

HABITS OF POSTURE A CAUSE OF DEFORMITY AND
DISPLACEMENT OF THE UTERUS.¹

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The influence of habits of posture upon the shape of the chest, and the healthful development of the lungs, has long been understood. Their influence in the production of spinal curvatures is well known. It has long been a common practice to elevate an inflamed part, and otherwise limit or utilize the force of gravitation in the treatment of medical and surgical cases.

Before the time of Marion Sims, the gynecologist and obstetrician had learned the usefulness of certain postures in the treatment of pelvic conditions. In the light of all this knowledge it seems strange that so little should be known to-day in reference to the influence of habits of posture in the *production* and *maintenance* of deformities and displacements of the uterus, an organ so movable, and in itself so helpless to resist the forces of gravitation and pressure from surrounding structures.

The human body viewed from the standpoint of its mechanics, consists of a central arch, or pedestal,—the pelvis, which supports a perpendicular superstructure, the trunk. Because the pedestal is subject to movement upon its axis, the superstructure to maintain an equilibrium must be flexible, and this flexibility is attained by the spinal column made up of many segments, by ribs articulating with it, by flexible costal cartilages and by soft abdominal walls.

The trunk supports three weights which are attached to its summit, viz:—the arms and head. Upon the position of the pelvis below, and the adjustment of these elevated weights, the shape of the spinal column in health mainly depends.

The pelvis rests upon its ischia, or upon its column-like supports, the legs, at an angle more or less oblique, in which position it has the power to rock backward and forward, and from side to side.

The absence of bony landmarks, posterior and anterior, upon the same plane of the pelvis, makes it difficult to measure its actual angle

¹ Read before the Gynecological Section of the Pan-American Congress, Washington, D. C., September 8th, 1893.

