

**The diagnosis of early pregnancy : with report of one hundred cases and special reference to the sign of flexibility of the isthmus of the uterus / by Ellice McDonald.**

**Contributors**

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Royal College of Surgeons of England

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The Diagnosis of Early  
Pregnancy

BY  
ELLICE McDONALD, M. D.  
New York

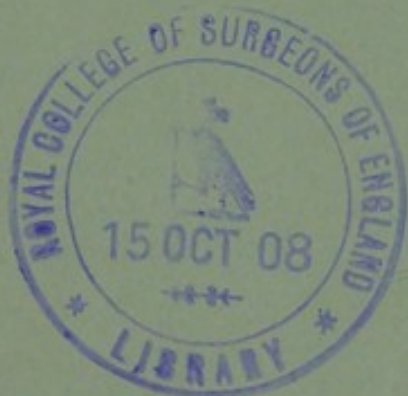
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## THE DIAGNOSIS OF EARLY PREGNANCY

WITH REPORT OF ONE HUNDRED CASES AND SPECIAL  
REFERENCE TO THE SIGN OF FLEXIBILITY OF  
THE ISTHMUS OF THE UTERUS.\*

BY

ELLICE McDONALD, M. D.,

New York.

Instructor in Obstetrics, College of Physicians and Surgeons; Clinical Assistant in  
Obstetrics, Vanderbilt Clinic; Instructor in Obstetrics, New York  
Post-Graduate Medical School and Hospital.

(With Illustrations.)

THE question of the diagnosis of pregnancy is one which has been an object of investigation for medical observers of all times. The ancient writers from the time of Hippocrates and Celsus have all directed their attention to the subject. The vaginal methods of examination, however, have only come into use during the last century and brought with them the knowledge of new signs of pregnancy.

To make a decided diagnosis of pregnancy in the early weeks is one of the most difficult problems in medicine and one in which the physician's prestige with his patients may suffer the greatest shocks. It is a problem to which the physician should bring his most cautious efforts. Van Smieten, in 1718, said on the subject: "*Nunquam forte magis perclitatur fama medici, quam ubi agitur de graviditate determinanda: undique fraudes, undique saepe insidere struuntur incautis. . . . Omnes enim qui de graviditates signis scriperunt, quamvis longo artis obstetricæ usu celibes primis præcipue mensibus signa graviditatis satis incertum esse.*"<sup>1</sup>

The question of pregnancy is one which must be solved before any operation upon a woman, and almost every operator has had the experience of finding, at operation, an unsuspected pregnancy. Unfortunate the surgeon who thus errs! He is held in execration by his patient and in derision by his colleagues. Yet the literature is full of such mistakes, although it is safe to say that the great majority are not published. Van der Veer,<sup>2</sup> in 1889, collected seventy-seven cases of abdominal section, in

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which unsuspected pregnancy occurred. In this list of seventy-seven cases, are many of the names of most distinguished gynecologists and surgeons of the world. From this it may be seen that the diagnosis of pregnancy is often one of no small difficulty and one which requires wide knowledge and great skill in gynecological examination. The subject was a favorite one for the early writers and they believed that a woman might know when conception had taken place.<sup>3</sup> They also believed that various abdominal symptoms occurred, such as slight colicky pains in the region of the umbilicus, etc.<sup>4</sup> This symptom was seen in some of my cases, but it also occurs just before menstruation.

The signs and symptoms of pregnancy are better divided into (1) those from the history, (2) breast signs, (3) signs on vaginal examination.

#### SIGNS FROM PATIENT'S HISTORY.

The symptom which most commonly brings a woman to the physician for an examination as to the probability of pregnancy is the suppression of the menstrual flow. This sign is of some value in certain cases; in others it is not. If a woman has been previously regular in her menstrual epochs and there has never been an alteration of the time of the period by more than one day, any cessation of menstruation is significant. But, if there has ever been any irregularity, the symptom is of no value.<sup>5</sup> It is also to be remembered that many other causes may contribute to this cessation. This condition is often noted in young girls, particularly Irish girls, who have immigrated from a foreign country and whose menstrual periods are absent for several months after their arrival. During this investigation several such cases have been seen. Then again, it is said that the menstrual flow may be absent in newly married women or in those fearful of the results of wrongdoing. It is also to be remembered that many pathological causes may contribute towards this end, as anemia, tuberculosis, chilling, wasting diseases and their convalescence, premature menopause, etc.

An interesting and rather rare cause of cessation in menstruation has been pointed out by Axenfeld<sup>6</sup> who recognized that tumors of the base of the brain, especially those which involve the hypophysis cerebri, are most commonly productive of cessation of menstruation. And it has been recognized that



acromegaly, especially in young persons, is likely to have complete amenorrhea as one of its first symptoms. Cessation of menstruation often declares itself before any other symptom of acromegaly can be observed and usually is treated in many ways before the hopelessness of the condition with the advance of nervous manifestations is observed.

These observations were confirmed by many writers, amongst them Cushing<sup>7</sup> who showed that sexual infantilism, involving complete absence of menstruation, was a complication of tumors affecting the hypophysis cerebri. The menstruation may have been delayed at puberty or, if established, not infrequently completely disappears. It may also be noted that certain cases of concussion of the brain are followed by prolonged disturbance of menstruation and sometimes by cessation for many months. As a large proportion of these cases were young unmarried women, the importance of the condition is evident.

These facts were also confirmed by Serafino Patellani<sup>8</sup> who collected and analyzed 145 cases of acromegaly in women with reference to its relation to the sexual functions. The altered function is especially demonstrated by arrested menstruation. He concludes that amenorrhea is not simply a symptom of acromegaly, but bears a causal relation to it. Pregnancy may occur with acromegaly; but lactation will hasten the progress of the disease. The amenorrhea may be the result of the atrophy of the uterus due to lactation. The disease occurs especially between the ages of twenty-one and twenty-five years and more frequently in virgins and sterile married women. The course in these is more rapid.

The symptom of amenorrhea is also misleading from the fact that a woman who is pregnant, may have some slight bloody discharge at the time the menstrual flow should have come, and speak of this as a menstruation. This flow is not uncommon at the first or second epochs, and is usually of a thin, serous character, and only tinged with blood. It seldom appears after the third month.

