THE AMERICAN

JOURNAL OF OBSTETRICS

AND

DISEASES OF WOMEN AND CHILDREN.

VOL. LV. JUNE, 1907. NO. 6

## ORIGINAL COMMUNICATIONS.

# FIBROID TUMORS OF THE UTERUS IN PREGNANCY, LABOR, AND THE PUERPERAL STATE.*

BY

MATTHEW D. MANN, A.M., M.D.,

Professor of Obstetrics and Gynecology in the University of Buffalo.

Buffalo, N. Y.

By the careful observation of a great number of cases, and painstaking analysis of their clinical and pathological histories, our knowledge of fibroid tumors has been greatly increased. Still, the last word has not been said. Especially is this true of the relations which these tumors bear to pregnancy and its sequelæ.

*Frequency.*—A large number of cases have been reported of fibroids complicating pregnancy. In a rapid and cursory review of the literature of the last five years I find more than seventy authors who have reported cases, and a few who have written more or less fully on the subject. These writers reported about 150 cases in all, and quoted statistics of about 500 other cases, collected from literature.

This may seem a large number, but the very rarity of the complication causes most of the cases to be reported, and, as medical literature is cosmopolitan, we have the result of the whole civilized world. The largest number of cases come from Germany,

*Read before the Wayne Co., Mich., Med. Soc., April 15, 1907.

where great care is taken to report all unusual cases. In a total of 2,274 cases of fibroids collected by C. P. Noble,[1] only nineteen became pregnant, and of these in six, or nearly one-third, the pregnancy was ectopic. Pinard[2] reports eighty-four fibroid tumors in 13,917 labors—about 0.06 per cent. In Schroeder's[3] clinics, in 20,000 obstetric cases there were twelve operated during pregnancy and thirteen labors complicated with tumors. In the Rotunda,[5] in one year (1899-1900), there were eleven labors with tumors. The writer has met with ten cases of pregnancy associated with fibroids. These figures show that, while pregnancy and fibroids may coexist, the combination is not very common.

*Cause.*—Unquestionably, the vast majority of women who have fibroids are nulliparæ. Olhausen[4] states that women having fibroids are often sterile. Among 1,731 married women, there were 520, or 30 per cent., who were sterile. This does not take into account unmarried women, who are, in my experience, common subjects of these growths. It is rare to see a woman with a fibroid who has had a large family. Pinard[6] quotes Bayle, who wrote in 1813:

"Married women who have had no children and those who have had only one or two, are more liable to myofibromas of the uterus than those who have had a large number of children. It appears that the uterus which has not undergone the changes of pregnancy is more apt to be the seat of a fibroma than the uterus which has many times been stretched with the products of conception." Pinard endorses this statement, and quotes others in support of the same view. Pinard teaches his students: "When you have charge of a primipara over thirty years of age in labor, always have a possible myoma in mind."

Of sixty-seven cases of fibroids examined in my office in the last five years, sixteen were unmarried, twenty-seven were married and sterile, and seven had had only one child—one-child sterility; total, fifty out of sixty-seven; while only sixteen had borne more than one child, and of these eight had had but two, and only two had had as many as five children.

My own belief is that the sterility stands in the relation of cause rather than effect. This has been explained in this way: The uterus has implanted in it a power of growth when the natural stimulus, an impregnated ovum, is fixed in its lining membrane. If the stimulus fails, then this natural tendency is manifested by irregular growths involving some or all of its con-

stituent elements, resulting in myomas, fibromas, or mixed tumors. This is, of course, purely speculative, but it does for a working hypothesis.

*Diagnosis.*—The diagnosis of pregnancy in the early months when associated with fibroids, is often extremely difficult. The fact that the tumors are apt to grow rapidly during pregnancy should always make us suspicious, when a hitherto quiescent tumor starts to make a rapid increase in size. If the cervix be so pushed up and hidden behind the tumor that it cannot be felt, and if the uterine body likewise is out of reach, the early diagnosis may be impossible. When, together with the stoppage of menstruation, the vaginal and breast signs are manifest, then the diagnosis becomes easier. In a number of cases pregnancy has not been suspected until the uterus and tumor have been removed and opened. This has happened twice to the writer. Both operations were done on account of sudden and rapid growth of the tumors. In each a fetus of about the second month was found. Both patients recovered.

