage of the whole number of pelves were found by external pelvimetry or by other tests, to be more or less out of shape and sufficiently so to warrant me in classifying them as asymmetrical.

Having thus eliminated the pelves which were found to be unsymmetrical, I grouped all others in several distinct classes according to size. The first group embraced all pelves measuring 24 centimeters between the iliac crests. The second group included those which measured half a centimeter more, or 24.5 centimeters, between iliac crests. The third group measured 25 centimeters between iliac crests. The fourth group embraced those which measured 25.5 centimeters between iliac crests. The fifth group included all which measured about 26 centimeters between iliac crests; and so on until every pelvis to the extremes of size was placed in one or other of the several groups.

Having thus classified what I esteemed to be the pelves of normal conformation, I averaged the interspinous and external conjugate measurements for each class and assumed that, for theoretical and practical purposes, the results in any instance would afford me the two companion measurements for pelves of that particular group or class.

To show how this result was obtained, let us assume, for example, that the different pelves, five in number, of one group and size, measured respectively about as follows:

Twenty-five Centimeter Class.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
	cm.	cm.	cm.	cm.	cm.
Intercrest	25.0	25.0	25.0	25.0	25.0
Interspinous measurement	23.0	22.2	22.8	23.2	22.8
External conjugate measurement..	17.0	17.8	17.4	17.6	17.2

Addition of the interspinous measurements and division by the number of pelves of this class:

Interiliac spinous measurement of pelvis: No. 1, 23.0 cms.; No. 2, 23.2 cms.; No 3, 22.8 cms.; No. 4, 23.2 cms.; No. 5, 22.8 cms.; total, 115.0 cms.

One hundred and fifteen centimeters divided by five, the number of pelves of this class, gives us 23 centimeters, which is the average or composite interspinous measurement for the pelves of this group, and which measured about 25 centimeters between the iliac crests.

External conjugate of pelvis: No. 1, 17.0 cms.; No. 2, 17.8 cms.; No. 3, 17.4 cms.; No. 4, 17.6 cms.; No. 5, 17.2 cms.; total, 87.0 cms.

Eighty-seven centimeters divided by five, the number of pelves in this group, gives us 17.4 cms., which is the composite or average external conjugate measurement for the pelvis in this 25 cm. group.

You will thus see how, by grouping all normal pelves in relation to

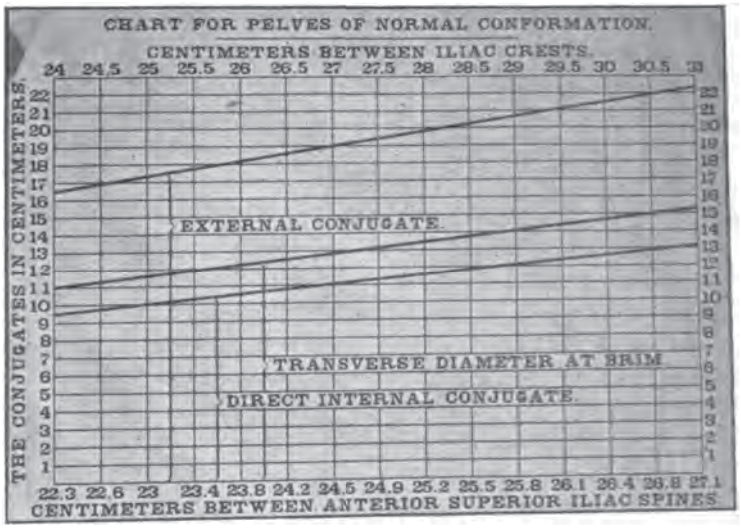

Fig. 3.

size between iliac crests, I was able to obtain averages of the two other and companion measurements in every instance. With these results in hand I devised a chart which shows the companion measurements for pelvis of one or other of the dozen or more groups or sizes. We may also read from the chart what I deem to be the companion measurement of the direct internal conjugate, and also the transverse diameter at brim of pelves of any size.

Description of Chart.

The space between any two horizontal lines represents one centimeter, the figures at the left and the right, reading from zero, indicate the number of centimeters for antero-posterior or external conju-

gate measurements. The heavy line beginning at 16.5 centimeters to our left on the chart and terminating at about 22.4 centimeters on our right, I designate as the external conjugate line.

Near the top of the chart appears a progressive series of numbers any one of which may be utilized for an interiliac crest measurement. The lines which descend from these numbers terminate at the bottom of the chart, where another progressive series of figures indicate the several companion measurements between the anterior superior spinous processes of the ilium.