Pregnancy may also take place during the physiological amenorrhea of lactation or in those who are in the habit of missing periods. It is stated by Karl Heil,<sup>9</sup> in a study of 478 lactation periods, that there were 234 (48.9 per cent.) with menstruation present during lactation, so that about half of all nursing women menstruate during lactation, and, as the number of pregnancies increase, the tendency to menstruate



increases also. Thus it will be seen that the absence of menstruation during lactation is not a reliable sign. It is also to be remembered that it is possible for girls to become pregnant without ever having menstruated. Many such cases are reported by Stein,<sup>10</sup> Sieber,<sup>11</sup> Montgomery<sup>12</sup> and Tanner.<sup>13</sup> This is said to be a common condition amongst the Turks.

The value of the menstrual signs of pregnancy is also lessened by the fact that menstruation may be delayed, as in a case reported by Hirst and Fox.<sup>14</sup> This woman had no menstrual flow until her thirty-fourth year, then menstruated spontaneously three times. After five months more of amenorrhea she became pregnant. Wolfe<sup>15</sup> also gives the history of a woman who married at thirty-four, menstruated at forty-five, conceived and was delivered at forty-six years. The first bleeding followed upon a fright. So that it may be said that, while the absence of menstruation in a woman of previous regular menstrual habit, is of some value as a symptom of pregnancy, it may also be significant of many other conditions and is an unreliable and uncertain sign of pregnancy.

Nausea and vomiting is the next most common symptom in the history of pregnant women. It may occur in the morning and is usually regurgitative in type, but varies in onset, duration and severity between very wide limits. The time of its onset is uncertain. Montgomery relates a case of a woman who was married Saturday, had morning vomiting on Monday and was duly delivered of a child in nine months.

In an excellent study of the nausea and vomiting of pregnancy in 300 cases, Giles<sup>16</sup> found that 45 per cent. of all pregnant women are exempt from vomiting during the first three months. It is least frequent between the ages of twenty and twenty-five years and 90 per cent. of primiparæ over twenty-five years suffer from sickness. It is least common in the third pregnancy, and women who menstruate painlessly suffer less from sickness of pregnancy. The "morning sickness" is most common during the second month, although three-quarters of all cases of vomiting begin to do so in the first month. Morning vomiting also occurs in many other conditions than pregnancy, as chronic gastritis, nephritis, in pelvic disorders, etc. So that it may be seen that, as only half of all pregnant women have this condition in the first three months, and as it may occur in other conditions than pregnancy, the symptom of morning vomiting cannot be considered a reliable symptom of pregnancy.



## BREAST SIGNS.

In this division only those conditions which appear before the third month will be considered. Montgomery's description of the breast signs of pregnancy remains classic. When conception has taken place and the menses have been suppressed for one or two periods, the woman generally becomes sensible of an alteration in the state of the breasts in which she feels an uneasy sensation of throbbing or of stretching fulness by soreness and tingling pains about the center of them and in the nipple.

There is considerable variety in regard to the effect of breast changes in the early weeks. But in some cases they are manifested very soon after the first menstruation is missed. Swelling and pain of the breasts in some women, however, accompany the return of each menstruation.

The primary areola of pregnancy was described by Roederer<sup>17</sup> and later by Montgomery,<sup>18</sup> whose name has been given to the follicles. The skin surrounding the nipple is soft and turgid. Little glandular follicles or tubercles, as they were called by Morgagni,<sup>19</sup> are softened and raised around the nipple. The color of these follicles is of a deep shade of rose or pink, slightly tinged occasionally with a yellowish or light brown hue. These glandular follicles number from twelve to twenty, and project a little above the surrounding skin. In dark women the pigmentation is greater.

The time of pregnancy at which this phenomenon manifests itself varies very much, but usually it is about the ninth week.

## SIGNS ON VAGINAL EXAMINATION.

The diagnosis of early pregnancy must, after all, depend upon vaginal examination. The conditions caused by pregnancy of growth and increased vascularity of the uterus must first have their effect upon the uterus itself and the pelvic organs. The changes may first be expected in the uterus itself, then in the vagina and adjacent parts. The signs of pregnancy which are recognized by vaginal examination are usually said to be: purplish hue of the cervix, softening of the cervix, compressible isthmus, alterations in the size, shape, and consistency of the uterus and intermittent contractions of the uterus.

With the hope of being able to put the diagnosis of pregnancy upon a more exact and scientific basis, the study of the con-



ditions and value of pelvic signs was undertaken. There were in all 100 cases of pregnancy examined. The duration of the pregnancy was calculated from the date of the last menstruation. This may cause a mistake in the calculation of the length of time of pregnancy, but it is the only date which can be absolutely fixed.

Great care was taken in the examination of these women in order that any tendency to error might be avoided. The diagnosis in the early weeks is one which must depend upon exactitude and skill in vaginal examinations. It is of the greatest importance that the bladder should be emptied. If any urine remains within the bladder, it is impossible to appreciate any minor changes in the size, shape and consistency of the uterus. The fundus cannot be accurately outlined and the intermittent contractions of the uterus cannot be felt.

The waist bands should be loosened and the patient in good position with the hips well elevated upon an examining table or a hard bed. If necessary, a board should be put under the bed. The operator should be in an easy position and one in which he may be able to hold his examining hands perfectly still over a period of minutes in order to properly appreciate the intermittent uterine contractions. The length of vaginal examination should extend over sufficient time to recognize two contractions of the uterus with the intervening relaxation. This is usually from five to ten minutes. If the patient is upon an examining table, one should rest one's foot upon a stool or step, and the arm upon the thigh in order to have proper control of one's hand. If the patient is upon a bed, the elbow may be rested upon the mattress. In this way, it is possible to take all muscular strain off the examining hand and more delicately appreciate any of the more minute pelvic changes. The greatest possibility of error is in making too hurried an examination and in finding a uterus in one phase of its contraction or relaxation, so masking other signs.

The 100 cases reported were almost all catheterized before examination. They were all examined over a period of five to ten minutes, and the cervixes were usually examined through a vaginal speculum.

The table of 100 cases and the percentage in which the various signs were found has been arranged with reference to the various weeks of pregnancy, which in every case were reckoned from the last present menstruation.



The cases are arranged in regard to the duration of pregnancy and to the number of times each sign was found. No case was included in the series, unless the author was convinced that it was a pregnancy, and not some condition simulating it. When Hegar's sign, the intermittent contractions of the uterus, softening of the cervix, and the sign of flexibility of the lower uterine segment were present, the diagnosis was considered exact.

TABLE OF 100 CASES.

