in their early stages; and not diagnosticated as cancer when well developed.

5. In this connection, an important question must be noted: Would an early recognition of a toxic breast and timely and efficient treatment of the underlying intestinal causes, tend to lessen the danger of malignant degeneration? If this is so, then we have here an important contributory factor in the etiology of cancer of the breast.

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(*For discussion, see page* 528.)

MISSED ABORTION*

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"MISSED abortion" has not received the consideration in this country that it deserves, being generally considered a rare and unimportant condition, while, as a matter of fact, it is of rather common occurrence and results in invalidism, sometimes of a very serious nature. That this subject is neglected in American medical literature is attested by the fact that of 139 references collected, only ten are American and three of these do not mention the term "missed abortion;" they describe the condition as a rarety and, evidently, have never heard of the term first applied by Matthews Duncan[1] who, undoubtedly, got his idea from Oldham, who in 1847 coined the term "missed labor."

TERMINOLOGY

"Missed labor" was defined as follows: "Protracted pregnancy is the condition of a woman who has passed 278 days and at least a fortnight more than this. If the child dies *in utero* there is not then a "protracted pregnancy;" the woman is in a state of "missed labor." This term has become established by usage since 1847, when Oldham[2] first used it. Duncan[1] in 1878, recognizing the similarity of the condition of a dead fetus *in utero* beyond full term and no labor, known as "missed labor," and the condition of a dead fetus before viability and no effort at expulsion, logically used the terms "missed abortion" and "missed miscarriage." The latter term has fallen into disuse and the term "missed abortion" is now applied to all cases of death of the fetus *in utero* before viability with no effort at expulsion within the usual time of an ordinary abortion.

This naturally brings up the query: When does a woman normally abort after the death of the fetus? Of course the question must be answered more or less arbitrarily. Rhodes[3] says: "The fetus is usually aborted a few days after death," which is, I think, ordinarily not

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true. Seitz[4] is nearer right when he puts it any time up to four or five weeks.

Inasmuch as constitutional symptoms of any moment are rare in the early stages and the pathologic conditions begin to manifest themselves about the eighth week, I am inclined to place the arbitrary limit of two months after the death of the fetus as the borderline between "abortion" and "missed abortion," which seems quite logical to me because the symptoms of a woman aborting before that time will not vary much from the symptoms of an ordinary abortion.

ETIOLOGY

Etiology must be considered from two standpoints: First; what are the causes of retention or why is the abortion missed? Second; What are the causes of the expulsion after the uterus has lain dormant so long, or why does the secondary abortion occur? At this time we are not discussing the causes of the death of the fetus, but why is it not expelled at the usual time after the demise of the fetus? Lack of irritability of the uterus, which was first suggested by Veit and von Graefe,[26] of course occurs to any one, but why is the uterus unresponsive to whatever irritation it is that causes it to expel a dead ovum?

Liebmann[5] attributes it to central lesions, but this will explain only the occasional case. Scharlaub says it is due to a thin musculature of the organ. Leopold[9] and Stanley Warren[10] claim that it is due to peritonitis, and Menzies,[11] Mueller,[12] Playfair,[13] and Beigel[14] that it is caused by cancer. Sänger[15] claims that fibroids reduce the irritability of the uterus, and that lactation and physical shock may do the same. None of the explanations are satisfactory; but it is easy to accept the theory of lack of irritability of the uterus in spite of the fact that there is little real proof to establish it. Mechanical interference like atresia and stenosis of the os and cervix, (Rissmann,[16] Arthur,[17] and E. Fraenkel[19]); cancer or fibroids of course are easily understandable causes, but aside from these no satisfactory explanation is as yet forthcoming. Why does the secondary abortion occur? Why should a uterus, which has been dormant for weeks and months, suddenly expel its contents, and often with contractions of the greatest violence? The foreign body theory of Orloff,[20] and Ivanoff,[21] is not sufficient, for the foreign body has been present all the time.

