

FIBROID TUMORS COMPLICATING PREGNANCY AND
LABOR.*

BY

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History.—Prior to the appearance of Levret's work, in 1749, there had appeared mention only of isolated cases of labor complicated by uterine tumors. The first record of what appears as a fibroid associated with pregnancy is one of the illustrative cases of Hippocrates' Fifth Book of Epidemics, according to Lefour, and is cited as follows: Forty days after labor the patient spontaneously expelled a fleshy tumor. The abdomen again became flat and the

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flatus disappeared. The discharges and the fetid blood ceased. The woman recovered. The Father of Medicine regarded this as an instance of superfetation.*

Corradi, in his history of obstetrics, refers to the first observation directly of interest to the obstetrician. He reports how, in 1530, Berenger de Carpi, together with Leon de Laenga, saw a woman in labor who died from the complications of a large fibroid tumor. In 1646 Fabrice de Hilden records an observation in which a fibroid of the cervix was mistaken for a fetus, since it presented in advance of the head and blocked the labor, which lasted six days and was terminated by rupture of the uterus. The autopsy showed that the child's head had passed through into the abdomen. Paullinus, in 1686, cites the case of a woman who remained in labor during three days. Believing that the tumor was another child, they exerted traction upon it. The patient died the next day and at the autopsy it was disclosed that in the orifice of the cervix there was a fibroid tumor the size of a fetal head. In 1715, Amand refers to a fibroid tumor which was mistaken for the head of a child, and effectually prevented birth. Louis writes, in 1748, that sterility is a necessary sequence of a fibrous body in the uterus.

The work of Levret is chiefly remarkable for his careful anatomical pathological descriptions of the tumors which antedates the more widely known work of Morgagni and Hunter. Levret concerned himself with the treatment of the palpable tumors of the cervix and those which project from the uterine cavity as polyps, since only these forms were regarded as open to treatment. He suggests that in case the fibroid is not expelled spontaneously, that its pedicle should be ligated. Simon was the first to advocate the Cesarean operation, in 1743, as a method of treatment, and in 1791, Vincenzo Michelacci removed a tumor from the uterine orifice, after which a living child was extracted with instruments.

Following the discussion of premature labor, in 1756, in London, Macauley and Kelly treated several cases by abortion, in spite of the criticism of Baudelocque and his pupils. Ashwell, after describing the putrid degeneration which often supervenes in fibroids, suggested in 1836, that the induction of labor would prevent such complications, which suggestion was vigorously combated by Ingleby, in the same year. The whole subject of fibroids and pregnancy furnished a theme of discussion for the Société de Chirurgie in Paris, in 1868 and 1869, since when it has been a favorite topic.

Frequency.—The relative frequency of fibroids during pregnancy

*My translation from Lefour.

naturally depends upon its frequency during the child-bearing age, and the relation between fibroids and sterility. There is little doubt but that fibroids of size sufficient to complicate labor are apt to disturb the circulation of the uterus and thus delay the menopause. A very considerable proportion of pregnancies complicated by fibroids are consequently more than forty years of age; thus, fourteen of Hofmeier's forty-two cases were forty years or more; while twenty-three of the same series were more than thirty-five. Seventy-five per cent. of Schauta's patients were over thirty years when pregnancy first occurred, while 46 per cent. of Pinard's series of 171 cases were more than thirty years. Accuracy, therefore, demands that we adduce statistics showing the frequency of fibroids in women under forty-five years. Unfortunately, I have met with no series in the literature thus considered.

The statistics of Young and Williams come the nearest to it, and approximate the frequency of small fibroids in women under thirty-five years of age. These authors found small fibroids recognized only after the abdomen was opened at operation in $2\frac{3}{4}$ per cent. of 1402 cases in Boston. Since this series includes no case diagnosed previous to operation, the percentages are lower than the actual facts. The text of these authors is somewhat obscure on the following point, yet it appears from the context that they also noted fibroids in $7\frac{1}{8}$ per cent. of 363 women under thirty-five years, autopsied at the Boston City Hospital. The frequency of fibroids in gynecological clinics cannot be adduced as value here save in a general way, since we would limit our study to the frequency of fibroids in women between sixteen and forty-nine years. The larger number of women in a gynecological series who are more than forty-five years of age more than offsets the smaller number younger than the age at which fibroids make their appearance, and modifies in an uncertain way the percentages available in the literature. It is stated that fibroids run between 4 and 8 per cent. of the ordinary gynecological cases. Thus Haultain noted them in 8 per cent. of cases in Edinburgh; Goetze, in 8 per cent. of cases in Greifswald; Doederlein in 8 per cent. of cases in Tübingen; while Hofmeier, Essen-Moeller and Kleinwächter all found averages between 4 and 5 per cent. The percentages of fibroids noted at autopsy are of interest, yet their value in this consideration is impaired by the fact that the majority of these observations are based upon autopsy records of females of all ages. Pichard, in 1813, found fibroids in 1 per cent. of 800 women at autopsy; Pollack, in 1852, in 7 per cent. of 583 postmortem cases; Braune, Chiari and West each noted 1

per cent. Champney found fibroids in 8 per cent. of 1860 women over thirty in autopsy records at St. Bartholomew's Hospital, while the much quoted statistics of Bayle, in 1813, state that one-fifth of all women over thirty-five years were found to have fibroids. Bayle's statement is as follows: "car en faisant l'ouverture du cadavre de cent femmes prises indistinctement et agees de plus de trente-cinq ans, il est au moins vingt chez lesquelles on trouve un ou plusieurs de ces corps accidentels." We emphasize these older statistics as more nearly representing the true frequency of fibroids, since at the present time large growths are usually removed during life by the surgeon.