It must not be forgotten that the percentage of ectopic pregnancies is large (Noble). The diagnosis of this condition must be very difficult under these circumstances. Three conditions must be differentiated—the bursting of a pus tube, necrosis of a tumor, and twisting of the pedicle. Necrosis generally occurs postabortum or postpartum, but is occasionally met with in pregnancy. Twisting of the pedicle of a fibroid is certainly rare, and must be extremely so in connection with pregnancy. I have met with two cases of twisting of the pedicle of a fibroid, but in neither case was pregnancy possible. As each of these conditions will probably mean laparotomy, the diagnosis may be left until the abdomen is opened. The knowledge that these serious accidents may occur in pregnancy with a fibroid should not be lost sight of in the presence of sudden severe symptoms referable to the abdomen and pelvis, and should warrant immediate operation.

After the period of viability, the diagnosis becomes easier. The signs of a living child then come to help, and the breast and vaginal signs are well marked. Still, many cases have been reported where mistakes have been made, and it is wise to be careful, as, otherwise, infant lives may be needlessly sacrificed.

*Effect of Pregnancy on Tumor.*—The first point to discuss is, what is the effect of the pregnancy on the tumor. As might be supposed, the same formative activity, with increased blood sup-

ply, which affects the uterus and other generative organs when pregnancy occurs, affects the tumor also. This results in a rapid increase in size, not, in my experience, from edema, as some have maintained, but from actual growth. A tumor which has been of moderate size will rapidly become formidable in its proportions, and, as pregnancy advances, may occupy a considerable portion of the abdomen, leaving little room for the uterus and fetus.

Another effect is the reverse of this: If the woman is able to carry both fetus and tumor to the end of pregnancy, and in some cases where the pregnancy is interrupted before the end of the full term, then the tumor may undergo the same process of involution which affects the uterus. This process seems to apply to small tumors especially, the large ones not being so much affected by the retrograde metamorphosis.

The evidence given by writers on this subject seems somewhat conflicting. Olhausen[7] states that the tumors diminish only to the size which they had attained before pregnancy. Routh considers involution in the puerperium as certain. Stolypinski[8] says that in the puerperal period myomas retard the involution of the uterus, but that the tumor is diminished and is sometimes absorbed. Dakin[9] holds that in the puerperium involution of the tumor goes on the same as in normal uterine muscle, so that it resumes the size it was before the pregnancy. Doran[10] has collected thirty-seven such cases, of which thirteen disappeared in childbed. I have seen one case where the tumor disappeared after an abortion at the end of the fourth month.

Kouwer[11] and Esch[12] report cases where a second labor was complicated by the same tumor, and in Esch's case there had been an abortion between. Many other cases where the tumor did not disappear after pregnancy have been reported. The amount of evidence, on the whole, is so great that we cannot longer doubt that the tumors do sometimes spontaneously disappear after pregnancy; but that it is always the case is also certainly not true. What the determining factor is has not yet been settled, except that size has something to do with it.

Sometimes, during the puerperium, submucous fibroids tend to degenerate and become necrotic, with, of course, great danger to the woman; or they may be extruded into the uterine cavity and be expelled without bad results.

*The Effect of the Tumor on the Pregnancy.*—This is not always

so evident, as it depends on the location and size of the growth. Statistics seem to show that abortion is more common than when there are no tumors. In four of the ten cases observed by me, abortion resulted. In the eighty-four cases reported by Pinard, there were five abortions. Stratz[13] reports seventeen abortions in sixty-seven cases treated by him, though he states that the myoma was not in every case the cause of the abortion. Stavely[14] collected 548 cases, of which 15 per cent. aborted, with 12 per cent. of deaths following abortion. Hofmeier found abortion to take place fifty-four times in 796 cases—7 per cent.; while Nauss describes it as occurring forty-seven times in 241 cases—19.5 per cent; average, 11 per cent.