<i>Week of Pregnancy</i>	5	6	7	8	9	10	11	12	13	Total
<i>Number of Cases</i> .....	6	8	12	12	15	15	12	12	8	100
<i>Enlargement of Uterus:</i>										
Symmetrical.....	0	4	9	3	9	3	9	11	5	53
To the left.....	2	1	2	3	3	6	2	0	2	21
To the right.....	4	3	1	6	3	6	1	1	1	26
<i>Softening of Uterus:</i>										
Symmetrical.....	0	4	9	3	9	3	9	11	5	53
On the left.....	2	1	2	3	3	6	2	0	2	21
On the right.....	4	3	1	6	3	6	1	1	1	26
<i>Jacquemin's sign:</i>										
Slightly.....	0	2	3	6	9	4	2	4	4	34
Markedly.....	0	0	0	3	0	6	6	4	4	23
Absent.....	6	6	9	3	6	5	4	4	0	43
<i>Hegar's Sign:</i>										
Moderately.....	2	6	6	6	9	8	4	3	1	45
Definitely.....	2	1	3	6	6	7	8	9	7	49
Absent.....	2	1	3	0	0	0	0	0	0	6
<i>Cervix Blush: Present</i> .....	2	1	3	6	9	10	10	12	8	61
" " Absent.....	4	7	9	6	10	5	2	0	0	39
<i>Cervix Softening:</i>										
Present.....	2	2	6	6	8	12	10	12	8	66
Absent.....	4	6	6	6	7	3	2	0	0	34
<i>Intermittent Contraction: Pres.</i>	3	6	12	12	19	13	11	12	8	88
" " Absent..	3	2	0	0	4	2	1	0	0	12
<i>Flexibility of Lower Segment:</i>										
Definitely.....	2	6	8	9	12	12	10	10	8	76
Moderately.....	2	2	3	3	4	3	2	2	0	21
Absent.....	2	0	1	0	0	0	0	0	0	3

*Jacquemin's Sign.*—This sign of bluish tinge of the vaginal mucous membrane is one which was first taught in 1837 by Jacquemin.<sup>20</sup> In the examination of 4,500 prostitutes in compliance with police regulations of Paris, he observed that this violet hue of the vagina was present very early in cases of pregnancy. Duchatelet<sup>21</sup> mentions his investigations upon the subject and notes the accuracy of the sign. Kluge,<sup>22</sup> professor of midwifery at Berlin, was also an advocate of the sign, although priority in the matter seems to belong to Jacquemin. Sommer<sup>23</sup>



studied the sign under Kluge, convinced himself of its accuracy and reported Kluge's results. The sign came in for a great deal of criticism at first, but was finally accepted by the profession as accurate and exact.

It is usually, and was by Jacquemin, spoken of as the violet hue or blush of the vagina. It extends up to the cervix and involves the vulva. The sign is usually said to be present by the second or third month.

In this series of cases, it was found that this hypertrophy of

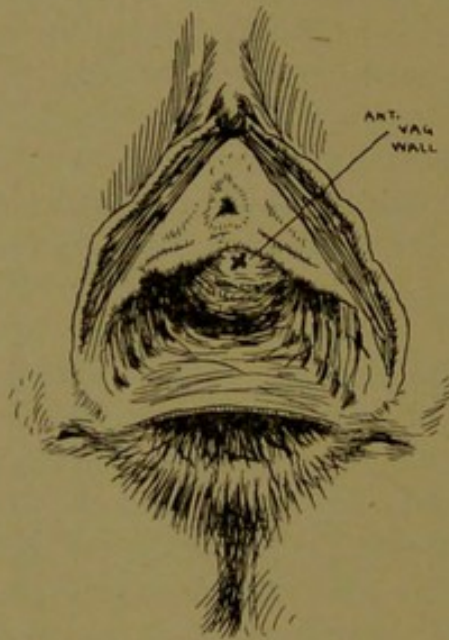


FIG. 1.—Jacquemin's spot.

the vessels and venous congestion of the vagina occurred first at a spot upon the anterior vaginal wall about 2 cm. below the orifice of the urethra. This spot later enlarged to spread the violet hue over all the vagina. This spot, called by the author Jacquemin's spot (Fig. 1), did not at first show upon the surface of the mucous membrane; as the mucous membrane here has creases and crevices, the sign was seen as streaks of livid, bluish purple at the bottom of these furrows. The phenomenon may best be seen at its first appearance by separating the labia and stretching the mucous membrane of the anterior wall, so that these creases may be opened and the engorged veins exposed.

As will be seen from the table, the sign was observed in 57



per cent. of the 100 cases before the thirteenth week. In 43 per cent. it was absent. It was absent in the very early weeks of pregnancy, present slightly from the seventh to the tenth week and commonly after the tenth week. As pregnancy advances, it is present in a greater proportion of cases and, after the thirteenth week, is a very reliable sign.

Weissenberg,<sup>24</sup> in a study of the lividity of the vagina, found that, in 106 examinations, the livid aspect was present in 5 at the fifth week, 1 at the second, 10 at the eighth, 7 at the twelfth. It was slightly present in 2 at the fifth, 13 at the sixth, 10 at the seventh, 6 at the eighth, and 3 at the tenth. It was absent in 5 at the fifth, 20 at the sixth, 4 at the seventh, 6 at the eighth, 6 at the tenth, and 2 at the fourteenth week. In other words, in 106 cases the vagina was noticed markedly livid in thirty-one cases (28.3 per cent.), slightly livid in thirty-six cases (33.9 per cent.), and absent in thirty-nine cases (36.7 per cent.). It was more frequently present as pregnancy advanced. Thus it will be seen that Weissenberg's findings are very similar to those of this investigation, where the sign was marked in 23 per cent., slightly marked in 34 per cent., and absent in 43 per cent. of cases of pregnancy under thirteen weeks.

#### BLUSH OF CERVIX.

The violet hue of the cervix uteri usually is a more satisfactory sign than that of blush of the vagina. It is, as a rule, more definite and more frequently found. The changes in the uterus can usually be depended upon to extend and show in the cervix before they appear in the vagina. All these cases were examined with a bivalve speculum and in a good light. The cervical blush was noticed in 61 per cent. of all cases and was absent in 39 per cent. It was, as was the vaginal sign, more definitely present as pregnancy advanced. At the eighth week, it was present in half the cases, at the tenth week in two-thirds and, in all after the twelfth. Thus it may be seen that it is a more reliable and accurate sign of pregnancy, than is the blush of the vagina.