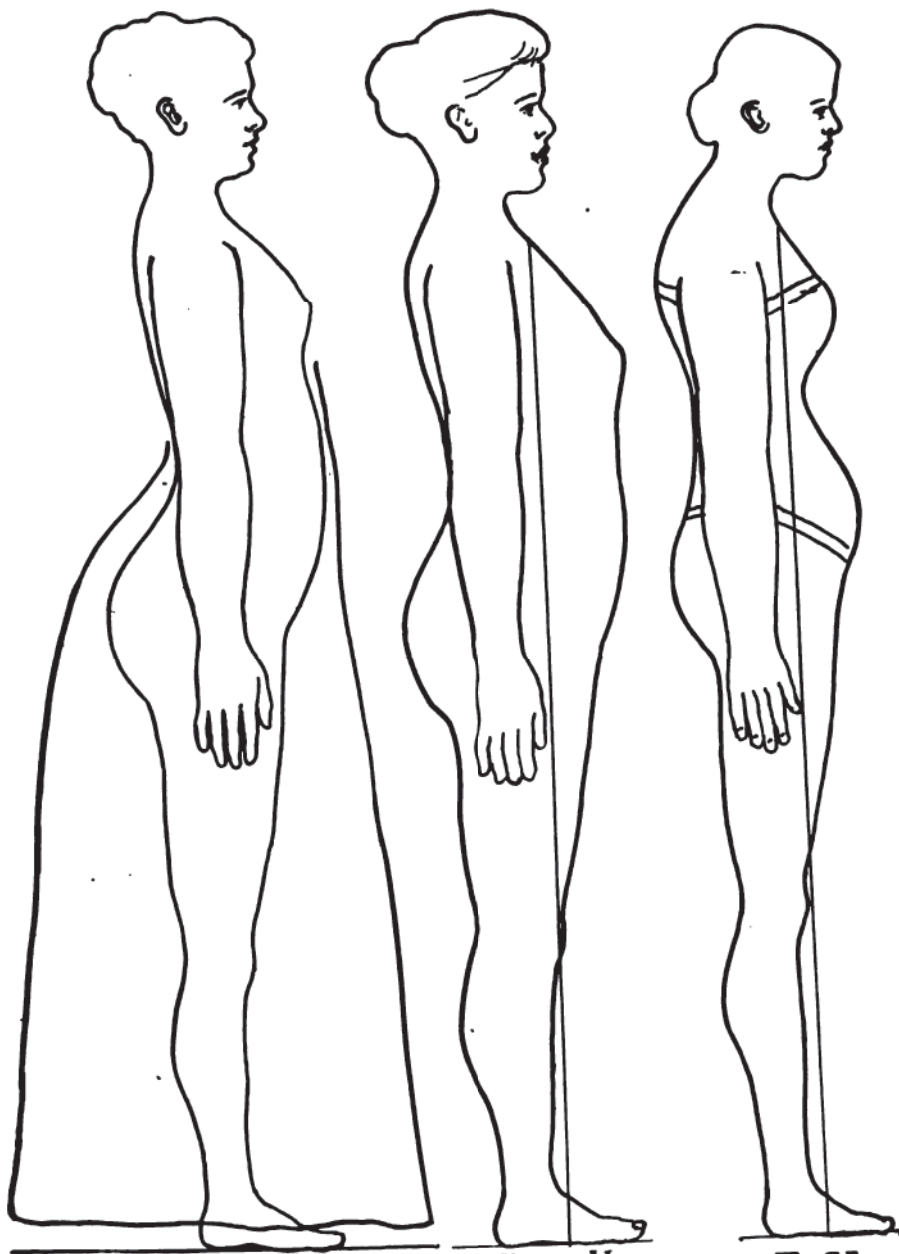


FIG. I.

FIG. II.

FIG. V.

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of anterior inclination. The prominence of the spinous process of the last lumbar vertebra, and the upper border of the symphysis pubis, are points which have been chosen by a good many from which to make measurements. Others, myself among the number, have preferred to measure from the sacro-vertebral articulation, a point readily found by placing a rule with sliding bar firmly across the crests of the ilia, and measuring downward an inch; the depression which indicates its location is found very near this point, especially if the individual to be measured bends backward or forward. The angle with the vertical, formed by measuring from these points, has been termed the "Angle of Obliquity of the Pelvis." Movement upon its axis laterally, may equally well be called "Lateral Obliquity of the pelvis," adding for the sake of distinction, the words "right" and "left."

The normal position of the pelvis with the body in equilibrium in the upright, is, without doubt, such a degree of obliquity as is necessary to place *the weight of the abdominal viscera upon the bony arch of the symphysis pubis, and the lower anterior portion of the abdominal wall.* In this position when there is no lateral inclination, the pelvis supports the spinal column and all the structures connected with it, not only in symmetrical position, but so placed that a minimum amount of muscular force only is required, to maintain them in equilibrium. (See Figs. 1 and 2.¹)

Within the pelvis, the uterus poises obliquely upon the summit of the vagina, where it is steadied by its lateral ligaments; these by their broad insertion into the middle of its body, and their firm mooring to the bony wall of the pelvis, are well calculated to maintain it in this its most permanent position. Loops of intestine dangle around its fundus, but with the pelvis at a normal angle, they do not act as weights upon it. A full rectum or bladder rocks it forward or backward temporarily; muscular movements and readjustments of the upper weights, so change the shape of the trunk as to cause this loosely placed organ to make more or less wide excursions, from which, however, if it be in a healthy condition, gravitation brings it back, *provided the pelvis retains, or regains its normal inclination.*

What figures represent this normal angle of obliquity? In looking up the literature of the subject, I find that John George Roederer in 1751, called attention first to this subject, but his measurements are not recorded. From his time to the present, more than fifty observers

¹ The outline drawings accompanying this paper are modified from Kellogg's "Outline Studies of the Human Body."

have measured this angle, and have given averages which range from 20° to 75° . Some mention the points from which measurements were made, others do not. As the angle varies with the point of elevation from which it is measured, these statistics are of little value to us in this study of the subject. Schröter (*Geburtshilfe*, Bonn 1888) quotes Herman Meyer as saying, "The inclination of the pelvis varies very much in the *same* individual in the standing position, depending especially upon the degree of abduction and rotation of the thighs." That much depends upon the position of the legs in standing, is proved by the fact that a variation of 20° can easily be made in the inclination of the pelvis by most women, by first placing the legs firmly in *extension* (with the calf muscles strongly in action) and then relaxing until the knees become slightly bent beneath the trunk.

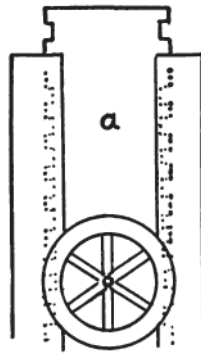


FIG. A.