The theory of pressure on the internal os and paracervical ganglia is reasonable, because the pressure occurs later on account of the more gradual shrivelling of the ovum and the slower disappearance of the amniotic fluid. But the theory of Ernst Fraenkel,[19] that the returning menstrual function with its consequent congestion causes the bleeding and contractions, is more tenable because it seems to be more effective the longer the time that has elapsed since the death of the fetus and the more the congestion of pregnancy has subsided. (O. Schaeffer.[23])

INCIDENCE

Missed abortion undoubtedly occurs much more frequently than the reports in the literature indicate. I have records of thirteen cases, twelve of which I have seen personally, and one was reported in detail by a former student. I am sure that I saw several cases early in my career when ignorance of the possibility of the condition led me to miss the diagnosis; but as I look back upon them now, I feel sure they were cases of missed abortion. Thirteen cases in one limited experience would not argue very great rarity. Williams,[24] and DeLee,[25] both believe that it is commoner than usually supposed. Up to 1896 von Graefe[26] collected 70 cases. Ernst Fraenkel,[19] reported several of his own and collected others from the literature, bringing the total number of cases up to 105.

I have consulted 52 references, published since 1903, and have found 75 others which, on account of difficulties brought about by the war, I am unable to secure; so I cannot make a compilation of the number of cases, but from the number of articles it would seem that missed abortion is far from a rare occurrence.

The condition occurs usually in multiparæ. Nassauer asserts that it occurs exclusively in women who have borne children. But this is not true. Only four of my cases were multiparæ, and others have reported similar experiences.

RECURRENCE

In this series Mrs. L. had missed abortions twice within two years, and Machenhauer,[27] also reports recurrence.

MEDICOLEGAL SIGNIFICANCE

When a married woman, in the absence of her husband, expels a fetus corresponding to a development of shorter duration than the husband's absence, which is possible in the event of a missed abortion, unjust suspicion may be cast upon her. Duncan,[1] commenting on this point said: "You cannot say that a woman is pregnant, without misleading, if she is in the condition of missed abortion. Such unfortunate misapprehensions have happened, which shows the importance of counting the term of a woman's pregnancy not, up to the time the fetus was discharged, but back to the time when it died."

TERMINATION

Ultimately the ovum is expelled; but it may be retained for months and even years. One case of retention for twenty-eight years, and another for fifty-two years, found at autopsy, have been reported. The most common termination is maceration with toxemia. Mummification sometimes occurs and, exceptionally, the ovum may be infiltrated with calcium salts and an intrauterine lithopedion is the result. Infection

is not a common termination, contrary to experience in ordinary abortions; but if instruments have been used, or the membranes otherwise ruptured, as by frequent coitus, infection may result. Decomposition is common but putrefaction rare. The unrecognized missed abortion is sometimes brought to light by the appearance of an inexplicable sepsis months after the death of the fetus.

Polano,[28] and Ludwig Fraenkel, assert the possibility of complete resorption of the entire ovum. I have seen the entire disappearance of the embryo in an otherwise intact ovum. Absorption cannot take place after the tenth or twelfth week (Edgar). Skeletization is a very interesting termination in which the bones of the fetus with none, or very little of the soft parts attached, are found within the uterus. Rosenkranz,[22] reports a case in which he found the bones only of a four months' fetus.

PATHOLOGY

In my cases hemorrhage was a prominent finding, giving the ovum the appearance of a hematoma mole; but hemorrhage may be entirely absent. In the placenta infarcts are numerous, sometimes occupying nearly the whole organ, suggesting the probable cause of death of the fetus. Degeneration of various kinds and grades is the rule. Ohlbaum[31] found fatty degeneration of the entire ovum. The placental surface may be dry, shrivelled, tough, of a red or whitish yellow, or waxy appearance.

One of the great dangers of missed abortion is due to degeneration of the blood vessel walls which may be so completely destroyed that uncontrollable hemorrhage results. Rosenstein's[32] fatal case died of hemorrhage due to degeneration of the blood vessels and the neighboring uterine wall, which was transformed into a homogeneous mass.