The literature indicates that fibroids associated with pregnancy are not uncommon. Mann states that in the five years prior to his paper in 1907, more than seventy authors had reported cases. Carstens, in his review of the literature to January 1, 1908, tabulated 516 cases, of which 498 were subjected to various abdominal operations. Yet only 117 of these were at full term, and 381 less than seven months. The frequency of this condition in obstetrical clinics, as shown by statistics, varies within wide limits, doubtless because the most complicated cases alone are apt to be recorded unless the subject has been the theme of special investigation in the clinic. The proportion in various obstetrical clinics ranges between 1-125 and 1-2000 cases. Stratz, in 1886, recorded twenty-five cases from Schroeder's clinics. They were observed among 20,000 obstetric cases. Twelve were operated during pregnancy, and had been reported prior to his paper. Thirteen came into labor and are separately considered. Stolpinsky observed eight fibroids in the series of 14244 obstetrical cases during 1900-1903. Pozzi reports eighty-three cases in 10050 labors during a period of five years. Schauta, eighty-six cases in 110,000 pregnancies in his clinics; Haultain, seven in 4000 pregnancies; Goetze, one in 461 births; and Le Maire, one in 1325. Pinard in 21,891 deliveries in the Baude-locque clinic during 1895-1905 found 171 cases of pregnancy and fibroids. Troell reports fifty-one cases from the obstetrical clinics in Lund to 1910; Siegel, sixteen cases from the Freiburg clinic between 1904 and 1911, while Köhler records ten large fibroids noted in 6000 births in Strassburg between 1901-1911. Yet Mangiagalli encountered pregnancy with fibroids but three times in eighteen years in the obstetrical pavilion in Milan. The infrequency of cases occasioning marked obstetrical complications is emphasized by many observers. Spencer, in an experience of 35,000 labors during fourteen years, found only one case in which extirpation of the

myomatous and pregnant uterus was necessary. Basso is quoted by Joubert to have seen but four cases demanding operative procedures during the observation of more than 8000 deliveries during 1894-1903 in Florence. Kerr states that laparotomy was necessary only three times for fibroids in 3500 labor cases in Glasgow. Marchthurn states that operation was necessary in only four myoma cases observed during 24,000 deliveries prior to 1897 in the Chrobak clinic. Boursier quotes Fieux that only twelve fibroids were observed during the delivery of 25,498 cases in the obstetrical departments of Bordeaux between 1870-1900. No abdominal operations were necessary in this series.

Hofmeier mentions sixty cases of pregnancy found in 1000 fibroid cases; Scipiades, seventy-five in 985 cases; Fabricius, fourteen pregnancies encountered among 801 fibroid operations. Peham mentions eight pregnancies encountered in 117 fibroid operations; while Kelly and Cullen in 1674 fibroid operations observed but eleven cases of pregnancy.

Fibroids, however, may coexist with pregnancy without recognition. Thus Troell on the final examination of 5159 puerperal women Lund found fibroids diagnosed for the first time in twenty cases. In the same manner Le Maire found forty fibroids not hitherto diagnosed in 16,850 puerperal women on discharge from the Stockholm clinic. It is probable, however, that fibroids coexist with pregnancy more frequently than these reports would indicate since there are always many cases like those of Troell and Le Maire in which the tumors remain undiagnosed until the examination on discharge.

It is unfortunate that we have few reports of series from America, since judging from the isolated cases reported in discussions at various Society meetings, the coincidence of fibroids and pregnancy or labor is very common in the practice of American surgeons. Save the excellent report of Lobensteine of 100 cases in the New York Lying-In, there are no other American series of size.

Fibroids and Sterility.—There is no doubt but that the fibroid statistics of the literature show higher proportion of sterile marriages than similar cases not presenting such deformity, yet it is an open question whether the fibroids are responsible for the sterility, or merely result because the woman is sterile. Olshausen found sterility in 30 per cent. of 1730 married women in the fibroid cases recorded by West, Roehrig, Beigel, Schumacher, Scanzoni, Michels, Winckel, Schorler, and Hofmeier. In the same manner we have found that sterility existed in 31.5 per cent. of 3617 similar cases, adding to the

above series the cases of Schroeder, Young and Williams, Haultain, Goetze, and Kelly and Cullen.

All of the many errors attending any series of sterility cases probably occur in these tables. It appears to me, moreover, that they contain errors from the incorrect translation of some of the earlier series forming the basis of Olshausen's calculations, since there are differences in the figures cited by Hofmeier and Olshausen and Lefour in what appears to me as the same series of the same author. Unfortunately, I have been unable to obtain all of the original reports for verification. That there are errors due to variation in the usage of common terms is certain, since some have accepted as sterile cases which were pregnant but which aborted before reaching term, while others have included these as fertile. Assuming that the proportion of sterility in these 3600 cases is anywhere between 25 and 35 per cent., we see at once that this is more than the sterility of ordinary marriages. The latter proportion is variously given. Peter Mueller's compilation showed that in the series of Sims, Simpson, Wells, and Duncan, the percentages of sterility ran from 8 to 15 per cent. Grünewaldt found sterility in 21 per cent. of 900 cases who complained of symptoms referable to the pelvis, and in whom congenital conditions were deemed sufficient to account for the sterility in all cases. Hofmeier found sterility in 447 of 2795 private patients (17 per cent.), as contrasted with 441 cases noted in 5462 cases at the Policlinic (8.1 per cent.). Young and Williams found sterility in ten and a half per cent. of 238 medical cases, who gave no symptoms referable to the pelvis. These women were of the same average age as their fibroid cases; *i.e.*, 38.4 years. Goetze found sterility in 7 per cent. of 730 gynecologic cases, including those with fibroids.