In order to obtain measurements of the pelvic obliquity in healthy women, and in those suffering from uterine disease, for purposes of comparison, it was necessary to invent an instrument, as I knew of none in this country. The one which I have used for the statistics which accompany this paper, was devised by Dr. Fred Baker, of California, and myself. As is often the case, the first one made proved unwieldy, although its markings were practically correct. For assistance in planning the more perfect instrument which I shall describe, I am indebted to Dr. R. L. Dickinson and Dr. B. B. Mosher, of Brooklyn. For its careful construction, to Mr. Julius Pfarre, of Messrs. Tieman & Co., New York. I have taken the liberty of naming it a "Pelvic-Obliqui-meter." It consists of a grooved upright standard, attached to a solid horizontal platform. Upon the latter the

person to be measured stands. A sliding bar within the upright standard (Fig. A) permits adjustment to the height of different individuals. Two caliper-like arms are attached to the sliding bar, the posterior of which, Fig. B, b, is stationary, (for application to the sacro-lumbar articulation). The anterior, Fig. B, c, is provided with a slot, which not only allows lengthening and shortening of the arm, but also permits vertical movement, around its pivot. An index needle projects from the posterior extremity of the anterior arm, which moves over a graduated arc, d, e, placed behind it. As the arm drops to the level of the symphysis pubis, the angle of displacement may be read in degrees on the arc.

With my first instrument I measured the obliquity of the pelvis in forty women, between the ages of sixteen and seventy years, using as

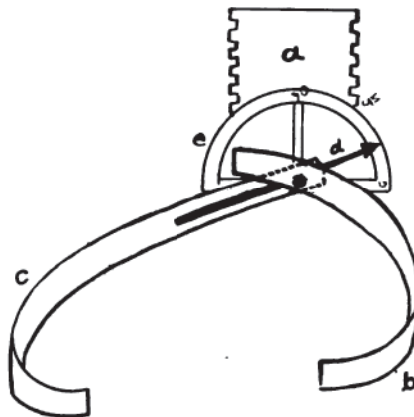


FIG. B.

landmarks the sacro-lumbar articulation and the upper border of the pubic symphysis. Of this number eighteen gave no history of pelvic disease, functional or organic. The remainder had suffered from some form of pelvic disturbance from two to twenty years.

Those of the first class stood habitually with knees firm and chest elevated—practically the military position. Their pelvic obliquity in standing varied from 37° to 48° (see tables appended). Their sitting posture was observed to be equally upright, although it was not measured. Of the remaining number, fifteen had retrocession and retroversion uteri, while six had anteversion or anteflexion.

Those suffering from retroversion with its attendant limitations, with but one exception, held the pelvis at an inclination varying from

25° to 30° only, and rolled it still farther back in sitting. They stood habitually with knees bent, and had poorly developed calf muscles. In searching their history to find if this habit of posture was acquired as a *result* of pelvic discomfort, or otherwise, it was found in a number of instances that the patient was able to recall having been criticised in early life for projecting the abdomen forward. One who had suffered upward of twenty years (during six of which she had worn a pessary), said 'she "had been ridiculed by her family all her life



FIG. 3.

Showing that Pubic Symphysis is in Front of Sternum. (Bernard Roth, M. D.).

because she had poked out her stomach." It would seem, therefore, that the condition was the *result*, rather than the cause, of this habit of posture.

Six women had anteversion or anteflexion uteri. In these cases the pelvic obliquity ranged from 29° to 33°.

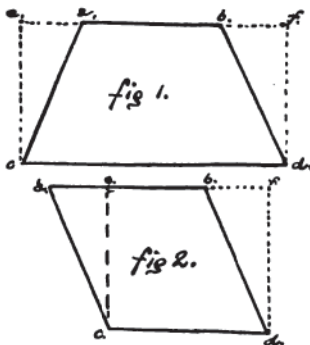
A digital examination made per vaginam with the patient standing in her habitual position, discovered exaggerated intra-pelvic pressure,

in all cases where the pelvic inclination was less than 33° . This pressure increased as the angle lessened. If one of these patients was placed for a few moments in the *modified* "knee-chest position," (*i. e.*, with abdomen well supported) to drag the intestinal loops out of the pelvic cavity, and re-examined with the pelvis at 38° inclination, the intra-pelvic pressure was not observed. It returned slowly, however, when the habitual angle was again regained.