The heavy line running obliquely across the chart from 11 centimeters upon our left to 15.3 centimeters upon our right, indicates the transverse diameter at brim, according to the point at which it may be intersected by any particular line in interest, thus:

A pelvis of normal conformation measuring 29 centimeters between iliac crests would measure 14 centimeters transversely at superior strait, and would measure 25.8 centimeters between iliac spines, and 20.7 centimeters over sacrum and pubes.

The heavy line running obliquely across the chart from 9.5 centimeters on our left to 13.1 centimeters on our right indicates by its intersection with any vertical line the companion direct internal conjugate of any pelvis in interest.

To make practical use of the chart, let us assume that we have examined a pelvis and find it to measure 27 centimeters between iliac crests. We follow the descending line underneath 27 centimeters to to bottom of the chart, and there we read 24.5 centimeters, that being the companion interiliac spinal measurement. Observe the point at which the descending vertical line just referred to intersects the broad and inclined external conjugate line, and follow the horizontal line from that point to its termination at the left or right of the chart, and we there read the companion external conjugate diameter for a pelvis measuring exactly 28 centimeters between crests. It is 19 centimeters.

Another Illustration.

A pelvis presents with an external conjugate of 21 centimeters. Let the eye follow the horizontal line from the figures 21 at either the left or right side of the chart to its intersection with the external inclined conjugate line; from that point follow the vertical line to the top of the chart and read the companion intercrest measurement, which is 29.5 centimeters, and to the bottom of the chart to ascertain the companion interiliac spinous measurement, which is 26.1 centimeters.

Another Example.

If a pelvis presents with an interiliac spinous measurement of 23 centimeters, follow the vertical line upward to its intersection with the external conjugate line, and you will find that the companion external conjugate measurement should be about 17.4 centimeters. Follow the vertical line to the top of the chart, and it terminates at 25, that being the companion interiliac crest measurement for a pelvis with an interiliac spinous measurement of 23 centimeters.

As one uses the chart a little he naturally acquires the habit of reading between the lines, and he soon imagines that he measures so accurately that he begins to find, for example, a pelvis whose interiliac crests are neither exactly 27.5 centimeters nor 28 centimeters, reading from his pelvimeter during application 27.7 centimeters. He looks at the chart and, finding no such interiliac crest in figures, imagines a line to descend two-fifths of the way between the 27.5 and 28 centimeters; that it intersects the external conjugate line at about 19.5 centimeters, and that his imaginary line descends to the bottom of the chart, where he estimates that the companion interiliac spinous measurement would be about 25 centimeters.

Asymmetrical Pelves.

If, in the mensuration of a pelvis, any one of these three companion measurements is found to be very much less or greater than the indications of the chart, we must feel fully warranted in the presumption of asymmetry. In such instances two of the diameters depart widely from the standard. The following from my collection of asymmetrical pelves illustrates this:

Case A.—Before craniotomy. Crest, 29 centimeters, iliac spines, 29 centimeters; external conjugate, 19 centimeters.

At autopsy, when post-mortem symphysiotomy was performed, the following internal diameters were taken: Direct internal conjugate, 6.3 centimeters; transverse, 13.8 centimeters.

In this case the increased distance between the iliac spines afforded most pronounced indication of asymmetry.

Very often only one diameter departs materially from the indications of the chart, and is illustrated by the following from my collection of ill-formed pelves:

Case B.—Crest, 27 centimeters; iliac spines, 22.5 centimeters; external conjugate, 17.5 centimeters.

In this instance one might assume the intercrest diameter at fault, since the relation of the interiliac spine to the external conjugate conforms with the indications of the chart. However this may be, it is sufficient to note that the external measurements indicated internal asymmetry, and should at once have directed us to more particular and internal examination. An external conjugate of 17.5 centimeters does not belong to a crest of 27 centimeters. She was a handsome young woman, with broad hips, presenting the following parturient history: First labor; very prolonged second stage; instrumental delivery with dead child weighing seven and one-half pounds; second labor, prolonged second stage, delivery of a living child weighing six and one-half pounds, without instrumental aid; third labor, head rested at the superior strait, instrumental delivery of a living child weighing seven pounds.

Case C.—From my asymmetrical list. It was rachitic, with the following measurements and history: Crest, 26 centimeters; iliac spines, 25.5 centimeters; external conjugate, 17 centimeters.

Comparison of these diameters, with the indications of the chart, shows that no measurement is right in its relation to either of the others.

First labor, instrumental delivery of a dead child after a prolonged second stage, attended by a professional friend of mine; second labor, delivery without instrumental aid, after a short second stage, of a living child weighing five and one-half pounds; third labor, instrumental delivery of a living child weighing seven pounds; fourth labor, instrumental delivery of a living child weighing seven pounds. This woman was attended by the reader in all but her first confinement, and her three children born alive are still living.

Case D.—Another from my asymmetrical list: Crest, 27 centimeters; iliac spines, 26 centimeters; external conjugates, 21 centimeters.