There is no doubt but that these figures show an overwhelming proportion of sterility in fibroid cases, yet we must agree with Hofmeier in using caution in accepting the sterility as necessarily caused by the fibroid. There are many points for consideration. Fibroids are more frequent in the fifth decade of life, while pregnancy is most common in the third, a difference of twenty years. There is ample opportunity during this long period for other conditions to occur which will cause sterility. In fact it appears as if in the majority of cases the sterility is the cause of the myoma rather than that the myoma is the cause of the sterility. Other causes beyond the fibroid may be operative in the causation of sterility. Women are often sterile from design. Moreover, tubal and ovarian disease are frequently observed associated with fibroids. Thus Kelly and Cullen

found that the tubes were bound down with adhesions in 364 of their 934 cases, while one tube was affected in fifty-nine other cases. The ovaries also showed some departure from normal in more than half the cases of the entire series (496 of 934 cases). Young and Williams likewise found inflammatory change in the appendages of thirty-five of their 163 cases operated for fibroids. Whether the tumor is the cause of these complications in any marked per cent. of cases is impossible to say. There is no doubt but that the fibroid occasionally may cause adhesions through friction, pressure of the tube, and the inflammation following degeneration. Yet venereal infection cannot always be excluded. Young and Williams investigated the histories of thirty-one married women with inflammatory lesions in the appendages. Ten of these were sterile while twenty-one had born children, percentages closely approximating those of the fibroid cases with normal adnexa.

Martin, at the International Congress in Buda Pesth, called attention to the fact that more than 50 per cent. of sterility is due to the husband, and also made a strong point of the ovarian condition as another causal factor of sterility with fibroids. Yet we must not in this discussion forget that in the twenty years which intervene between the period of most frequent childbearing and the height of tumor growth, a woman may bear children, and later develop a fibroid which may or may not cause subsequent sterility.

The site of the fibroid is of great importance in this consideration. In view of our present knowledge of the fibroid uterus, it seems difficult to believe that all myoma were once regarded as equivalent in the causation of sterility. The recent work of Sampson has given us anatomical proof of conditions long suspected from clinical observations, *i.e.*, that the influence of the tumor upon the circulation of the uterus, and *vice versa*, depends upon its location and size. Many authors have discussed the site of the tumors from the stand-point of sterility. Their statistics, however, have not confirmed our expectations.

Hofmeier, in forty-two cases of fibroids and pregnancy, located the growth as interstitial in thirty cases, subserous in five cases, submucous in two, and cervical in two cases. Schorler, in 253 cases, found sterility in nine per cent. of cases with fibroid polyps, 16.7 per cent. of cervical, 24.7 per cent. of interstitial, 38.8 per cent. of submucous, and 47.8 per cent. of subserous growths. Young and Williams, in their series, found that sterility was present in 27 per cent. of the cases with interstitial tumors, 31 per cent. of the submucous cases, and 42 per cent. in the subserous cases. Their series

arranged in another manner showed that the size and number of the growths was quite as important as the location. Goetze arranged his cases in four groups, according to the size and number of the tumors and the severity of the symptoms. The sterility given as associated with these groupings ranged from 13.6 per cent. for the simpler tumors (less than the size of an apple) to 50 per cent. with growths the size of a man's head or larger. This table is of interest in reminding us that the high proportion of sterility in other series may be explained by the fact that the largest growths are often interstitial, and that pregnancy is less likely with the largest growths. Goetze also emphasizes that 91 per cent. of his fibroid cases with submucous growths had borne children, and calls attention to the rarity with which this form of tumor is seen in nullipara.

Nearly all authors unite in stating that "one child" or relative sterility is also commonly observed in fibroid cases. Of sixty-eight cases reported by Pinard thirty had not been pregnant for more than ten years.

The Effect of Pregnancy on the Tumor.—The tumor increases rapidly in size during pregnancy, frequently attaining the size of years' ordinary growth in three or four months (Caseaux). Cases are reported where a tumor the size of a hen's egg grew to that of a four months' pregnancy prior to the conclusion of the period of gestation. This increase in size is partly due to actual growth resulting from the stimulation of the muscle fibers by the increased vascularity and the influence of pregnancy, and partially due to edema. The actual growth, as shown by Mallory, is due to the proliferation and hyperplasia of muscle cells, while the fibrous elements remain merely as supporting structures. Edema exerts a marked influence upon the consistence of the tumor. Occasionally the growth attains enormous size from edema alone. Interstitial and submucous tumors are most apt to be thus affected. Polyps are often reported which, having outgrown the space available in the uterus, are forced into the cervix, without inducing labor. All emphasize the softness of the rapidly growing tumor, which Tarnier claims may undergo rhythmic contractions. The pelvic blood-vessels may attain tremendous size. As a result of this increased blood supply, the uterus usually presents a dark purplish-red color. Bleeding may continue during pregnancy, especially with submucous growths. Nauss observed it nineteen times in his series.