Let us for a moment consider the mechanical changes which accompany an abnormal lessening of the angle of obliquity of the pelvis.

The spinal column loses a portion of its anterior lumbar curve, which makes room for the abdominal viscera to drop backward in this region. The symphysis pubis rotates outward and upward, taking a position upon a plane with or in *front* of the summit of the sternum. (See Figs. 3, 4 and 5.) This movement lessens the distance between the origin and insertion of the rectus abdominis muscle, thus tending to weaken its power to contract; at the same time the inclination of the abdominal wall is so changed, that intra-abdominal pressure takes a direction downward and backward, instead of downward and forward.¹ The result of this movement is to push the contents of the abdomen into the upturned inlet of the pelvis, instead of in front of it, upon the firm bridge of pubic bones made for its support.

When we think of sixteen or eighteen feet of small intestine, more often than otherwise weighted with the products of an imperfect digestion, and distended by gas, swinging upon a relaxed and lengthened mesentery, and crowded into the pelvis not only by gravitation but by



¹ Moreover, that lessened obliquity of the pelvis *in itself* produces actual increase of pressure can be demonstrated by a law of hydrostatics, *i. e.*, the pressure upon the floor of a vessel containing fluid depends on the area of that floor and the depth of the liquid. In Fig. 1, let a b be the waist line, narrowed by tight bands, or corset steels,

abdominal and corset pressure, we easily recognize the cause of the increase of intra-pelvic pressure observed in the cases described.

But what about the uterus itself, in a pelvis held at an angle of 25° ? The force of gravitation strikes its fundus at a point posterior to that which is normal, swinging its weight backward and downward, thus changing the relation of its summit to the vagina, just as we have seen the relation of the abdominal viscera to the inlet of the pelvis changed.

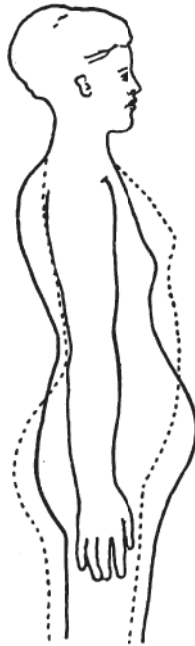


FIG. IV.

c d the abdomino-lumbar line, lengthened by the approach of the pelvis to the horizontal. The contents of the abdominal cavity thus form a cone a b c d. But, by hydrostatics, the pressure on the floor of this cone is equal to the pressure on the floor of a cylinder e f c d of the same height and altitude as the cone.

With a normal waist line and the pelvis held in normal obliquity, the altered conditions may be illustrated by Fig. 2, the lettering on which corresponds to that on Fig. 1. The amount of pressure in this cone is equal to that on the base of the cylinder e f c d. It is easily seen that the base line being shortened by the increased obliquity of the pelvis, the cylinder is smaller in Fig. 2 than in Fig. 1, and the pressure of the mass a c e no longer falls on c d.

This backward movement or retrocession may be the only change in the position of the uterus caused by lessened obliquity of its bony case. It is liable sooner or later, however, to move still farther from its normal place, or to become moulded into new shape by pressure from above. Temporary increase in its weight (after childbirth), relaxation of its supports due to general anæmia or an acute illness, and many other causes favor such a change. The shape and position which it shall assume, depends upon the angle at which the superimposed weight impinges upon it and the direction in which gravitation draws it.

The school girl at her books, rocks the pelvis backward, reducing its angle of inclination to 23° , and then encroaches still more upon the space for the abdominal viscera, by dropping the weight of arms and head forward; at this age normal invagination of the uterus may not yet have become complete, hence the cervix, closely fastened to the pubis, moves upward and forward with it, while retrocession of the body occurs. Can it be otherwise than that pressure from above will mould the fundus into the shape which we so often recognize later, as forward, backward or lateral flexions?

The shop girl stands in this position all day. The seamstress sits in it. The housekeeper alternates standing with sitting. In all, the increase of weight in the uterus during menstruation exaggerates the strain.

Retroversion uteri seems to be the more common lesion, produced by this habit in the adult, especially when the obliquity of the pelvis is lessened to 25° , or even to 29° . When it measures 30° or 33° anterior positions of the fundus, seem to obtain in the few cases I have studied.