Should the pregnancy continue and the tumor not grow to considerable size, no harm may result; but if the tumor reaches great size, then very disagreeable and even threatening symptoms, referable to the heart and lungs, bladder, or intestines, may supervene. In two of my cases pain was the main symptom for which the patient sought relief. Similar cases have been reported by others. Any of the symptoms may become so severe as to demand operative relief. Other bad symptoms are uncontrollable vomiting and rapid emaciation.

Selhorst[15] did a myomotomy for a retroflexed and incarcerated uterus, the tumor being the hindrance to reposition. The pregnancy was not disturbed. Stratz[16] reports a similar case.

*Effect of Tumors.—Abortion.*—As has already been noticed, abortion is a not uncommon result, especially where there are submucous and interstitial fibroids. A careful investigation of the decidua has shown reasons for this. Pinto[17] reports observations on five carefully examined cases, of the changes in the decidua and placenta in cases of pregnancy complicated with fibroids. He says that the decidua vera overlying a submucous fibroid becomes atrophied, and that the decidua in other parts of the uterus is hypertrophied. In interstitial or subserous tumors, when it lies at a distance from the tumor, the decidua is hypertrophied. The fetal placenta is only changed in those cases in which it lies directly upon the fibroid; and in these cases there is an absence of proper development of the chorion, which in other places has its natural structure.

It is to be noticed that only when the placenta is situated on those portions of the decidua which have their nutrition interfered with by the tumor, is abortion apt to occur. If abortion does

occur, all those who have written on it mention the great danger which attends it. So much is this the case that many authorities advise against artificial abortion. The danger comes from the difficulty which may be experienced in emptying the uterus; the great danger of infection, and severe or even uncontrollable hemorrhage.

In one case which came under my notice, some years ago, the tumor so completely filled the pelvis that it was impossible to reach the cervix. The fetus was spontaneously expelled, but no trace was ever found of the secundines. I had the patient carefully watched, expecting to do a hysterectomy as soon as evidences of sepsis showed themselves, but the patient made a complete and uneventful recovery. Doubtless the placenta was absorbed. A very few such cases have been reported.

In another case, abortion was followed by the formation of a very large abscess in the tumor. The tumor had grown very rapidly and had reached a great size. The abscess, which held more than a pint of pus, was discovered after removal of the tumor. The patient made a good recovery.

In the third case, recovery took place, but it was necessary to clean out the uterus, as the placenta was retained. This case has already been mentioned as one in which the tumor disappeared by involution.

In two cases septic symptoms of a very severe type supervened. In one the tumors were submucous, and in the other there were two—one interstitial and one subperitoneal, the latter being attached to the uterus by a broad pedicle. In both cases operation was refused until it was too late, and the patients died. These cases will be referred to again. Cases similar to these have been reported, and they make certain the great danger of abortion where fibroids exist.

*Effect of Tumors.—Labor at Term.*—It has never been my fortune to meet with a uterine tumor complicating labor at term. In three instances friends have told me they had cases which they expected to turn over to me for Cesarean section. In each case they reported later that the tumor had ascended into the abdominal cavity with the advent of uterine contraction, and the labor had gone on without interruption.

I have been forced to do Cesarean section in one case where a fibroid tumor was situated deep in the pelvis, but it was not connected with the uterus, being subperitoneal.

Dr. C. P. Noble[18] has collected a number of cases of labor in the presence of fibroids. He quotes Olshausen,[19] who concludes that the presentation is often abnormal. In the cases collected by Olshausen, 54 per cent. had vertex; 24 per cent., breech, and 19 per cent., transverse. Pujol[20] finds that in 100 cases, 53 per cent. were vertex; 27 per cent., breech, and 19 per cent. were transverse—very nearly agreeing with Olshausen.

In Pinard's[21] eighty-four cases labor was spontaneous in fifty-four, sixty-six reached term, in thirteen labor was premature, and five aborted; operative aid was required in thirty. The maternal mortality was 3.6 per cent.; sixty-five children lived.