The amount of amniotic fluid present depends on the age of the ovum at death and the length of time it has been retained in the uterus. In one of my cases in which a four months' fetus was expelled after retention for more than a year there was no amniotic fluid; and in another ovum of two months, retained two and a half or three months, the amount of amniotic fluid was apparently normal. Disappearance or marked diminution of the amniotic fluid without rupture of the membranes is the rule. Occasionally a dropsical ovum is observed (Seitz[4]). In cases of retention for any considerable length of time a deposit of connective tissue is nearly always found which may be in an amount sufficient to be called sclerosis of the placenta (Garrigues,[35] Rosenstein[34]).

A very interesting fact is the frequently found discrepancy between the size of the placenta and the fetus, the former being often as large as the placenta of a fetus a month or more older than the one found; this is due to connective tissue increase, hemorrhages into the placenta

and that curious true growth of the placenta after the death of the fetus. When the fetus dies, especially in the early weeks, the chorion and decidua may go on growing because they are nourished by the maternal blood circulating in the intervillous spaces which may continue for a long time. La Verge[6] observed karyokinesis indicating cell multiplication rather than hypertrophy. The Langhans or inner layer of the villous epithelium, which is not in direct contact with maternal blood, is an early victim to coagulation necrosis; but the outer syncytial layer, bathed in maternal blood, is preserved much longer until thrombosis takes place, shutting off the blood supply to the intervillous spaces.

In the second half of pregnancy von Franque[7] asserts that this interesting phenomenon of continued growth after the death of the fetus does not occur. That the placenta lives and grows, at least in the early months, after the death of the fetus has been proved by Moll,[29] O. Schaeffer,[23] Physalix,[30] Giacomini,[8] von Franque,[7] and LaVerge.[6]

Microscopic studies show all stages of necrosis of tissue, placenta, decidua, amnion, blood vessels, the fetus and even uterine walls. If the ovum remain in the uterus for a long time, drying out or mummification occurs. Calcification with lithopedian formation is rare; but, if maceration occurs in place of the drying out, the soft parts may entirely disappear; there being found only remnants or nothing of the secundines, and only the skeleton of the fetus remains.

SYMPTOMS

Usually, but not always, after the death of the fetus there are signs of an abortion which subside, and the patient and her attendant think that a threatened abortion has been avoided or completed. Weeks or months later the physician is consulted because there is no increase in the size of the uterus or, on account of continued hemorrhage, or the cessation of fetal movements and other subjective signs of pregnancy. Examination shows that the uterus has not grown or has even decreased in size. The patient, not infrequently, has already noticed that the size of the womb is diminishing. The consistency of the uterus is not characteristic of that elastic softness peculiar to pregnancy, neither is it hard like a fibroid but rather between the two.

Regressive changes in the breasts also take place. The patient thinking an abortion has already occurred, or mistaking the occasional hemorrhages for irregular menstruation, seeks the advice of her physician because of her unaccountable invalidism, which has been progressive, and begins usually with malaise, anorexia, "dyspepsia," or headache. This is followed by loss of flesh, chilliness, or even chills, a foul taste in the mouth, and sometimes by a bearing-down weight "like a stone in the abdomen." All of these symptoms increase until she is, indeed, an invalid and her medical attendant finds her a victim of grave anemia

out of all proportion to the loss of blood, and an afternoon temperature. In some cases symptoms of mental derangement appear and, occasionally, there may be no symptoms whatever. Ohlbaum[31] reports a case of a woman who carried a three months' fetus for more than six months "without causing any physical disturbance." Case 2 of my series carried a one month fetus for three months with no untoward symptoms.

HEMORRHAGE

Hemorrhage is a very inconstant accompaniment of missed abortion, but in some form or another it usually complicates the condition, sometimes it constitutes a very great danger. However, in some cases, there are no signs of hemorrhage; not even microscopically in the pathologic specimens. When hemorrhage does occur, the first bleeding is like that of a threatened abortion; then it may become intermittent, days, weeks or even months may intervene, or there may be a more or less constant blood-stained discharge varying in amount from time to time. Upon examination, or other manipulation, or at the time of expulsion there may be no bleeding or a violent hemorrhage. Duncan[1] noted the loss of a quart of blood from the introduction of a tent. Rosenstein[32] had a fatal case of bleeding due to degeneration of the blood vessels. The bleeding at expulsion of the ovum or postpartum is sometimes so severe as to threaten the patient's health and life. This is not altogether due to the lack of tone of the uterus but to hyalin degeneration of the blood vessel walls and to infiltration with connective tissue cells rendering contraction impossible.