What are the causes we ask ourselves, which tend to produce the habit of rolling the pelvis backward. Out of ten girls, under sixteen, measured by me, six had well developed calves, showing that they had stood habitually with knees firm, and walked with energy. Each of these girls held the pelvis at an angle above 33° . The remainder had soft, small calf muscles, and evidently stood with bent knees, and walked with leg muscles weakly active. Nearly all of the latter number carried the pelvis at 33° or below. Bent knees in standing mean relaxation of the muscles which hold the pelvis at its normal angle of obliquity. Hence I place as one underlying cause, a lack of training in childhood into right habits of posture in standing.

Articles of dress, which by their weight and in other ways fatigue the legs, favor relaxation of muscles. High-heeled shoes (i.e. over half

an inch) make it impossible to stand with knees firm; hence their influence in lessening pelvic obliquity. The corset steel, as it bends, makes pressure upon the soft abdominal wall in the region of the waist line; approximation of the anterior body line to the posterior moves backward the centre of gravitation proportionately, and in this central region of the upright column, it especially tends to unbalance the body; the latter, however, regains its equilibrium by throwing the pubis upward and outward and the weights attached to the upper region of the trunk forward and downward. The posture is a familiar one and is well shown in Fig. V.

The seats provided for children and adults, from the infant rocker and the school room chair to that of the lecture hall and church, are all responsible in a large measure for this habit of sitting. It is impossible in by far the larger number of such seats, to place the pelvis at the normal angle, and at the same time use the back of the seat to support the shoulders. Luxurious cushions and soft upholstery, tempt the pelvis into positions unknown to our erect grandmothers, whose hard-seated straight-backed chairs, alas! we have tied with ribbons and placed in a corner.

In-door sedentary lives, in over-heated houses and school-rooms, and many similar wrong conditions (which it is the duty of physicians as guardians of the public health to correct), all these produce habits of posture which it would seem have a more potent influence than has generally been recognized, in the production of pelvic diseases in women.

In its normal position the pelvis occupies a horizontal plane, with no lateral angle of obliquity. Sitting upon one ischia, or standing upon one foot produces a lateral inclination, which, if allowed to become habitual, has power to change the shape of the entire body. The scope of this paper permits a study only of the influence of this position upon the organs of the pelvis.¹

With the pelvis in "lateral obliquity" the superimposed trunk retains its equilibrium by throwing its upper weights (arms and head) toward the elevated side. (See Figs. 6 and 7.)² By this movement the

¹ For a further development of this subject see Author's paper on "The Influence of Habits of Posture upon the Symmetry and Health of the Body," Brooklyn Medical Journal, July, 1892, and "Habitual Postures of School Children," Educational Review, N. Y. October, 1892.

² Photographs taken from Dr. Bernard Roth's "Treatment of Lateral Curvature of the Spine."

spinal column is made to take a long lateral curve, with slight rotation upon its vertical axis. The shoulder, hip and ribs approach each other shortening the body line and encroaching upon the space within the abdomen in that region. Opposite conditions obtain upon the side which is unsupported. The contents of the abdomen move downward and toward the latter, carried by gravitation and mechanical pressure. Loops of intestine crowd into the pelvis *upon that side* and against the uterine fundus, prying it out of the place to which



FIG. 6.

Right Lateral Obliquity of Pelvis. (By Bernard Roth, M. D.)

gravitation alone would carry it, and over toward the side where there is least pressure. The broad ligament upon the lower side is stretched and pressed upon, while the other tends to grow short from disuse. The ovaries receive their share of ill-treatment and suffer accordingly.

As these changed conditions become permanent, we should expect the circulation of blood through the organs of reproduction to be interfered with, since all the vessels enter and find exit from the uterus, at its sides in close relation with the insertion of the broad ligaments.

Upon the short side they would become *over* tortuous in their journey to the organ, while upon the other they would straighten out abnormally, because the distance which they are obliged to travel is lengthened. Neither of these conditions is conducive to free movement of the blood current. The obstruction thus presented is exaggerated during the menstrual engorgement, and therefore it would seem that we might count it among the causes of dysmenorrhœa, and especially of that form wherein without evidence of organic disease of



FIG. 7.

Right Lateral Obliquity of the Pelvis. (By Bernard Roth, M. D.)

the ovaries, pain is habitually referred to the lateral regions of the pelvis.

I have examined per vaginam and per rectum, a large number of women and girls, who have acquired a lateral obliquity of the pelvis from habits of posture, and in almost no instances have I found the uterus in the axis of the pelvis.

