

this suggested method. A patient who (1) with a sensitive nervous system has developed angina pectoris under unusual provocation—mental or physical—is a good risk, provided (2) he shows by physical examination and other methods of study little or no evidence of cardiac pathologic change, if (3) the pain is caused by moderate or much exertion and is not brought on by very slight activity or while at rest (angina decubitus), and provided (4) he can receive adequate treatment, which in the main consists of rest and relaxation, with reasonably rapid response to this treatment. Many patients with definite angina pectoris show no abnormal signs either by physical examination or by special tests and by concealing their histories, could easily pass a rigid life insurance examination. Yet these people have true angina pectoris (not so-called "toxic" or "secondary"; simply because no pathologic change can be found); they will do well, as a rule, if treated properly; in the main, they are good risks. Any patient with angina pectoris will do better by avoiding five things: (1) hurry, (2) worry, (3) overexertion, (4) overeating and (5) very bad, cold or stormy weather. I cannot emphasize enough the value of proper therapy in prolonging life. Undoubtedly a quiet trip south to avoid the severe New England winters adds years to the lives of many people and, frequently, sea trips at critical times achieve the same results. Even an accident or an operation, if not too severe, may prove to be a blessing in disguise by enforcing rest in bed for a while with the disappearance of anginal symptoms. The correction of some chronic ailment by surgery is sometimes stated to be the reason for improvement, when it is really the rest enforced during the convalescence following the operation that is so beneficial.

Cervical sympathectomy in the treatment of angina pectoris is still on trial, at least so far as prognosis is concerned. It was done on two of my patients, one with syphilitic aortitis, the other without. Both died of cardiac disease within five years of the onset of their angina pectoris, with little or no relief by the operation.

Prognosis in Coronary Thrombosis.—It may be said, in the first place, that patients often survive for years in good or in fair condition. In fact, the average duration of life after the attack in this group of sixty-two patients, half of whom are still alive, is close to two years. The sex and age at which the attack occurs seem to make little or no difference so far as prognosis is concerned. Hypertension, evident sclerosis and syphilis alter the prognosis hardly at all. Syphilis is rare in either group. The heart is enlarged in the majority of patients of both living and dead groups. Poor heart sounds and congestive failure do, however, add to the gravity of the prognosis. The finding of fever or paroxysmal auricular fibrillation at the time of the attack of coronary thrombosis has made no difference in prognosis in the few cases tabulated here.

Pericarditis was somewhat more frequent in the patients who died. The electrocardiogram did not help, though the very slow pulse of complete heart block was a bad sign. It happened that intraventricular block was more common in the survivors. Neither the previous occurrence of angina pectoris nor its duration prior to the attack of coronary thrombosis has seemed to matter. The treatment, consisting primarily of rest with long convalescence and a careful life afterward, was satisfactory in the majority of the entire group of sixty-two patients as well as in the selected patients that died or survived.

MYOMECTIONY, HYSTERECTOMY AND RADIOTHERAPY IN FIBRO- MYOMA OF UTERUS*

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The presence of fibromyoma of the uterus does not necessarily mean that treatment is indicated. Unless the tumor produces symptoms that are dangerous to health, or cause discomfort or possibly sterility, it may be advisable not to institute treatment. The danger of the growth becoming sarcomatous or the development of a carcinomatous condition in the uterus itself is slight; sarcoma develops in about 2 per cent and carcinoma in about 4 per cent of the patients treated surgically. When treatment is advisable, the important question to decide is whether radium, roentgen rays or operation should be resorted to. It is unquestionably true that radium is advised too frequently, not only by those who have a limited amount of this element at their disposal, but by those who are inexperienced in its use, and this accounts for many of the unsatisfactory results that are now observed. The fact should not be lost sight of that a surgical operation is often a more conservative form of treatment than the administration of even a small dose of radium or roentgen rays. In this connection also, it should be recognized that the operations preferable for fibromyoma of the uterus are among the safest and most satisfactory in the field of major surgery. If for any special reason radiotherapy seems advisable during the child-bearing period, light doses of roentgen rays, as advised by Corscaden,¹ are probably preferable to intra-uterine applications of radium on account of the destructive action of the latter on the endometrium and its tendency to produce sterility. Unfortunately, the dose of roentgen rays cannot be as accurately judged as that of radium.

The patient's age is an important consideration. For one under 40 there can be little argument against myomectomy as the procedure of choice. W. J. Mayo² says, "Radium must justly be considered in selected cases as a competitor of hysterectomy, but it has no comparative standing in cases suitable for myomectomy." Myomectomy is advisable not only for solitary tumors of small size but also for large tumors, no matter where situated, and for multiple tumors. Bonney³ mentioned the successful removal of thirty tumors in one case. There is no contraindication to opening the uterine cavity, but if this is done it is advisable to use a sharp curet, to swab the endometrium with a 3.5 per cent alcoholic solution of iodine, and then carefully to suture the uterine muscle and visceral peritoneum. Mayo⁴ in 1911, reported a case in which, during the removal of a deeply embedded fibromyoma in the lower segment of the uterus, the cervix was completely severed from the body. These were sutured together and a good result was obtained.

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¹ Read before the Section on Obstetrics, Gynecology and Abdominal Surgery at the Seventy-Seventh Annual Session of the American Medical Association, Dallas, Texas, April, 1926.

² Corscaden, J. A.: Statistics and Technic in the Treatment of Fibromyoma of the Uterus by Radiotherapy, *Am. J. Roentgenol.* **9**: 812-820 (Dec.) 1922.