DIAGNOSIS

The diagnosis is more readily made than the cursory writer would have us believe. More mistakes are made on account of the failure to bear in mind the possibility of the existence of a missed abortion than from the difficulties of making the physical finding. That master teacher of our art, Matthews Duncan,[1] put it very forcibly when he said, "I do not know of any subject better than missed abortion for illustrating the value or necessity of extensive knowledge with a view to good diagnosis. *If you do not know of a thing you are quite sure not to suspect it; and if you do not suspect a thing you are almost certain not to find it.*" Unfortunately there seems to be a lack of knowledge on the part of a considerable percentage of the profession of the possibility of the existence of a missed abortion, therefore it is likely to be overlooked. It was this ignorance, first on my own part and later observed in others, and the woeful paucity of literature on the subject in the United States, that led me to select this subject for discussion.

The diagnosis is not particularly difficult if the possibility of missed abortion is kept in mind. This possibility should be strongly suspected if a woman has skipped one or two menstruations and then had symptoms of threatened abortion, which have subsided, and the size of the

uterus does not increase. The lack of growth of the uterus can be determined, even if there be no previous knowledge of the patient, by two examinations made a month apart, or by comparing the size of the uterus with the size it ought to be for the supposed period of gestation. If there be a lack of a combination of symptoms pointing to missed abortion, particularly if toxic symptoms are wanting, it may be wiser to wait even two months between the examinations. The uterus will not be as large as it should be, it will be harder, less elastic, and the other objective signs of pregnancy will be absent or regressing. The irregular bleeding may lead the woman to think she is not pregnant, particularly if her abdomen does not increase in size.. The condition may then be mistaken for malignancy. Todd[33] reports a case where an eminent specialist diagnosticated a malignant growth and advised removal of the uterus at once. Any woman of the childbearing age, who has suppression of the menses, irregular or atypical menstruation, toxic symptoms such as malaise, loss of appetite, chilliness, foul taste in the mouth, anorexia, loss of weight, particularly afternoon temperature, and who is in a general state of invalidism, should always have the possibility of missed abortion excluded before concluding that she has tuberculosis, syphilis, focal infection, or what not.

An instance which well illustrates how missed abortion may be overlooked is the following: Mrs. J., a multipara, skipped two menstruations, then bled irregularly for short periods; at first she thought she was pregnant, then she thought that she was not, interpreting her hemorrhages as irregular menses. She lost her ambition, had no appetite, was anemic and in a generally debilitated condition, and later she developed an afternoon temperature. Her husband, a physician, became worried about her condition and took her to a very good colleague for examination. He pronounced her not pregnant. He then had her examined by an excellent internist who examined her thoroughly, but could not account for the afternoon temperature. All sorts of tests were made, tuberculin, Wassermann, sinus illumination for focal infection, tonsil examination, and x-ray of the teeth, but her condition remained a puzzle. When we were called in, on account of quite a brisk hemorrhage, a diagnosis of missed abortion was made and when the uterus was emptied all the symptoms disappeared at once. Three excellent physicians had missed the diagnosis, not from lack of skill but from the lack of knowledge that "missed abortion" is always a possibility with skipped and irregular menstruation, and obscure invalidism, particularly with an afternoon temperature. Internists should note that missed abortion is a cause of afternoon fever.

PROGNOSIS

The prognosis in this condition is not as favorable as is generally supposed. While most cases, if left to themselves, will finally expel

the dead ovum, the dangers of its presence are real. A condition which constantly has the potential danger of hemorrhage, invalidism, which may become permanent, and death, cannot be considered lightly. Duncan's case[1] of excessive hemorrhage illustrates the danger from this source.