Probably also rachitic, with the following parturient history: Prolonged second stage, head rested at brim, delivery with the forceps of a dead child weighing eight pounds.

Here again the measurements are not in accordance with the indications of the chart.

Case E.—Another asymmetrical pelvis. Dimensions: Weight, 185 pounds; height, 158 centimeters; crest, 29 centimeters; iliac spines, 27 centimeters; external conjugate, 20 centimeters. Correction of measurements on account of obesity: Crest, 28.3 centimeters; iliac spines, 26.3 centimeters; external conjugate, 18.6 centimeters.

This woman's first labor lasted two days and was delivered with

forceps; living child; second labor, small living child, long labor, no assistance; third labor, seventy-two hours, small living child, unaided; fourth labor, chloroform, forceps, dead child; fifth labor, anæsthesia, failure with forceps and resort to symphysiotomy and delivery of child weighing ten and one-half pounds, nude. Afterward delivered of a smaller child by the forceps.

Case F.—Another patient, aged fifteen years, four feet six inches in height, pelvis small and probably slightly out of shape. Crest, 22 centimeters; iliac spines, 21.5 centimeters, should have been about 20.5 centimeters; external conjugate, 16.5 centimeters, should have been about 15.5 cntimeters; internal conjugate, 7 centimeters.

Judging from the relatively increased external conjugate, I judge that she had a relatively shortened transverse internal diameter at brim.

She was delivered by Cæsarian section of an eight and one-half pound living child. She returned to the hospital at the age of eighteen for accouchement, when all the diameters were found to have increased. The internal conjugate then measured 9 centimeters, and she was delivered with the aid of forceps of a child weighing about seven and one-half pounds.

Case G.—Measured at autopsy after death following Cæsarian section by a friend. A round pelvis. Crest, 23.5 centimeters; iliac spines, 21.5 centimeters; external conjugate, 18 centimeters. At autopsy: Internal conjugate, 10.1 centimeters = 4.1 inches; transverse, 10.2 centimeters = 4.2 inches.

On the chart you will notice that in extremely small pelves the difference in measurement between iliac crests and iliac spines is less than 2 centimeters, and that as we proceed to examine larger and larger pelves this difference increases uniformly until in extremely large pelves it amounts to about 4 centimeters.

I wish to direct particular attention to the relation of the external conjugate line to the companion intercrest and interspinous dimensions. You will notice that it increases in geometric ratio with the increasing size of the pelvis. Although my measurements have established this external conjugate line practically in this form, that is, in the form of a straight line from the smallest to the largest pelves, I had presumed that my calculations would eventuate in an upward or downward curving of the conjugate lines. While in making these averages there were slight deflections in the two conjugate lines, their general direction was so nearly straight that I assumed the slight deflections to be only as one might have expected from averages based on a comparatively limited number (several hundred) of observations. In this relation

I would say that such a chart should be based upon the averages of a few thousand, instead of a few hundred, cases. I indulge the hope that some one having abundant material at hand will continue this work of recording and averaging the relative measurements of normal pelves of various sizes, and thus correct or maintain, with greater authenticity, the readings of this chart.

I have not in this study attempted to deal with other than the intimations of the three common external pelvic measurements. They are the most important and relate to the superior strait, or that part of the birth canal where osseous deformity or contraction so frequently eventuates in trouble for all interested.

Regarding the practical utility of external pelvimetry, I believe that with this chart as a reference to guide us in our estimations, or with some similar standard whereby we may easily determine not only the size but also pronounce on the qualities of symmetry and asymmetry, we shall be able to discover, with almost unerring certainty, the pelves which are most liable to give trouble in parturition.

In general, external pelvimetry offers only presumptive evidence; but the presumption is so strong in many cases that the birth of an undersized child only may appear to clinically disprove its claims.

The practice of external pelvimetry is harmless in that it may be used without endangering the patient to sepsis, and it is of great value in directing us in certain cases to more particular internal examination. It also enables us, in just those cases where the knowledge may be of value, to announce at times that the superior strait is small, ill-shapen, or narrowed antero-posteriorly, and that a large child, and especially a malposition of the child, so often caused by asymmetrical pelves, may eventuate in mch trouble to all interested.

Moderately small but symmetrically formed pelves may offer far less resistance to childbirth than much larger ones with greatly shortened conjugates.

I once saw a master of obstetrics make a single measurement—the distance over sacrum and pubes—and he at once remarked to a class of students that the pelvis was slightly flattened. Without knowing the companion iliac crest and interspinous diameters, I think that he had no good reason for assuming that the pelvis was flattened. "Flattening" is a relative term, and if one is without some standard of reference for pelves in their varying sizes, he may easily mislead by its clinical use.