#### SOFTENING OF THE CERVIX.

This sign is one which is frequently referred to in text-books as a most reliable one. A common simile is that the cervix of



the nonpregnant uterus is as hard as the cartilage of the nose, while the cervix of the impregnated uterus is as soft as the lips.

The softening of the cervix was noticed in about the same proportion as the blush of the cervix. It was present in 66 per cent., and absent in 34 per cent. It was present in increasing proportion with the advance of pregnancy. The sign, as may be seen from the table, was not reliable until after the tenth week.

The softening of the cervix seemed to occur from without inwards, that is to say, the mucosa became congested and soft, and the hard cone of cervical tissue could be felt with the softened outer layer. The cervix, then, increased in softness throughout.

These signs of change in color and consistency of the vagina and cervix are not readily caused by any congestive condition, save pregnancy, and are very reliable in its diagnosis, after the twelfth week of gestation. Before that time they are unreliable, although offering strong corroborative evidence.

#### CHANGES IN UTERUS.

It is natural to suppose that, as the growth of the physiological tumor occurs in the uterus, it is here that the first changes caused by gestation may be felt. It is usually the case that uterine enlargement may be felt by the educated hand as the earliest sign of pregnancy. This enlargement usually is evidenced in one or other part of the fundus. In the very early weeks (five to eight), this enlargement is not accompanied by complete softening of the uterine tissue, but it is somewhat softened with scattered hard spots or islands of firm tissue (Fig. 2), giving an impression, not unlike a soft uterus with small, firm, nodular fibroids.

This enlargement and softening progresses equally and is quite often placed towards one or other uterine horn. It is more frequent to find this asymmetry confined to one or other horn of the uterus in the earlier weeks; and, as time progresses, the uterus becomes more and more symmetrical, so that after the ninth week it is uncommon to find it other than symmetrical. Dickinson<sup>25</sup> first noted this asymmetry in early pregnancy and referred to it as causing a furrow or fold, dividing the body of the uterus into separate prominences. He also alluded to a denser spot of uterine tissue, which he believed to be the site



of the ovum. His first communication was in 1892,<sup>25</sup> and was followed by others in 1893<sup>26</sup> and 1901.<sup>27</sup> This asymmetry was also investigated and described by von Braun<sup>28</sup> and in a monograph by Piskacek<sup>29</sup> who made a study of 145 cases.

The asymmetrical enlargement of the uterus in the early weeks of pregnancy may almost become a distortion and may give rise to errors of diagnosis, the consequences of which are

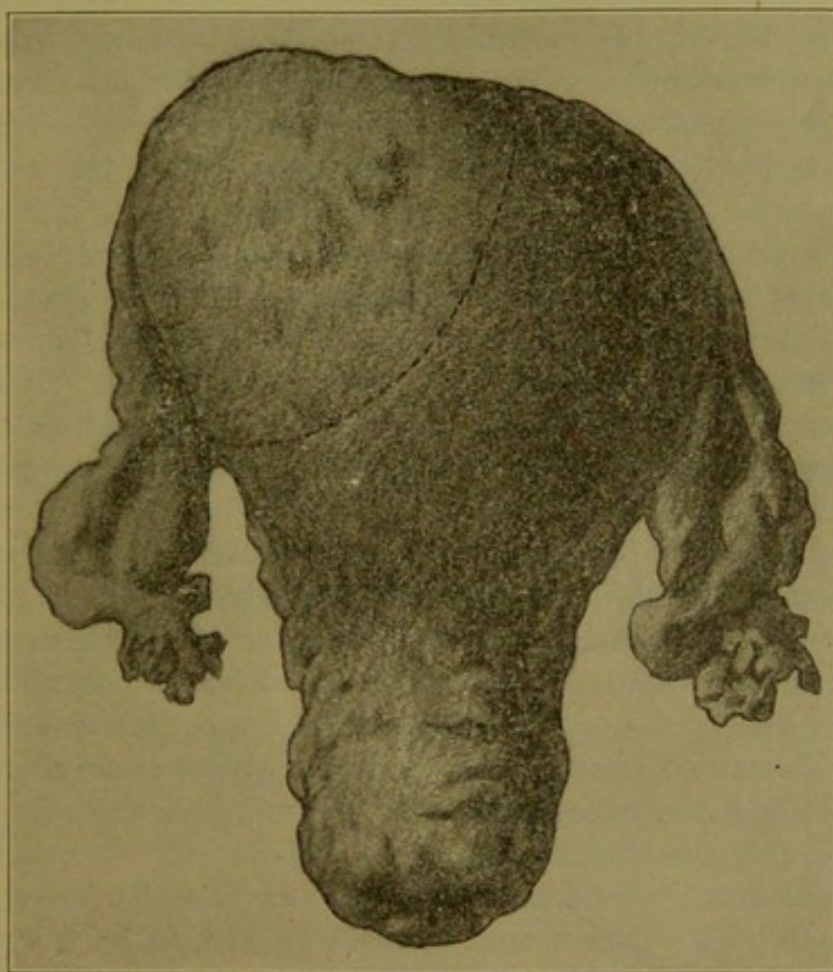


FIG. 2.—Asymmetrical enlargement of the uterus.

sometimes grave. It has sometimes been likened to a face swollen from an inflamed tooth and gives a different sensation to the hand than the part which is not hypertrophied. A common type of this condition is shown in Figure 2. On palpation, it seems as if a tumor is annexed to the uterus and it has been, on occasion, diagnosed as tubal pregnancy. The body of the uterus preserves its habitual firmness, while the cornual



part, usually involving all the uterus to the mid-line, offers great contrast by its flabbiness. It may almost feel fluctuating or cystic, although this is not the rule.

This form of asymmetrical enlargement may be found in many degrees of which "angular" pregnancy is the extreme. The distortion is not usually so marked, however, nor is the feeling of fluctuation common. The enlarged part usually gives a sensation of doughy softness with isolated hard spots. Peuch<sup>30</sup> has described the extreme type of this condition, in a report of fifteen observations, four of them personal, in which this phenomenon developed eight times on the right and seven times on the left. This irregularity in the uterus constitutes only a temporary phase, which disappears with the progress of gestation.

This type of change in the uterus in the first weeks of pregnancy has also been described by Lequeux.<sup>31</sup> He states that it is not uncommon and claims that it is due to attachment of the ovum in the neighborhood of the tubal opening. Piskacek also describes various forms of irregular changes in shapes of the uterus and explains them as caused by the site of the growing ovum.