As the uterus rises out of the pelvis, the tumors attached to it usually become displaced above the pelvic brim. Even the growths which have developed in the lower segment become drawn up during

pregnancy or labor. This fact has determined the expectant method of treatment, a method which unfortunately is not known to all who practice surgery. Cervical and intraligamentous growths are not usually displaced, unless they are driven downward during labor, sometimes in advance of the head, when they may be forced out of the canal, while more frequently they remain as an obstacle to delivery. With the softening of the tumor mass there follows alteration in form—a point emphasized by Olshausen. As the uterus enlarges and rises up the fibroids lose their globular form, or become flattened as the uterus expands—a fact especially true in the growths of the corpus, which on this account are difficult to diagnose. I once mistook a large fundal tumor for a fetal head, the large size of the patient (who was in labor) adding to the difficulty of the diagnosis.

In the great majority of cases there will be no symptoms due to the tumor during pregnancy. When symptoms are encountered those of pressure are most common, and the bladder, ureter, bowel, and pelvic blood-vessels may be more or less obstructed. Cases have been recorded of intestinal obstruction initiated by pressure of the tumor. Occasionally symptoms arise from the overdistention of the abdomen and the pressure upon the diaphragm from the large tumor mass in the latter months of pregnancy. As a rule, intraligamentous growths are the most common source of pressure. Various degenerations may occur during pregnancy. Virchow describes cyst formation with and without hemorrhage. Tarnier and Mackenrodt called attention to necrosis, and Troell has collected twenty-three instances. Kaltenbach described red degeneration, a subject which has recently been emphasized by Bland-Sutton as the frequent cause of pain. Torsion of the pedicle may also occur, the twist involving only the tumor proper; or sometimes the womb itself. Piquand and Leme-land have collected twenty-five such cases from the literature, twelve of one and thirteen of the other. As a result of the torsion, various degenerations may be seen ranging from simple edema to necrosis and gangrene, with subsequent peritonitis.

Effect of the Tumor upon Pregnancy. Abortion.—The majority of authors quote Gusserow to the effect that abortion occurs in 21 per cent. of cases. Pozzi, however, at the International Congress of 1909, voiced the belief that 5 or 6 per cent. more nearly represented the true proportion. These figures seem lower to us than are indicated in the literature. It is certain, however, that Gusserow's tables contain many errors, some of which we will show, in order to prove our claim that the true percentage represented there is less

than the figures quoted. A constant difficulty encountered in the study of the older cases is due to the lack of data given in the reports so that it may be impossible for a reviewer to say whether abortion followed spontaneously or resulted from operative measures directed toward the removal of the tumor. Gusserow's tables apparently were copied from the following series in Lefour, and read as follows:

	Cases	Aborted
West.....	36	28
Winckel.....	46	16
Sebileau.....	47	15
Nauss.....	241	47
Toloczinow.....	119	21
Lefour.....	307	39

The reference of West is not easily verified. The quotation given does not contain the figures quoted, but presents data only of interest in the study of fertility. It states that sixty-two married women with fibroids had 124 children and forty-eight abortions. Hofmeier states that the Winckel article reads: "Of my forty-six patients, thirty-seven had 114 children at term, and sixteen abortions." The exclusion of these faulty series considerably diminishes the percentage of abortion in the total of the remaining series. Lefour, quoted above for 307 cases, distinctly states in his article that "of my 307 cases, 227 only made reference to the time at which labor terminated." Abortion occurred in thirty nine of these (17.1 per cent.). These references all antedate 1880.

Later Series Give Lower Percentages.—Chahbazian, 1882, reports that abortion occurred in eight of seventy-three collected cases of cervical fibroids and pregnancy (10 per cent.). Further study of his article shows, however, that operative interference for the removal of the tumor during pregnancy was carried out in eight cases, with two resulting abortions. His percentages, therefore, should be reduced to 8.2 per cent. Hofmeier reports twenty-three cases, two of which are excluded on account of hysterectomy during early pregnancy, and one aborted because of a hydatiform mole. Two of the remaining twenty cases miscarried (10 per cent.). (The calculation is my own, as Hofmeier's article states that seventeen cases remained after the deduction of the two abortions, evidently a typographical error.) Stratz reports twenty-five cases from

Schroeder's service, seven of which must be deducted as aborting following operative procedures. Abortion resulted in three of the remaining eighteen cases (16.6 per cent.). Goerdes reports nine cases from Martin's clinic, all of which went to term. Meheut, 1902, records five abortions in the eighty-four cases observed in the Clinic Baudelocque (6 per cent.). Le Maire reported only two abortions in 121 cases. Lobenstein, 1911, reports thirteen spontaneous abortions in his series of 100 cases (13 per cent.), and two following operations. Ten of Troell's fifty-one cases aborted, as did ten of Schauta's first series of fifty-four cases up to 1898.

Unfortunately, the tendency is for abortions to occur late in pregnancy. Thus Lefour records that twenty-six of thirty-two cases aborted later than the second month, and seven cases between six and seven months. Since the time of Forget, in 1846, authors have sought to correlate abortion and the site of tumors, often without success. Pinto's work is of interest in this connection. As a result of his study of five early pregnancies removed by hysterectomy he concluded that abortion is not likely unless the ovum is imbedded in the thinned decidua immediately overlying the tumor. Premature labor occurs in about the same percentage as abortions. Lefour mentions this termination in twenty-three of 227 cases (10 per cent.), and Chahbazian, in ten of seventy-three cases of his collected cases of fibroid of the cervix (13.8 per cent.). Yet it is quite likely that labor may here have been induced in some of these cases as a therapeutic measure. Meheut, in Pinard's series, records premature labor in thirteen out of eighty-four cases (15.4 per cent.).