My case, No. 5, of prolonged invalidism with ultimate recovery, shows the low state of health to which a woman may descend, but yet be restored after emptying the uterus. Case 7 is an example of a woman in good health up to the time of her missed abortion resulting in an invalidism from which she never recovered, finally ending in tuberculosis. Rosenstein's fatal case of hemorrhage from degenerated blood vessels illustrates that missed abortion has a definite mortality.

TREATMENT

With this prognosis, expectant treatment cannot be safely prolonged. Rosinski[34] believes the uterus should be emptied immediately and Rosenstein[32] was driven to the same conclusion by his fatal case, going so far as to advise vaginal hysterectomy in cases of long standing. I am thoroughly convinced that missed abortion is a very much more serious condition than is generally supposed and that we are not justified in exposing our patients to the dangers of temporary or permanent ill health, or even death, by allowing missed abortion to go on indefinitely in the hope of a spontaneous termination.

If the ordinary methods of inducing expulsion fail, the cervix should be dilated, the contents removed, and the uterus packed, on account of the tendency to postoperative bleeding. The inexplicable indolence of the uterus, which has caused the retention of the dead ovum, seems to persist, rendering it incapable of contractions. Often the cervix inordinately resists dilatation; if difficulty is met in attempting to dilate the uterus, one should not persist in the attempt but perform a hysterotomy (vaginal Cesarean section) immediately.

CONCLUSIONS

1. Missed abortion is the prolonged retention of a dead fetus *in utero*.
2. It is a common condition.
3. The cause is unknown.
4. The dangers are: (a) Temporary ill health, continuing until the uterus is emptied. (b) Permanent ill health, if allowed to continue too long. (c) Death.
5. Its medicolegal significance is important.
6. Diagnosis made on regressing signs of pregnancy, irregular bleeding and afternoon temperature.
7. Afternoon temperature with any of the above signs is particularly significant.
8. Uterus should be emptied before condition becomes a menace to health.

PERSONAL CASE REPORTS

The cases which I have personally observed I desire to present in abstract as follows:

CASE 1.—Mrs. J., para ii; month of fetal death, second; retention *in utero* after death of fetus, five months; symptoms, invalidism, anemia, hemorrhage. Diagnosis not made before expulsion.

CASE 2.—Mrs. X., para ?; month of fetal death, fourth; retention *in utero*, four months; patient not seen. Diagnosis made from specimen and history.

CASE 3.—Mrs. D., para i; month of fetal death, three and one-half; retention *in utero*, three; symptoms, general invalidism, no bleeding.

CASE 4.—Mrs. C., para i; month of fetal death, third; retention *in utero*, ten months. In this case the diagnosis was not made until the complete ovum was expelled at the end of the thirteenth month.

CASE 5.—Mrs. B., para iii; month of fetal death, first; retention *in utero*, three months. No symptoms.

CASE 6.—Mrs. C., para i; month of fetal death, fifth; retention *in utero*, two months. No symptoms.

CASE 7.—Mrs. T., para i; month of fetal death, fourth; retention *in utero*, three months. Course marked by weakness and afternoon temperature; afterwards developed tuberculosis, possibly favored by the debilitated condition.

CASE 8.—Mrs. L., para v; month of fetal death, fourth; retention *in utero*, three months. Course marked by general debility, loss of weight, anorexia, afternoon temperature. This patient had two "missed abortions" two years apart.

CASE 9.—Mrs. L., para vi; month of fetal death, third; retention *in utero*, four months. (Same as previous case.)

CASE 10.—Mrs. A., para ii; month of fetal death, third; retention *in utero*, four months. Course marked by irregular bleeding, loss of weight, general debility, afternoon temperature.

CASE 11.—Mrs. B., para iv; month of fetal death, second; retention *in utero*, four months. No symptoms.

CASE 12.—Mrs. J., para iii; month of fetal death, fourth; retention *in utero*, four months. Course marked by anorexia, loss of weight, anemia, marked debility.

CASE 13.—Mrs. S., para ii; month of fetal death, fifth; retention *in utero*, three months. Course marked by debility, no temperature.

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