It has been said by Dickinson, Peuch and others, that a groove or furrow exists between the softer enlarged part and the harder, firmer part of the uterus. The author has never been able to satisfy himself that such a groove exists, but thinks that this belief is due to the sharp edge of the firmer part. The firm and soft uterine tissue lies side by side and the examining hand passing along the fundus causes a depression in the soft tissue when leaving the hard edge.

The author also cannot convince himself that the denser spots described by Dickinson and believed by him to be the site of the ovum, are anything more than the ordinary uterine tissue in the progress of being softened by the growing congestion and vascularity of pregnancy. As a proof of this, these hard or denser spots are more commonly felt in the very early weeks of pregnancy and, as pregnancy advances, they disappear into the common softness.

This enlargement of the uterus (Dickinson's sign) was felt to be symmetrical in 53 per cent. It was seldom symmetrical before the seventh week, and more commonly symmetrical after the tenth week. In other words, as pregnancy advances, the uterus becomes more and more symmetrical. The enlarge-



ment was to the right in 26 per cent. and to the left in 21 per cent. When the uterus was symmetrically enlarged, it could not be judged whether the enlargement was anterior or posterior, save in one case where the enlargement is markedly posterior.

Softening of the uterus is a sign which should be taken with that of symmetrical or asymmetrical enlargement. It occurred in this series in the same proportion of cases, *i.e.*, 53 per cent. symmetrically, 21 per cent. on the left and 26 per cent. on the right side. This softening usually takes the character, as has been pointed out by Dickinson, Von Braun and Piskacek, of an elastic doughiness, often with firm, isolated points or buttons. The firm part of the uterus is unchanged and, from the soft part being larger and more easily palpated, gains the impression of an increase of density.

Weissenberg,<sup>32</sup> in his interesting study of the difference in consistency of the two halves of the uterus, noted the softness on one or other side and never symmetrically. In 108 examinations he found that the left half was softer in seventy-three cases (67.9 per cent.), while the right half was the softer in thirty-five cases (33 per cent.). The discrepancies between the percentages of the two sides were more marked in the earlier weeks when the left was much more frequently softer. The author of this paper, however, believes that the enlargement is not always to one side or the other, as Weissenberg has it, but that it is sometimes central, anterior or posterior, and is felt bimanually as a symmetrical enlargement.

A very marked finding in the present study of 100 cases was the great increase of softness and vascularity in the uterus in proportion to the amount of enlargement which was noted in eight cases of retroflexion. The softening of the uterus and the amount of lividity of the cervix was greater in these cases of early pregnancy with retroflexion, than it was in proportion to their uterine enlargement, and than it was in comparison with the cases of early pregnancy with ante flexion with a history of the same duration. This increase in softening is supposed to be due to the increase in congestion caused by the retroposition.

The enlargement and softness of the uterus often joined with a marked thinning of the uterine wall. This is not, however, the rule, although it is not uncommon.

The consistency of the uterus should be judged during an interval of relaxation, when the softness and enlargement may be properly appreciated. If it is judged during a contraction,



the increase in firmness caused by the muscular contraction masks the real conditions (*vide infra*).

It has been thought by Dickinson, Von Braun and others, that the harder, firmer side of the uterus represents the side of the gestation, while Hubl, Schauta and Landau believe that the softer side is the location of the pregnancy. The author is inclined to the latter view. In one case of pregnancy interrupted for pernicious vomiting at the third month, the gestation was located upon the softer side.

#### INTERMITTENT UTERINE CONTRACTIONS.

Uterine contractions were studied by Braxton Hicks and reported by him in 1871.<sup>33</sup> These contractions had, however, been recognized before by Ingleby,<sup>34</sup> in 1836, who pointed out that "in advanced pregnancy the uterus, when moderately grasped or rubbed, slightly hardens independently of actual labor and almost instantly regains its yielding condition." Oldham,<sup>35</sup> in 1856, pointed out that this power of contraction of the uterus might be taken as a trustworthy characteristic of pregnancy, for he states that the large gravid uterus alters in a marked manner under the influence of pressure, from a condition of flaccidity to one of tension "assuming a tense rounded form and becoming firm and resisting." Oldham believed that no other condition than pregnancy was able to produce these uterine contractions. This was attacked by Tanner<sup>36</sup> who, while believing in the value of the sign, reported cases of uterine contractions from large fibroid polyp and vesicular mole. Tanner, however, believed that in pregnancy or other enlargement of the uterus by a substance in its cavity, there existed "a regular peristaltic movement, consisting of slight contractions and dilatations."

It remained, however, for Braxton Hicks<sup>37</sup> to put the subject upon a definite basis and bring it before scientific men. He claimed that the sign was of use in the diagnosis of pregnancy and also reported instances of contractions from other causes than pregnancy.

Braxton Hicks studied these contractions of the uterus only after the organs could be palpated abdominally. He claimed that the sign was of use after the fourth month of pregnancy, that is, only after the uterus could be palpated through the abdominal wall.



It cannot be too emphatically stated that *these contractions of the uterus are present or may be excited throughout pregnancy and that they are a very valuable sign of early pregnancy.* Thus Lindbloom,<sup>38</sup> in 1891, showed that a change in consistency of the uterus occurred in early pregnancy after manipulation and massage bimanually with the finger-tips.

These contractions are a constant accompaniment of pregnancy and occur whenever the uterus is irritated or stimulated by massage. The manipulations of the fingers in vaginal examination are usually sufficient to cause a uterine contraction, so that by the time the examination is made, the contraction has taken place. The contraction may last some time, usually from one to three minutes. A stage of relaxation or softening then follows, when the bimanual signs of pregnancy may best be elicited. The contraction involves the whole uterus, including the lower uterine segment and the cervix. The cervical involvement is well shown in a report by Johnson<sup>39</sup> of intermittent hardening and softening of the vaginal portion of the cervix, with a change of color from a pale violet to a normal pink hue or the reverse. He states that this condition, as seen through a speculum, is a valuable sign of pregnancy prior to the third month.

These contractions of the uterus come and go during an examination, hence they are called intermittent; but there is no means of discovering whether they occur intermittently in early pregnancy without a stimulus, as the entrance of a speculum is sufficient in itself to cause contractions. It is, however, probable that they do so occur; for Braxton Hicks and others have noted that, in the later stages of pregnancy, more or less continuous intermittent uterine contractions without known stimuli do exist.