On the other hand, the uterus may be extremely tolerant of both fibroids and pregnancy. Twins and triplets, each at term, are recorded. Lefour mentions four cases of full-term twins among his 307 collected cases, although I find that the tumor was so small as to be nearly negligible in two of the cases. In the same manner Carstens mentions three twin pregnancies which went to term after myomectomy. MacClintock's case of triplets was complicated by an interstitial tumor, $7 \times 2 \frac{1}{2}$ inches, found in the interior wall of the uterus at autopsy. Carstens cites another case of triplets reported by Jepson, but operated before term.

Occasionally much difficulty is encountered in removing placental tissue postabortum, on account of fibroids blocking the way. Not only may dilatation of the cervix be extremely difficult, but the uterine cavity may be divided into two compartments by a fibroid jutting out from the wall, which may prevent further exploration until its removal.

Fetal Position.—The tumors frequently affect the position of the child, and breech and transverse positions are common. Thus vertex presentations constituted 59 per cent. of 304 cases which I have compiled from the literature, in contrast with 22 per cent. of breech and 18 per cent. of shoulder presentations. Yet considerable variation is shown in the various reports. Thus the vertex cases range from a minimum of 51.9 per cent. (Lefour) to a maximum of 76.4 per cent. (Lobenstein); breech from 7 per cent. (Lobenstein), with the next lowest of 20.8 per cent. in Toloczinow's series to 32.3 per cent. (Lefour). The transverse presentations maintained a more even proportion, as is shown by the following: Lobenstein, 16.4 per cent.; Lefour, 16.6 per cent.; Süsserott, 17.6 per cent.; Toloczinow, 20.8 per cent.; and Nauss 20.9 per cent. Yet faulty presentations occurred in only four of Schauta's fifty-four cases, *i.e.*, three breech and one brow presentation.

Placenta Previa and Ectopic Pregnancy.—Placenta previa has been described so frequently that a fibroid uterus must be considered as a strong predisposing factor. At the first meeting of the American Gynecological Society in 1876, Chadwick reported one personal observation, together with eight others collected from the literature. The frequency with which this anomaly occurs during pregnancy with fibroids has been studied by Nauss and Lefour, the former finding it in 2 per cent. (five times in 221 cases), while the latter records it in 4.2 per cent. (13 of 307 cases). Ectopic pregnancy is also often reported and its frequency has been emphasized by Noble. Troell records forty-nine cases from the literature.

Labor.—Fibroids of the corpus with the exception of some intra-ligamentous growths rarely block the pelvic outlet at term to cause distocia. More frequently they merely diminish the strength of the uterine contractions in labor, and cause inertia. Pressure symptoms frequently arise, but are seldom serious. Occasionally the prolapse of a pedunculated subserous growth effectually blocks labor, yet it is remarkable how seldom the obstruction is effectual. Even the tumors of the lower segment may be drawn above the child's head during labor, long after the hope of such good fortune had been abandoned. Cervical fibroids are the usual cause of dystocia from impaction, especially when situated on the posterior wall, yet the presence of such tumors does not demand even difficult birth. All depends upon the size of the tumor, its consistence, and whether it is movable or immovable. Thus, Chahbazian, in eighty collected cases of pregnancy with cervical fibroids, found that "easy" spontaneous labor ensued in thirteen cases, while in ten other in-

stances labor was finally spontaneously accomplished, but after many days. Yet, as I reviewed his series of "easy" labors, I was forced to disagree with his idea of "easy" in several of his cases. There is no doubt that supravaginal cervical fibroids are the most uniform source of dystocia, since from their immobility they are likely to remain in the pelvis. The uterus may rupture as a result of blocked labor. Troell has collected nineteen instances. The placenta may be retained and is often adherent and most difficult to remove, if the passage is blocked by tumors displaced from their original position in the rearrangement of the uterine musculature following birth. Yet the most frequent complication is doubtless postpartum hemorrhage, because retraction and contraction, and efficient thrombosis of vessels is impeded by the tumors of the uterine wall. Hemorrhage may closely follow birth, or come many hours later. It tends to recur and constantly threatens, the paulo postpartum hemorrhage of Barnes. This has occasioned many fatalities, and often after all danger was thought to have passed.

Puerperium.—The view that with the completion of labor pass the chief complications from fibroids has suffered many modifications. Recent observations are demonstrating that the puerperium may be the period of greatest danger, especially in uteri with multiple tumors. Many simple tumors involute with the uterus, especially if they are true myoma. They shortly approach the fibroid stage, as shown by Anspach, and Allen and Corson. Thus I once observed a fundal growth the size of a fetal head recede in three months to walnut size, and Doran has collected thirteen cases in which the tumor disappeared in childbed. Downer, among others, has reported the disappearance of a tumor of similar size which, moreover, had not reappeared at the fifth month of a subsequent pregnancy the following year. Yet all cases do not terminate so fortunately since involution is often retarded and complicated by infection. A few years ago I saw a case in which the physician noted a large uterus immediately after delivery of the child. Suspecting twins, he introduced his hand into the uterus to effect delivery. The enlargement proved to be a fibroid in the right fundal wall, the size of a fetal head. Infection followed and the right femoral vein became thrombosed. Three months later the tumor appeared undiminished in size, with a uterus as of a two weeks' puerperium. At operation the growth was found to present areas of beginning necrosis.