We can readily see that the size and situation of the tumor has much to do with its effect on labor. The lower the attachments of the tumor, the more apt it is to get down into the pelvis and obstruct the passage of the child. If it be above the internal os—that is, be on the body of the uterus—the contractions are apt to pull the tumor upwards, and the danger of its being an obstruction is lessened. If the fibroid grows from the posterior part of the supravaginal cervix, the tumor is likely to become incarcerated below the pelvic promontory and cause much trouble. If this occurs,[22] the uterus may take a half turn, so that one or the other broad ligament lies in front. If the tumor is on the anterior part of the cervix, it is quite likely to be pushed upward and cause no trouble. If a tumor be attached to the posterior part of the body by a long pedicle, then it may fall below the head and form an obstacle proportioned to its size. Tumors in the broad ligament and in the connective tissue below the pelvic peritoneum are rare, but are much more apt to cause trouble, because they are firmly fixed and cannot be pushed up out of the way of the advancing fetus. Tumors in the cervix not only act as obstructions, but also prevent the dilatation of the os. W. E. Ford[23] reports a case where the fetus was spontaneously delivered through a rent in the posterior wall of the uterus, and recovery took place without interference. Thorn[24] reports a similar case.

If the cervix be free of the growth, so that dilatation can take place, and the tumor be free, so that it can spontaneously rise or be mechanically pushed up above the pelvic brim, then labor may go on unimpeded and without injury to either mother or child.

Tumors, especially in the pelvis, and even those above the contraction ring, may readily induce an abnormal position and pre-

sentation. Consequently, transverse position and breech presentation are frequently met with and add to the difficulties. Abnormal position of the placenta is common, and a considerable number of cases have been reported of placenta previa, and a few of prolapse of the cord.

The uterine muscle being occupied in part by tumors, the contractions are very often interfered with, inducing irregular pains, uterine inertia, postpartum hemorrhage, and rupture of the uterus. Exstein,[25] on introducing his hand to remove a retained placenta, found a rupture of the uterus alongside a large tumor. He replaced the intestines and tamponed the uterus, and the patient recovered.

Interference with the third stage of labor has been frequently observed. In some instances the placenta has been attached directly over an intramural tumor. This has made it necessary to manually remove the placenta, and has increased greatly the dangers of postpartum hemorrhage and sepsis. The uterus in these cases is, as it were, splintered open and prevented from contracting by the tumor. The contractions are weak, and retraction interfered with.

*Effect of Tumors.—Postabortum and in the Puerperium.*—The great danger from fibroids in abortion and labor, after delivery and the period of danger from postpartum hemorrhage are past, is unquestionably septic invasion. Pellanda[26] reports a collection of 171 deaths following fibroids, showing the cause of death in each case. Eighty-five cases (48½ per cent.) died of infection, most of them during pregnancy, labor, or abortion. The low vitality of these tumors makes them very susceptible to the attacks of septic germs. This is promoted in several ways: First, by interference with the proper clearing out of the uterus and with drainage. Second, by injury to the capsule of the tumor, or to the tumor itself, and consequent sloughing and general septic invasion. Third, by direct infection of tumor from septic endometritis, causing either abscess in the tumor or general necrosis of the tumor. Lastly, by extrusion[27] of the tumor from the uterine muscle by contractions and consequent shutting off of the blood supply.

Whichever way it happens, the condition is very dangerous, and must lead, if left alone, to serious, even fatal, results in a great majority of cases. Absorption of the secundines is an event so rare that it cannot be relied on. Tumors situated in the lower

uterine segment are the ones likely to be injured by pressure or by instruments used in efforts to deliver the child.

*Treatment.*—How shall these cases be treated under the varying conditions in which they are met? The answer is a somewhat difficult one to give. I will consider it under three heads.

*Pregnancy.*—During pregnancy the tumors may be so situated and of such size as to call for no interference of any kind. This will probably be true in a large majority of cases. Stratz[28] reports that since 1886 he has treated sixty-eight cases, and in only one was operative interference found to be necessary. Seventeen aborted, and the remaining fifty had easy labors, and all the children lived.