The phenomenon of contraction in early pregnancy gives a curious sensation to the examining hands. The soft uterus is felt, then a change is noted with a hardening of the uterine tissue as if the uterus was "crouching." It is a similar sensation to that given by a small animal, as a guinea-pig, suddenly crouching under the palm, while held on a table. The uterus apparently becomes shorter and firmer. All parts of the uterus are involved in the contraction including the lower segment and cervix, as has been shown by Johnson.

It is the fashion to describe these uterine contractions as regular and irregular and state that they may involve only one-



half or part of the uterus. The author has not been able to recognize such distinctions, but, from these cases, considers that, when a contraction involves one part of the uterus, it involves the whole. It sometimes seems, owing to a marked softening and thinning of one part of the uterus, that the contraction is irregular, but this is because the uterine wall is thinner at one part and manifestly cannot contract with the power of the thicker part, and, also, the softer tissue beneath may make the contracted and thin part of the uterus appear less firm. The contractions may, however, vary considerably in intensity in the same uterus and at the same examination.

It is of the utmost importance to consider these uterine contractions in the diagnosis of early pregnancy, not only on account of their diagnostic importance, but also on account of their effect upon the other pelvic signs of pregnancy. For this reason it is necessary in the examination for early pregnancy that the bimanual examination should extend over sufficient time to allow the note of a cycle of contraction and relaxation of the uterus, and preferably two cycles. It is also necessary that the examining hands may be held quiet for some time, so that the movement and irritation, incident to bimanual examination, may not cause the uterus to pass from one contraction to another with only a short period of relaxation.

It has been said that cervical manipulation will excite uterine contraction more easily than massage or manipulation of the fundus, but the latter has been most successful in this investigation.

The vaginal fingers are held in the anterior fornix and the abdominal hand steadies and rubs the fundus against the palmar surfaces of the lower fingers.

In this study of 100 cases, the sign of intermittent uterine contractions was found to be a most valuable corroborative one. It was noted in 88 per cent. of the cases and was not elicited in 12 per cent. These twelve cases were examined in the early part of the study and five of them in the fifth and sixth week of pregnancy. With increasing appreciation of this sign and skill in its elicitation, it was very constantly found.

Uterine contractions may be present in other conditions than pregnancy. They may be present in any condition which distends the uterine cavity and causes a marked congestion. It has been felt in vascular uterine fibroids of fair size, but no case can be found in which a fibroid or fibroid polyp of such size, which



could be mistaken for an early pregnancy, caused uterine contractions. It may be present in congestive conditions of the mucous membrane; it is sometimes felt on the day before menstruation is established. It was felt by the writer in one case of extrauterine pregnancy in which a large cast of uterine decidua was afterwards passed. However, in spite of these possibilities, the sign remains one of the best corroborative signs of pregnancy. It should not, nor should any single sign be thought sufficient evidence upon which to base a diagnosis of an early pregnancy.

#### SOFTENING AND COMPRESSIBILITY OF THE ISTHMUS—HEGAR'S SIGN.

This sign is one of the most popular ones and was first described by Reinl<sup>40</sup> from Hegar's clinic. He described the sign as a softness, compressibility and alteration in the lower uterine segment at that part directly above the insertion of the sacro-uterine ligaments. He advised that the sign could be best elicited by one finger in the rectum. He claimed that the sign could be found in the first month of pregnancy.

The phenomenon was afterwards described and investigated by Landau,<sup>41</sup> Hegar<sup>42</sup> and others, and was found to be a most reliable and accurate sign of early pregnancy. It is now commonly elicited by placing one or two fingers in the anterior vaginal fornix and the upper or abdominal hand upon the posterior surface of the uterus and attempting to make the finger-tips of each hand meet. A striking absence of resistance is noticed and well-defined compressibility is found.

The value of the sign depends upon the recognition of certain conditions. If the uterus is in a state of contraction, it is impossible on account of the firmness of the isthmus to obtain this compressibility. The firmly contracted uterus moves as one body and the sensation of lack of resistance is not felt. If the abdominal wall is firm, as is not uncommon in nulliparæ, it is difficult to press the upper hand far enough down to obtain the sign. A thick abdominal wall or tender pelvic organs may also complicate the procedure. It is impossible to obtain the sign when the bladder is full.

In the very early weeks of pregnancy (five to eight weeks) the uterus is as a rule more contractile and irritable than in the time following this, when the tissue is softer, the muscle flabbier



and the organ more readily handled. For this reason in order to obtain the sign in the very early weeks, the author used the following method: After the examining hands were in place with two fingers in the anterior fornix and the abdominal fingers gently steadying the fundus, the hands were held quiet until a uterine contraction had passed. Just after the rigidity of the uterus had waned, the lower fingers were pressed upwards and forwards almost in the direction of the umbilicus. When the sign was present, there was a sensation of relaxation as if the fingers were pressing upon an elastic band which slowly stretched. (Figs. 3 and 4.) This maneuver is the more easily done, because the cervix in early pregnancy usually lies more in the axis of the vagina, than it does in the nonpregnant. In this way a more acute angle is made by the corpus and cervix of the uterus which allows the fingers to be placed in the angle