In the forty-two cases (notes of which I have taken), twenty-two had a *right* lateral obliquity (right hip elevated) while the remainder

had acquired the opposite tilt. In every one of these cases the uterus approached the elevated hip, especially in the upright position of the trunk. Most of these women had dysmenorrhœa and leucorrhœa, and in some the condition was accompanied by more serious pelvic lesions.

A combination of the two forms of obliquity in the habitual posture of the pelvis is quite common especially when the habit has been acquired in standing, and the influence of both can be traced in the shape and position of the uterus.

If we admit that certain habits of posture have the power to increase abnormally intra-pelvic pressure, and predispose women to deformity and displacement of the uterus it becomes our duty, it seems to me, to decide upon the best measures which can be taken to do away with this widespread and far-reaching cause of ill health in women and since prevention is easier and more economic than correction, the work should begin in the home and in the school room.

Mothers in every school district should collectively be instructed in reference to the normal position of the body in standing and sitting, and of the danger which menaces their daughters if not properly trained. Teachers everywhere should be similarly instructed and urged to enforce the adoption of right habits of posture in their pupils. Physical exercise not only in the gymnasium but in the school room, between classes, should be given to strengthen the muscles which hold the pelvis in normal obliquity, and which correct the tendency to lateral obliquity. A physical director (preferably a woman) should be employed by the school board of every city to measure the pelvic obliquity of all of the girls in the public schools, from time to time, so as to place those who require it under special training, which should be continued until a right habit of posture has been acquired.

Physicians and all intelligent people should exert an influence against the use of articles of wearing apparel by girls and women which engender bad habits of posture, most important of these being high heels, the corset steel and tight waist bands.

School and lecture room seats, and chairs in general, should be constructed in such a manner as to aid rather than hinder the body in its efforts to maintain an equilibrium in healthful positions.

It is hardly necessary in the light of the facts here presented, to remind the gynæcologist of the importance of training patients into right habits of posture, before beginning local treatment for disease of the uterus and ovaries. Nor can we wonder at the failures we have

been forced to record in the treatment of flexions, versions, and prolapsus of the uterus, when we remember how we have disregarded this important factor in their causation.

I hope the time is not far distant when a systematic use of the "Pelvic Obliqui-meter," accompanied by corrective exercise during girlhood, will obviate the present necessity for the frequent use of the speculum and the surgeon's knife, for the relief of conditions within the pelvis, which interfere with the health and happiness of so many women.

TABLE OF MEASUREMENTS.

OF

Pelvic Obliquity in Women Who have Never Suffered from Pelvic Disease or Discomfort.

| Case No. | Age | Conditions. | Occupations. | Height of Body. | Breadth of Pelvis. | Obliquity of Pelvis. | Remarks. |
|----------|-----|-------------|--------------|-----------------|--------------------|----------------------|---------------------------|
| 1 | 31 | M. | Actress. | 62.5 | 12.5 | 37° | |
| 2 | 36 | S. | | 62. | 10.75 | 37° | |
| 3 | 25 | S. | Nurse. | 64. | 11.75 | 38° | |
| 4 | 26 | S. | Stenog. | 69.5 | 11.75 | 45° | |
| 5 | 39 | M. | House. | 63.75 | 11.75 | 42° | |
| 6 | 36 | S. | | 64.5 | 11.25 | 48° | |
| 7 | 26 | S. | Nurse. | 66. | 11.75 | 42° | |
| 8 | 25 | S. | M. D. | 62. | 11.75 | 39° | |
| 9 | 24 | M. | | 65.5 | 12. | 42° | |
| 10 | 24 | S. | | 63. | 11.75 | 40° | |
| 11 | 24 | S. | | 64. | 12.25 | 37° | |
| 12 | 70 | M. | House. | 61.25 | 11.25 | 37° | |
| 13 | 28 | M. | Editor. | 60. | 11.75 | 38° | |
| 14 | 20 | S. | | 68. | 12.5 | 35° | Slight anteversion uteri. |
| 15 | 65 | S. | | 65. | 11.75 | 37° | |
| 16 | 22 | M. | House. | 63. | 11. | 48° | |
| 17 | 22 | S. | | 67. | 12.25 | 40° | |
| 18 | 17 | S. | | 65.5 | 11.75 | 40° | |