If, on the other hand, the tumor proves to be an absolute obstruction to labor, or grows so rapidly as to threaten the life of the patient before the end of pregnancy, or threatens to end the pregnancy by provoking abortion, or causes the patient so much pain, or so threatens life, as to warrant interference, then, if it is so situated as to render it accessible, it may and must be removed. Manifestly, a large growth situated deep in the uterine tissue, or a submucous growth, cannot be removed except by first ending the pregnancy or by a panhysterectomy. Many writers agree that the induction of artificial abortion in these cases is rarely or never called for, and is attended by great danger. Numerous authorities could be quoted on this point.

I have operated on three patients by laparotomy, at the fourth, fifth, and sixth months of pregnancy respectively, removing good-sized tumors from the uterine walls, sewing up the wounds with catgut, and have seen no bad results. Two of these patients were operated on for pain, and the third on account of the large size and rapid growth of the tumor. I experienced no trouble from hemorrhage. In one of the cases the tumor had a large pedicle, and in the other two the tumors were sessile, but rather superficial, so that the uterine muscle was not seriously injured.

In each instance I followed up the case, and ascertained that the pregnancy went on to full term and that labor was uneventful. With such an experience, I should not hesitate to attack any superficial fibroid during pregnancy which was giving trouble, and should confidently expect a good result. I should consider interference with heart, lungs, bladder, and intestines, and rapid growth, or extreme size, pain, vomiting, and rapid emaciation, the indications.

When the abdomen is opened, if the child be viable, its interests must be considered, and the choice of operation guided by this fact. If the tumor can be removed by myomotomy or myomectomy, provided the uterine cavity be not invaded, this should be the first choice. The probabilities are that pregnancy will go on to term and be ended naturally.

If these operations be impossible without emptying the uterus, then Cesarean section must be the first step and removal of the tumor follow it. If the tumors are too numerous, or involve too much of the uterine structure to warrant our leaving it, a supravaginal or panhysterectomy must be done.

If the child is not viable, then either removal of the tumors or a hysterectomy without previous Cesarean section may be done, according to the case.

Cervical growths, which can be easily reached by the vagina, and which would be almost certain to cause trouble at the time of labor, can be removed by that route, and the pregnancy allowed to go on.

In every case where a pelvic tumor exists, before any operation is decided upon, an attempt must be made, under anesthesia, to push the tumor above the pelvic brim. If this can be done, then the labor may be awaited with confidence, as in the large majority of such cases no trouble is experienced. W. E. Ford and others have reported such cases.

The late Dr. Paul F. Munde[29] was one of the first, perhaps the first in this country, to do a vaginal myomectomy for a fibroid during pegnancy. Munde's case was in 1884. By an incision through the cervix and capsule, he enucleated a three-pound tumor. The woman recovered. At that time Munde was able to collect from the literature, going back to the year 1754, only nine cases, and in them all the mothers recovered, and all the children were saved in those cases in which enucleation was done before other attempts at delivery were made.

Since that time other cases have been done. I have been able to collect the histories of six additional cases, all of which recovered.

*Treatment.—Labor.*—The management of a labor complicated by a fibroid may tax the skill and ingenuity of the obstetrician to the utmost. Schroeder's thirteen cases, in which seven mothers died and two had a very severe puerperium, must make us very careful and anxious. The first step, if the pelvis be blocked, is

to attempt to push up the tumor above the pelvic brim. This must be done with the greatest care, as any injury to the tumor may be followed by necrosis and sepsis. When the os is dilated and can be reached by the hand, the temptation to do version or to apply the forceps is very great.

Süsserott[30] collected 147 cases. In twenty, forceps were used; eight mothers and thirteen children died. Nauss collected nineteen forceps deliveries in 241 cases, with five maternal deaths.