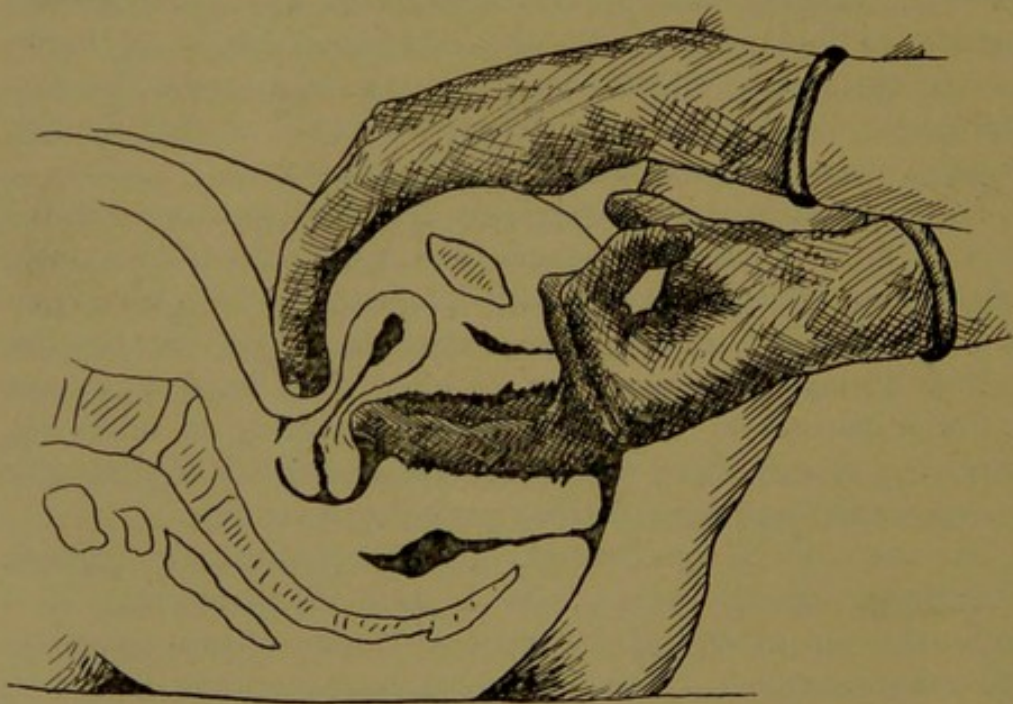


FIG. 3.—Hegar's sign. Uterus in normal position.

of the isthmus. It is believed that this maneuver increases the value of the sign in the very early months.

Hegar's sign was obtained in this way in 94 per cent. of the 100 cases. It was obtained definitely in 49 per cent. and moderately well in 45 per cent. It was best obtained from the ninth to the twelfth week of pregnancy.



This sign, while it is of great value in pregnancy, is also obtained in a number of other conditions. Once, while doing routine autopsies, the author did a postmortem upon a coroner's case of chloral poisoning in a young woman. The uterus was as large as a fourteen weeks' pregnancy and very soft. There was marked thinning of the lower uterine segment and Hegar's sign of pregnancy could be readily demonstrated. The uterus was excised and shown to the class of students as an early pregnancy and the method of obtaining Hegar's sign pointed out. What was the demonstrator's chagrin to find that the uterus on section showed only a soft vascular myomatous tumor! The friends were communicated with and it was found that, the tumor suddenly growing noticeable to the woman, she had consulted her family physician who, finding Hegar's

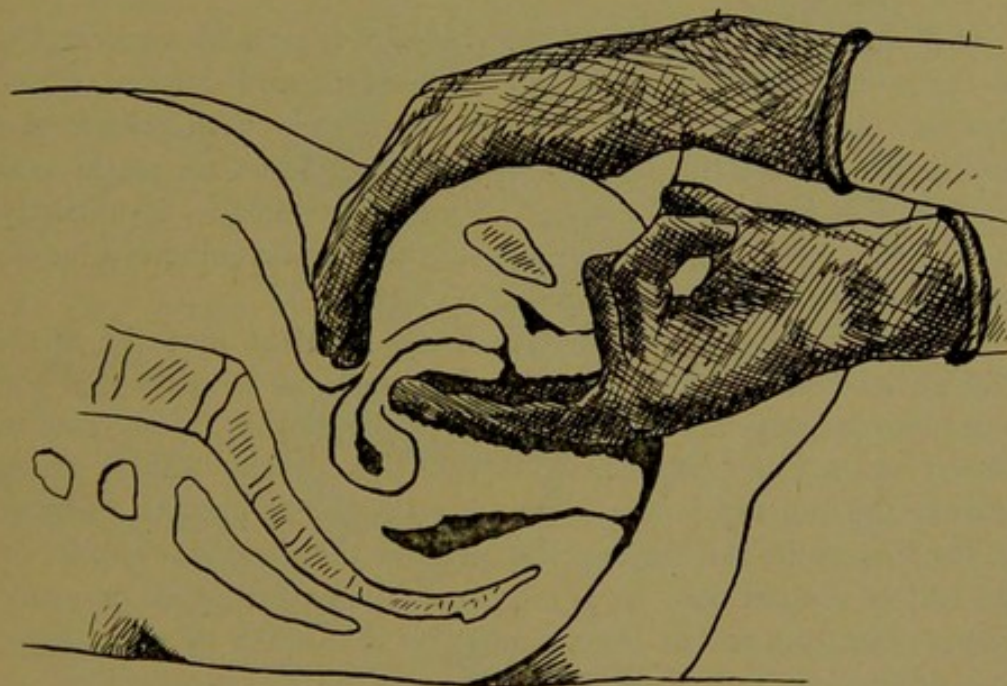


FIG. 4.—Hegar's sign in retroversion.

sign, pronounced her pregnant. In her distress, believing herself illegitimately pregnant, she committed suicide by taking chloral. The family physician's mistake convinced the writer of the grave consequences sometimes dependent upon a diagnosis of pregnancy and incited him to investigation of the subject, whereof this paper is the result.

Other conditions besides myoma may cause such alteration



in the uterus and give Hegar's sign. It is sometimes present just after the puerperium and during lactation.

However, such conditions which may simulate Hegar's sign are usually ones which are not likely to be confused with pregnancy and may usually be excluded in the diagnosis. Thus the history of hemorrhage or profuse menstruation in myomatous tumor usually differentiates this condition from pregnancy and this is rendered more distinct from the fact that the type of soft vascular myoma, which may be confused with pregnancy, usually causes free bleeding.

The sign, however, remains one of the most valuable and accurate signs in diagnosis of early pregnancy.

#### SIGN OF FLEXIBILITY OF THE ISTHMUS.

This sign also depends upon the softening and vascularity of the uterine tissue connecting the cervix and corpus of the uterus. It was suggested by the frequency with which the cervix, which usually in the nonpregnant is at an angle and more or less across the axis of the vagina, comes to lie directly in the axis of the vagina. This is due to the softening of uterine isthmus and the pressure of the vaginal walls.

To obtain the sign, conditions of examination must be ideal. The patient must be upon a hard surface, as a table, and the waist bands loosed. The bladder must be empty. One hand is placed upon the abdomen and the tips of the fingers press against the posterior part of the fundus. The palmar surfaces of the fingers in the vagina rest against the posterior aspect of the end of the cervix. It is important to note that no contraction is occurring as the uterus must be in a state of relaxation. The fingers of both hands are then pressed together (Fig. 5), as if in the attempt to make the fundus and the cervix meet. The fundus and cervix then come easily towards each other as if the isthmus of the uterus was a well-oiled hinge.