TABLE OF MEASUREMENTS
OF
Pelvic Obliquity in Women Suffering From Deformity and Displacement of the Uterus.

| Case No. | Age. | Condition. | Occupation. | Height of Body. (in inches) | Breadth of Pelvis. (Trochanters.) | Exaggerated intra-pelvic pressure. | Prolapsus Uteri. | Deformity. Anteflexion. | Deformity. Retroflexion. | Displacement. Retro-cessation. | Displacement. Retro-version. | Displacement. Ante-version. | Prolapse of one ovary. | Prolapse of both ovaries. | Obliquity of Pelvic Posture. | General Remarks. |
|----------|------|------------|-----------------------|-----------------------------|-----------------------------------|------------------------------------|------------------|-------------------------|--------------------------|--------------------------------|------------------------------|-----------------------------|------------------------|---------------------------|------------------------------|---|
| 1 | 22 | S. | Sewing. | 64 | | I | | | | I | I | | | I | 29° | |
| 2 | 25 | S. | Shop. | 62 | | I | | | | I | I | | | | 27° | Pain in sacral region since beginning of menstruation. |
| 3 | 49 | M. | House. | 61.25 | | I | | | | | I | | | | 27° | Examined by Dr. Sims 15 years ago; has been under care of several noted Gynecologists. |
| 4 | 37 | S. | Teacher. | 64 | 10.75 | | | | | I | I | | | | 30° | Small fibroid in posterior wall of uterus. |
| 5 | 37 | S. | "Sister of the Poor." | 66.5 | 13 | I | | | | I | I | | | | 29° | Discomfort, dragging in sacral region several years. Lifted heavy weight. Pain began immediately. |
| 6 | 25 | S. | Service. | 63.75 | 11.75 | I | | I | | | | | | | 25° | Pessary 6 years ago. |
| 7 | 38 | S. | Dress Maker. | 62 | | I | | | | I | I | | I | | 25° | Many years of pain and discomfort. |
| 8 | 40 | S. | Service. | 62 | 12.5 | I | | | | I | I | | | | 27° | Pain in sacral region 5 years, especially during menstruation. |
| 9 | 15 | S. | | 63.5 | 11.75 | I | | | | | | | | | 25° | Leucorrhœa. Dysmenorrhœa. Gen-eral congestion of pelvic organs. |

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|----|----|----|----------|-------|---|---|---|-----|---|
| 10 | 60 | M. | House. | 63.75 | I | I | I | 25° | Menopause six years. Pain and dragging in back most of time twenty years. Pessary many years. |
| 11 | 25 | S. | | 60 | I | | I | 31° | |
| 12 | 41 | M. | House. | 61.75 | I | I | I | 29° | Has worn pessaries of all shapes and sizes; hard to keep them in. |
| 13 | 38 | S. | | | I | | I | 30° | General Anæmia. Much headache. |
| 14 | 24 | S. | | 63 | I | | I | 29° | Painful Menstruation. |
| 15 | 38 | M. | House. | 64.5 | I | | I | 25° | History of inflammation after birth of child. Uterus adherent posteriorly. Long continued discomfort. |
| 16 | 37 | M. | Washing. | 61 | I | | I | 31° | No Pelvic symptoms. Constant headache. |
| 17 | 39 | S. | Shop. | 64 | I | | I | 30° | Used to stand, walk, and sit, tilted backward. Position corrected. Ovarian inflammation. Removal of Ovaries. Great mental distress. |
| 18 | 66 | M. | House. | 62.5 | I | | I | 26° | Pelvic discomfort twenty years. Pessaries innumerable. Intra-Pelvic pressure continues. |
| 19 | 22 | S. | | 63.75 | I | | I | 29° | Pelvic pain since age of seventeen. Habitual school posture with pelvis rolled backward. Lateral obliquity marked. |
| 20 | 44 | M. | House. | 64 | I | | I | 25° | Pain in pelvis since early girlhood. Examined ten years ago; diagnosis retroversion uteri. Condition continues. |
| 21 | 24 | M. | House. | 61.5 | | | I | 31° | Out of health three years. Miscarriages. |
| 22 | 24 | M. | House. | 67.5 | I | | I | 31° | First symptoms appeared after attack of typhus fever. |
| 23 | 32 | M. | House. | 61 | | | | 34° | Ante-version present many years. Intra-pelvic pressure extremely well marked. |