The mortality from version in fibroids, Noble well says, is startling, for Defour states that in thirty-five cases, twenty-one mothers and twenty-seven children died. In Süsserott's twenty cases, twelve mothers and seventeen children died. Nauss reports twenty-six cases, with twenty maternal deaths. With craniotomy, Nauss reports eleven deliveries and six deaths. Kirchheimer[31] and Trautmann report thirty forceps deliveries, with twelve deaths. Version, four cases, one death.

To sum up the statistics we have a total of 154 cases of labor with fibroids, delivered by forceps or version, with seventy-nine maternal deaths, and seventy-five cases—where result to fetus is mentioned—with fifty-seven fetal deaths. Of these cases, sixty-nine were delivered by forceps, with twenty-five deaths (37 per cent.), and eighty-five by version, with fifty-four maternal deaths (64 per cent.), and in fifty-five cases delivered by version forty-four children died (78 per cent.).

It would seem that these statistics would not incline one to try to drag a child past a fibroid either by forceps or version, but of course the exact condition of each case must decide. When the tumor is low, the dangers of forceps are that the tumor will be injured with a resulting necrosis and infection. Still more danger, from the same cause, is associated with version, and the danger to the child is much greater. Craniotomy has given equally bad results, but may be done in the case of a dead child where conditions are favorable. In view of the recent good results of Cesarean section, the right to sacrifice the child is certainly to be doubted. I deny the right of ever doing craniotomy on the living child.

If the tumors cannot be removed per vaginam or pushed above the pelvic brim, we have but one other recourse—that is, to open the abdomen. With the abdomen opened, we have a choice of procedures. With a living child, Cesarean section must be the first step. The advisability of removing the tumor and leaving

the labor to nature does not seem to have appealed to anyone—at least, I have not found any cases where it has been done after labor has begun. After the Cesarean section, the tumors may be removed, the uterus sewed up and left. Esch,[32] Kouwer,[33] and Scheib[34] have reported such cases, all favorable, and Martin[35] recommends this procedure. If, after the child is removed, it is not thought best to remove the tumor and leave the uterus, then either a supravaginal or panhysterectomy must be done.

I have found the histories of thirty cases of abdominal hysterectomy during pregnancy, or at the time of labor, with only two deaths. Also sixteen cases of Cesarean section with no deaths—some of them having been followed by removal of the tumor or hysterectomy.

As to whether panhysterectomy should be done or the cervix be left, there seems to be a difference of opinion, and statistics are conflicting. If the cervix has been injured, or sepsis exists in any form, the indications for entire removal seem to be plain. By a panhysterectomy, not only is all the infected uterine tissue taken away, but a good share of the broad ligament can be removed as well, thus lessening the opportunities for the spreading of the infection.

*Treatment.—Postabortum and in the Puerperium.*—Thorn has noticed in two cases marked meteorismus to come on soon after labor. This he considers to be due to injury of the intestines by pressure of the tumor. So far no cases have been reported where this symptom led to operation. Such injury might lead to inflammation and obstruction of the bowels, which would, of course, require prompt interference.

Uncontrollable postpartum hemorrhage, or hemorrhage after abortion, may require hysterectomy to stop it. The tampon, vaginal after abortion or intrauterine after labor, must first be tried, but, should it fail, removal is a last resource.

Unquestionably, the great danger after the uterus is emptied, is sepsis. In a previous paper I reported at length two cases already alluded to. In the first I induced abortion in the fourth month (a mistake), and was unable, the uterus being greatly distended and the canal long and curved, to properly empty the uterus. Sepsis came on. Operation was refused until the patient was almost moribund. Then a panhysterectomy was done, and the patient died in twenty-four hours. The tumors and uterus weighed nine pounds. The long canal was semicircular, and a

small piece of putrid placenta was left at the upper end of it. The tumors were necrotic all the way through.

The other case aborted spontaneously at the fifth month. The placenta was adherent and was removed with great difficulty. On the third day the temperature rose to 103°, and the odor was very offensive. Notwithstanding all sorts of intrauterine douches and packing, the symptoms grew rapidly worse. Operation was refused until it was too late, and the patient died.