The fundus is pressed downwards towards the pubes and the cervix is drawn forward and upward towards it, as if in the endeavor to make the tips of the fingers of the vaginal and abdominal hands to meet. The uterus may be often completely doubled upon itself in this way, although the flexibility of the isthmus is, in itself, an expression of the sign.

This maneuver requires some little practice and some experi-



ence in the firmness of the isthmus of the unimpregnated uterus. It can, however, be as readily learned as Hegar's sign.

In retroversion the sign may be obtained by pushing the cervix backwards toward the fundus. The increased vascularity of the retroverted pregnant uterus will often allow the cervix to move back and forward upon the corpus like one arm of a flail.

This sign has been said to be a new form of Hegar's sign and it undoubtedly does depend upon the same essential causes as does Hegar's and all other signs of pregnancy, *i.e.*, the increased vascularity and growth of the pregnant uterus. Hegar's sign, however, is definitely stated to be the softness, compressibility

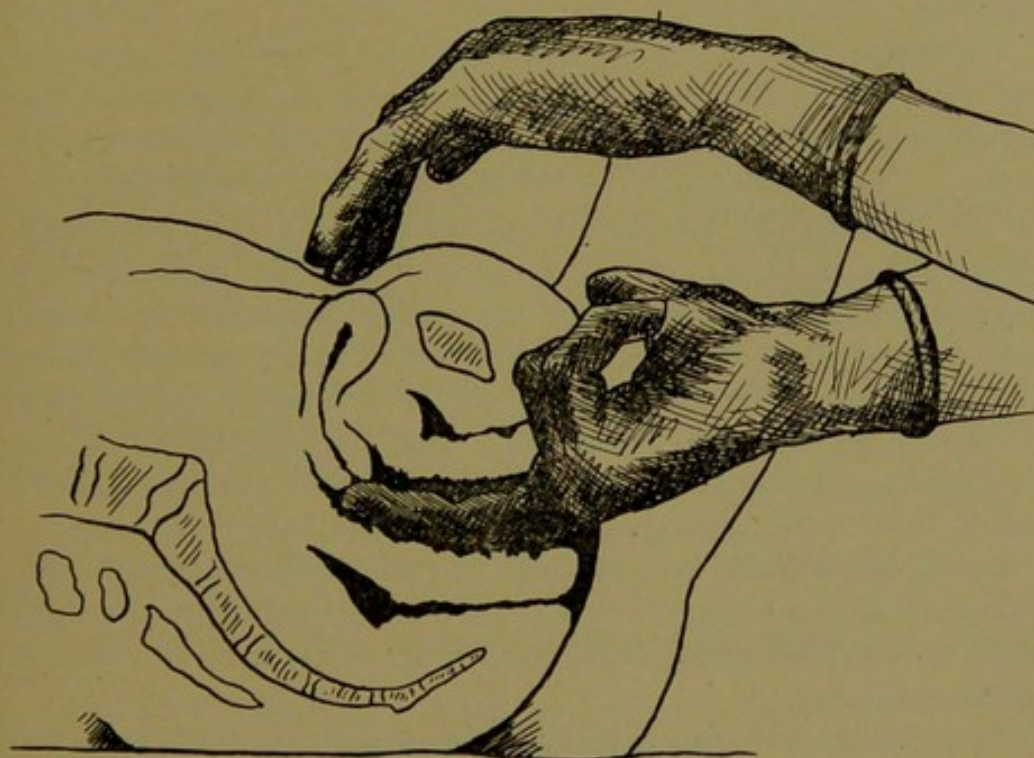


FIG. 5.—Sign of flexibility of the lower uterine segment.

and thinning of the isthmus ("... Weichheit, Nachgiebigkeit und Verduennung des unteren Uterussegments"), and the sign of flexibility of the isthmus is sometimes obtained even before there is thinning or compressibility. The vascularity, which causes both signs, allows flexibility before compression and thinning of the lower uterine segment.

The ease with which the cervix and fundus may be made to almost meet, is at first astonishing. Very little practice is



required and after one demonstration students usually are able to obtain the sign.

This sign was present in 97 per cent. of the cases; in 76 per cent. it was definite, and in 21 per cent. it was moderately well obtained. It was absent in 3 per cent. Thus the sign has apparently about the same value as has Hegar's sign.

Other signs of pregnancy are taught as the "jug" sign in which the body of the uterus is likened to the bulging part of a jug, while the cervix is the spout. This sign depends upon enlargement of the uterus so that it may cause a noticeable protuberance or bellying. This does not usually occur until the third or fourth month, so the sign is not of great value in the early weeks when the enlargement is slight and often asymmetrical.

Ladinski<sup>43</sup> has recently drawn attention to a spot upon the anterior wall in the median line just above the junction of the cervix where a marked change in consistency is said always to occur. This spot is said to be elastic and fluctuating in character. In the 100 cases here reported, softening of the uterus occurred symmetrically in 53 per cent. and, in 47 per cent., it was asymmetrical and to one side of the median line. The tendency was as growth continued for the softening to become more symmetrical. After the tenth week this median softening may no doubt be felt, but before that time the softening may be cornual or elsewhere, as has been shown by the studies of Dickinson, Von Braun, Piskacek and the author.

Other signs such as pulsation of the uterine artery<sup>44</sup> and pulsation of the vaginal arteries have been suggested, but they have no constant value, although they are of use in corroboration of the diagnosis.

It cannot be too emphatically insisted upon that the diagnosis of pregnancy must depend upon no single sign, but upon the conjoined evidence of a number of signs. Success in this diagnosis will advance coordinately with knowledge of the signs and skill in the examination. No result can be obtained save in examination under the best auspices upon a table or a hard bed and with the bladder empty. It seems trivial to insist upon these things, but this precaution is very commonly neglected.

The signs of inspection of the vagina offer very reliable evidence before the third month, but they are not of great use before the eighth week. At that time, blush and congestion of the vagina and cervix are present in about half the cases.



The diagnosis of early pregnancy must, after all, depend upon the changes wrought in the uterus by the growing ovum. Amongst these changes the most suggestive is irregular enlargement, symmetrical or otherwise. This condition of growth of the uterus is essential to a diagnosis of early pregnancy. Intermittent contractions, while they may exist in other conditions, are the most valuable of the corroborative signs. These contractions may constantly be felt if the conditions of examination are proper and the examination is conducted skilfully.

The signs of compressibility and flexibility of the isthmus are of great value in the diagnosis of the condition and, taken with intermittent contraction and uterine enlargement and softening, allow of a positive diagnosis being made in the early weeks of pregnancy.

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