Uteri which are the seat of multiple fibroid growths commonly present complications during the puerperium. Edema of the uterus is so common as to be the rule. Submucous growths tend to de-

generation and infection. Interstitial growths are often forced from their bed during the changes in the uterine musculature following labor, and present as submucous polyps which commonly become infected. Inversion of the uterus and submucous tumors of the fundus are well-known complications. Fibroid uteri tend to involute in retroversion.

Diagnosis.—Even the most cursory review of the literature emphasizes the frequent difficulty of the diagnosis during the first half of pregnancy. There is no doubt but that a large percentage of cases of the literature presented as cases of fibroids complicating pregnancy were first recognized only after the tumor had been removed and opened. The failure of early diagnosis is often due to the fact that pregnancy is not suspected on account of bleeding, especially marked at the time of the periods, which is especially common in cases complicated by cervical fibroids. Confusion also exists because there are many symptoms which are common to both pregnancy and fibroids, such as breast changes, the bluish discoloration of the vagina and the uterine souffle. The one sign strongly suggestive of pregnancy in the early months is enlargement and softening of the tumor mass, yet these features are commonly taken as evidence of sarcomatous change. In case of doubt, therefore, any rapidly growing tumor must be considered suspicious of pregnancy, just as normally the enlargement of the uterus suggests pregnancy. It *may* be that the test of Abderhalden will prove of value in such cases, *provided* that the irregularities demonstrated by Williams and Pearce for this reaction can be excluded. Within the last week I have used this test in connection with the following case:

A woman of forty-two, married twenty-three years, never pregnant save two years before, when she aborted at the second month. On examination we found a retroposed soft uterus of the size of a two months' pregnancy, surmounted by fibroids which changed the outline and made diagnosis extremely difficult. There was one fibroid in the posterior fundal wall the size of an egg. The uterus appeared fixed and could not be moved with moderate pressure. There had been no cessation of the periods, yet the mass felt like pregnancy. The serum test was positive.

Usually the larger and more numerous the fibroids, the longer it will be before the diagnosis of pregnancy is made. Occasionally, as in the case of Olshausen, the condition may defy recognition for a considerable time. Yet the diagnosis eventually may be given by the test of time and by the x-ray prior to the hearing of the fetal

heart. There frequently remains, however, the uncertainty as to the character of the tumor. Bland-Sutton well calls attention to the fact that the surgeon may begin an operation under the impression that he is dealing with an ovarian tumor, yet the mass may prove to be a fibroid, a tumor of the pelvic wall, a misplaced spleen, a kidney in the hollow of the sacrum, a tubal pregnancy, a sequestered extrauterine fetus (Lithopedion), or a calcified cyst. In this connection I recall an interesting case of confusion in the diagnosis.

A woman of thirty-five had had one child fifteen years previously, with no other pregnancy. Her last period was six weeks before we first saw her, since when she had bled at intervals. Marked nausea for one month. Bimanual examination was extremely difficult on account of a thick panniculus. A soft cystic mass was felt in the region of the right cornua. This was about the size of a golf ball and seemed to lie just above and without a fibroid the size of a walnut, situated on the anterior upper lateral wall. The right ovary was in place. The uterus felt extremely broad. There was no evidence of Hegar's sign. The cervix appeared normal on inspection. There were no abnormalities in the vagina. A few smaller fibroids were indistinctly felt in the uterine body. The case was regarded as an extrauterine, yet at operation a pregnancy in the right side of a uterus subseptus was found. The uterine wall was fairly studded with small fibroids, while the cystic mass was proven to be an edematous fibroid.

Sometimes errors are made with the uterus in one's very hand. Thus no less an experienced surgeon than Olshausen removed a gravid uterus, believing it was a cystic fibroid. It proved to be a large sacral teratoma growing from the fetus.

Treatment.—We must keep in mind during any consideration of treatment that the great majority of fibroids associated with pregnancy are seen in elderly primiparal; that the literature clearly shows that pregnancy and fibroids usually run a normal course; that complications during labor and due to the presence of the tumor are usually noted only in such cases as present fibroids in advance of the fetal head at time of labor; and that complications during the puerperium are quite as frequent as those of labor. Yet even the most casual review of the literature strongly suggests that these facts are not known to the mass of men who practice surgery, or else are disregarded, since radical treatment during pregnancy has been the rule in cases which have been reported.

The literature clearly shows that hysterectomy has been the most

common method of treatment of fibroids during pregnancy. This is demonstrated by the study of Carstens' 516 collected cases. Thus 23.5 per cent. of his series were operated by Cesarean at or about term; 30.1 per cent. had myomectomy early in pregnancy, while hysterectomy was done prior to fetal viability in 46.4 per cent. That is to say, nearly one-half of the cases of the literature up to four years ago were treated as fibroids alone. The question naturally arises whether the indication for operation in these 204 cases was furnished by actual complications during pregnancy, or whether the fibroid was of size sufficient to warrant the termination of what in many instances was the patient's sole chance for offspring.