I also referred to cases of sepsis with fibroids reported by J. Frank, B. Hirst, and Crofford, and since then I have found a number of others. Nearly all authorities at present agree that under these circumstances prompt removal of the tumors and uterus offers the best, or perhaps the only chance of recovery. Routh says that the danger from hemorrhage and sepsis is considerable, and advises in case of sepsis a prompt hysterectomy.

Hirst[87] concludes: "From these two operations and the observation of cases treated expectantly by others, in a number of instances with a fatal result, I shall always hold myself in readiness to operate on fibromata after labor as soon as I can conclude that they are infected. The low vitality of these growths makes them peculiarly liable to septic invasion. Germs which the cells of the uterine body could conquer and destroy would survive if they once got access through the lymphatics of the womb to a fibroid tumor in or on the uterine walls."

Someone might think that, since cases have been reported where after labor a sloughing tumor has come away of itself, or has been removed by operation,[88] that this method should first be tried with the hope of saving the organs intact and in a functionating condition. This method seems to me to be too risky. It would be easier, safer, and better rather to open the abdomen and remove the uterus and tumor, or, if circumstances seemed to favor the vaginal route, to do it in that way.

In conclusion, I can only repeat, with a slight change, what I wrote in 1896: "One cannot too strongly state that should sepsis occur in a uterus after labor or after abortion, such a uterus containing fibroids of any amount or size, unless the symptoms subside very promptly after douching and curetting, an operation for the removal of the entire uterus and the tumors, should be undertaken at once."

## REFERENCES.


1. *Jl. Am. Med. Assn.*, Vol. XLVII, 1906.
2. Am. Jour. Obst., 1902.
3. Stratz, *Zent. f. Gyn.*, No. 15, 1905.
4. Veit's Handbuch.
5. *Dublin Jour. of Med. Sciences*, March, 1902.
6. *Ann. de Gyn. et d'Obstet.*, Jan., 1905.
7. Veit's Handbuch.
8. *Zent. f. Gyn.*, p. 840, 1904.
9. *Zent. f. Gyn.*, p. 566, 1905.
10. Quoted by Dakin.
11. *Zent. f. Gyn.*, p. 599, 1905.
12. *Zent. f. Gyn.*, p. 473, 1906.
13. *Zent. f. Gyn.*, No. 15, 1905.
14. *Johns Hopkins Bulletin*, March, 1894.
15. *Zent. f. Gyn.*, p. 599, 1905.
16. *Zent. f. Gyn.*, No. 15, 1905.
17. *Zent. f. Gyn.*, p. 403, 1906.
18. *Jour. Am. Med. Ass.*, Vol. XLVII, 1906.
19. Veit's Handbuch.
20. Textbook of Obstetrics, Webster, p. 324.
21. *Jour. Am. Med. Assn.*, Vol. XLVII, 1906.
22. A. Routh: *Brit. Med. Jour.*, Oct., 1902.
23. Trans. Am. Gyn. Soc., 1901.
24. *Zent. f. Gyn.*, 1905, p. 710.
25. *Zent. f. Gyn.*, p. 906, 1904.
26. *Zent. f. Gyn.*, p. 964, 1906.
27. A. Routh: *Brit. Med. Jour.*, Oct., 1902.
28. *Zent. f. Gyn.*, p. 456, 1905.
29. Trans. Am. Gyn. Soc., 1884.
30. Esch: *Zent. f. Gyn.*, p. 476, 1906.
31. Esch: *Zent. f. Gyn.*, p. 476, 1906.
32. *Zent. f. Gyn.*, p. 473, 1906.
33. *Zent. f. Gyn.*, p. 599, 1905.
34. *Zent. f. Gyn.*, p. 814, 1903.
35. *Zent. f. Gyn.*, p. 994, 1906.
36. *Am. Gyn. and Obst. Jour.*, Vol. VIII., 1896.
37. Crofford: Am. Jour. of Obst., 1893, p. 398; also L. Frank: *Zent. f. Gyn.*, p. 746, 1903.
38. *Annals of Gyn. and Ped.*, Vol. V., p. 603.


37 Allen Street.