It is, of course, possible that the great majority of these cases were treated expectantly and operated only after the advent of symptoms. Yet a review of the literature does not offer much confirmation. Troell, indeed, states that in 100 collected cases myomectomy was done in fifty-seven cases without good indications. There is little doubt that the literature contains large numbers of cases reported as fibroids complicating pregnancy, when in fact there were no complications and the symptoms were merely those of early pregnancy, or else the diagnosis of pregnancy was not made until after the removal of the tumor. Unfortunately, we have no series to show the proportion of cases in which interference was actually necessary during pregnancy. Four only of Pinard's eighty-four cases were operated during this period, while myomectomy was twice performed in Lobenstein's series of 100 cases. Three of Troell's fifty-one cases were also operated during pregnancy. All careful studies emphasize the fact that pregnancy and fibroids usually run a normal course.

A study of the cases tabulated by Lefour, Chahbazian, Turner, Stavely and Thumin conclusively shows that extremely large growths are not the rule among these fibroid series. The largest proportion of tumors of size is shown in Lobenstein's series in which forty-four cases presented fibroids larger than the fetal head at term. Moreover, in thirty-three of his 100 cases there were tumors of the cervix or lower segment, while forty-one were of the posterior wall. It may be urged that the presence of these growths sufficed for operation, but the results obtained in this series by the expectant method controvert such assertions.

It is pertinent, therefore, to inquire as to this inclination for early hysterectomy. It is accidental and due to errors of diagnosis, or merely the natural development of our modern treatment of fibroids; or, because there still exists among the many who operate the belief

that the mortality from expectant treatment in general is that of the time of Lefour? Finally, is it the best and safest method of treatment?

In the time of the cases of Lefour, Cesarean section was nearly as fatal in its results as the sentence of death. Twenty-two of the twenty-seven cases of his report died, as did 14 infants; that is, nearly 30 per cent. of the total mortality of his series was from Cesareans, in spite of the fact that these cases constituted less than 9 per cent. of the total cases of the series, *i.e.*, twenty-seven cases in 307. Five of the six Cesareans in Chahbazian's review resulted fatally, with death of four of the six children. Pellanda reports that nearly half (48.5 per cent.) of his collection of 171 fatalities in fibroids and pregnancy were directly due to infection. Indeed, the mortality of all early series resulted from manipulations designed to avoid Cesarean. Fortunately, times have changed, and the fear of this operation has been removed.

The development of modern operative technic has again made possible the expectant treatment, the results of which have given a minimum of maternal and fetal death, provided, always, that operation is performed when indicated. This is well shown by the larger recent series. Thus, in spite of the complications elsewhere enumerated in the series of Lobenstein, reported in 1911, eighty-five cases came to term, and absolutely spontaneous labor ensued in three-quarters of them, a percentage which is increased to eighty-seven if we include deliveries made with low and mid-forceps. The entire series, including eight cases operated during four weeks postpartum, gave a mortality of but 4 per cent. The fetal mortality of the eighty-five cases at or near term is comprised only of six cases, all dead on admission. Pinard's series, 1895-1901, shows equal results. Intervention was necessary during pregnancy in four of his eighty-five cases, and during labor in twenty-four cases. Spontaneous delivery ensued in fifty-four cases. The maternal mortality was 3.6 per cent. for the series; and sixty-five children lived, the other nineteen being less than 2500 grams in weight. Spontaneous delivery ensued in 64 per cent. of Pinard's series of 1901-1904, and in 68 per cent. of Troell's series. With statistics like these in the literature it seems necessary to require indications for operations during pregnancy.

Yet complications may arise demanding operative treatment during pregnancy. For the most part these are due to pressure, hemorrhage or degenerations. When the symptoms arise from impaction, effort should be made to elevate the growth, under anes-

thetia if necessary. When all simple treatment has failed and operation becomes necessary, what operation is demanded? Myomectomy or hysterectomy? Much depends upon the surgeon and the conditions within the abdomen.

Myomectomy appears to many as a surgical curiosity with a rather narrow field. It is most difficult to perform successfully in the class of cases in which interference is most frequently demanded (pelvic impaction). It is best adapted for pedunculated growths, yet these seldom demand operation, save for pain. It can be best performed in the earlier months before the tremendous increase in the vascularity of the uterus. Yet interference is seldom demanded until the later months of pregnancy. Moreover, adhesions seem to be a necessary accompaniment of any conservative operation requiring the placing of sutures in a vascular pelvis. Infection furthermore is frequent in this class of cases, and the wound is likely to burst open if labor ensues shortly after operation. Nor are all tumors usually removed during myomectomy. Small growths which have escaped removal may later hypertrophy and occasion symptoms by reason of their presence. Finally there is the ever-present possibility that the scar may rupture during labor in the cases which have been operated by myomectomy but have escaped abortion and have come to term.

Yet, in spite of all theoretical objections, the operation enjoys wide vogue. Tumors of fifteen, sixteen or seventeen pounds have been successfully removed (Netzel's, Schorenz's and Edgar's cases). Many operators have reported its successful employment even where the incision reached nearly to the membranes. Surprisingly few cases are recorded where failure resulted from hemorrhage. Moreover, abortion has been reported in less than one-fifth of cases: thus Turner, 17.5 per cent. aborted in forty-four cases (1890-1900); Thumin, 22.5 per cent. aborted in 102 cases (1885-1900), and Carstens, 14.6 per cent. aborted in 150 cases, to 1908. Again, the maternal mortality is lower than that for hysterectomy in the earlier series, while in the later tables they appear about equal. This is undoubtedly due to the fact that myomectomy usually has been restricted to the most favorable cases. Yet in spite of the results shown by the tables, I believe that the field of myomectomy will be restricted with the diffusion of knowledge concerning fibroids and pregnancy, that is when it becomes generally known that the great majority of such cases can be let alone during pregnancy. The tables are as follows:

	Myomectomy Mortality		Hysterectomy	Maternal Mortality
	Maternal	Fetal		
Turner to 1900, 44 cases.....	9%		37 cases	13.5%
Thumin, 1885-1901, 102 cases	7.8%	28.4%	89 cases	11.1%
Le Maire 1892-1901, 93 cases	8.7%	26.4%	67 cases	7.4%
* Unterberger to 1904, 144 cases	7%		91 cases	10.9%
Carstens, to 1909, 150 cases..	8.6%	29.1%	204 cases	9.3%
Troell, 1900-1909, 157 cases..	3.9%	23.9%	133 cases	3%

When operation is indicated, on the other hand, supravaginal hysterectomy appeals to me as the choice, whenever practical. With the betterment of our knowledge concerning the complications, and the consequent recognition of definite indications for operative treatment, the death rate should be markedly decreased. The operation, however, will always be attended with considerable risk, from the increased chance of thrombosis and embolism, possibly even beyond that indicated by Baldy in the nonpregnant condition.

Fortunately, abortion is no longer considered as a proper method of treatment, for the reason that where indicated it may be impossible of accomplishment, and that in the other cases it merely interrupts the pregnancy, without removing the growth, or diminishing the danger from complications in the placental period. A case of my own is of interest in this connection. A woman of forty-three, mother of six children, while threatening abortion gave evidence of cardiac distress. The uterus was the size of a three months' pregnancy and was studded with multiple fibroids. The heart gave symptoms of myocarditis. We therefore judged the case was not suitable for hysterectomy. Accordingly a small Voorhees bag was introduced with difficulty into the cervix without anesthesia and without stimulating contractions sufficiently to cause expulsion of the bag. Twenty-four hours later we tried a larger bag without result, and on the following day attempted manual dilatation, which, when found impossible, was abandoned for an anterior hysterectomy and removal of the ovum under ether. The uterus was found to be fairly studded with the small fibroids. Following the operation there was constant temperature during the first week and a febrile rise about the tenth day, followed by the extrusion of two fibroid nodules the size of large marbles. One of these was gangrenous and suppurating.

* The series of Unterberger is composed of Thumins series, together with cases of Olshausen, Abuladse and Unterberger.

†The great majority of the hysterectomies were supravaginal operations.

The treatment of cases at full term naturally varies according to the size and location of the growth. As we have seen, tumors of the cervix, especially of the posterior wall, together with the intraligamentary growths, are most apt to obstruct labor. Yet such cases are rarely encountered. The rarity of cervical growths is well known. Thus, in 2246 cases of fibroids reported by Amann, Bigelow, Sims, Loehlein, Schroeder and Schorler there were only seventy-two cervical fibroids, 3.2 per cent. It is not surprising, therefore, that true obstruction of the pelvis from fibroids during labor is rarely noted. Yet when this complication ensues, and tumors are found firmly impacted in the pelvis, Cesarean section is indicated before there has been much manipulation. It is true that spontaneous birth may occur under almost impossible conditions, yet the chance of necrosis and infection in tumors bruised by manipulation or the trauma of labor is so great that little will be gained by waiting. As in Cesarean in general, the prognosis becomes worse the longer the labor and the more frequent the examinations. When the tumor is small and easily displaceable, labor may or may not be allowed to proceed, according to the individual circumstances. Spontaneous retraction of the growth above the pelvic brim is usual, yet if there are many tumors, others may bulge into the cervix and still offer obstruction, in spite of the elevation of the larger growths into the pelvis. Instances of such complications have been recorded by Cullingworth, Kreutzman and Routh. In general, an early Cesarean in the most threatening cases will save many complications, especially if the tumor mass is of size sufficient to demand a Porro. I am perfectly aware that this method will prevent some spontaneous births, and consequently urge it only for the rare cases presenting tumors in advance of the head at time of labor, and for those in which the uterus is so studded with tumors that ultimate hysterectomy is inevitable. Such treatment enables us to avoid many of the complications of the puerperium elsewhere indicated. The frequency of infection during the puerperium in cases which have been delivered through the natural passages is indicated by the twenty-two cases collected by Berger which showed evidence of gangrene and suppuration, and by six similar cases of Lobenstein and three of Fry. Yet the difficulty of prognosis during pregnancy as to the outcome of actual labor is well shown by my own experience. Four times in my service and that of others have I seen cases during pregnancy which I was certain could be delivered only by Cesarean. Yet labor proceeded so rapidly in three of these that they were unable to reach the hospital before spontaneous delivery, due doubtless to the fact

that the tumor became elevated above the pelvic brim subsequent to my examination.

Cases presenting tumors which lie above the pelvic rim should be treated expectantly, provided there is no doubt as to the diagnosis. Dangers from uterine inertia and hemorrhage must be kept in mind, together with the chance of rupture of the uterus in case conditions change and the labor becomes blocked. Nor are such cases free from the possibility of sepsis following trauma of the tumors from labor.

Early interference is advisable in cases presenting multiple growths and infectious processes during the puerperium. The literature is filled with cases illustrating the folly of waiting. As a rule hysterectomy is indicated as soon as the growth is known to be infected.

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