³ Mayo, W. J.: Myomectomy for Myomas of the Uterus, *Northwest Med.* **21**: 235-238 (Aug.) 1922; *Arch. franco-belges de chir.* **25**: 769-776 (June) 1922.

⁴ Bonney, Victor: Scope and Technic of Myomectomy, *Lancet* **2**: 745-748 (Oct. 7) 1922.

⁵ Mayo, W. J.: Some Observations on the Operation of Abdominal Myomectomy for Myomata of the Uterus, *Surg. Gynec. Obst.* **12**: 97-102, 1911.

In certain cases, after the abdomen has been opened, it will be found impracticable to save the uterus, and some type of hysterectomy will be justifiable. For this reason, when advising myomectomy, it is always desirable to get the patient's consent to a more radical operation if it should be found necessary. Even if the patient is young and anxious to have children, the position or character of the tumor may make the more radical operation advisable. If the patient is less than 38 and the cervix is in good condition, I try to save it, and also some of the body of the uterus, in the hope of retaining menstrual flow; but if the patient is more than 40, and especially if there is any disease in the cervix, I advise total abdominal hysterectomy. I believe that this operation can be done with as low a mortality as the subtotal operation. The patient is protected against the danger of cancer in the cervical stump and from troublesome leukorrhea, for which removal of the cervix might otherwise be advisable later. During the last five years, ten cases of carcinoma of the cervix have been observed at the Mayo Clinic, from three to fifteen years after subtotal abdominal hysterectomy for benign lesions, and nineteen cases in which it was not possible to determine whether or not malignancy had existed prior to the early operation. In about the same number of cases the cervix has been removed for troublesome leukorrhea in cases in which subtotal hysterectomy had been performed previously. In many instances, there was no history of the existence of leukorrhea before partial hysterectomy.

Radiotherapy is indicated for the large group of patients close to or past the normal age of menopause who have a history of menorrhagia, and who, on bimanual examination, preferably under a general anesthetic, are found to have uncomplicated interstitial uterine fibromyomas less than 15 cm. in diameter; for patients with a fibrous type of uterus; for patients with essential uterine hemorrhages; for younger patients who need an operation but refuse it; for patients for whom surgical treatment would be ill advised on account of serious, coexisting disease, or obesity, and for patients who continue to have menorrhagia or metrorrhagia after myomectomy or curettage for polypoid endometritis. With this list of patients suitable for the nonoperative type of treatment, I agree with Miller,⁵ who says that a large percentage of patients with myoma of the uterus, formerly subjected to operation, can be permanently and safely relieved by treatment with radium, and that practically all patients with uncomplicated essential hemorrhage can be cured by radium.

In outlining treatment, the size of the tumor should be taken into consideration. Abdominal myomectomy is the most satisfactory form of treatment for patients with symptom-producing fibromyomas occurring during the child-bearing period. All such cases would be considered very safe for the abdominal operation except those in which the tumor presents itself through the cervix; in the latter cases, the tumors should be removed through the vagina. Even if the tumors are quite small, if the patients complain of dysmenorrhea, sterility or menorrhagia, myomectomy is justifiable whether or not definite relief from symptoms may be promised.

Myomectomy or hysterectomy, rather than irradiation, is advisable if patients are more than 38 when

there is evidence of degeneration or inflammation in a myoma or fibromyoma; when the tumor is pedunculated; when it is submucous, or when some other condition exists in the pelvis or lower part of the abdomen for which surgery is advisable.

It has frequently been said that myomectomy is more dangerous than hysterectomy, but I doubt whether statistics from modern hospitals would bear this out. During the last five years, in the Mayo Clinic, abdominal myomectomy was performed in 259 cases, with only two deaths (0.77 per cent), and hysterectomy was performed in 1,643 cases of fibromyoma with thirty-one deaths (1.88 per cent). Death following either operation should be limited to accidental causes, of which pulmonary embolism is responsible for about 50 per cent of cases. In the foregoing cases, pulmonary embolism was responsible for fifteen of the deaths. It has also been said that myomectomy is an unsatisfactory operation because of the marked tendency toward the later development of other tumors in the uterus. If the patient is less than 30, there is a slight possibility of leaving very small tumors in the uterus. There was only one case during the last five years in the Mayo Clinic in which a second operation was necessary, but two operations for the removal of fibromyomas are preferable to one hysterectomy, or its equivalent in radiotherapy, in the case of a young woman. Apparently there is little or no decrease in the size of a tumor after treatment by roentgen rays or radium, unless the doses are powerful enough to precipitate the menopause. If patients are more than 30, there is very little danger that recurring tumors will become large enough to give trouble, and if they do, radium treatment would be indicated in most cases, as the patient would be close to the menopause.

Because of the fact that it is easier to perform abdominal hysterectomy than to enucleate several fibromyomas, the more radical operation is frequently performed on women who are still capable of bearing and anxious to have children. These cases represent many of the bad results of surgical treatment. Unless the end of the child-bearing period has been reached or is near, radiotherapy must be considered a more radical procedure than myomectomy or even subtotal hysterectomy, on account of its effect, not only on the uterus and on the tumors in it, but also on the ovaries. The action of radium on the uterus, according to many authorities,⁶ is secondary to its action on the ovaries. The premature menopause, artificially produced, whether by radiotherapy, removal of the ovaries, or in some cases by hysterectomy, even when the ovaries are left, is frequently a distressing period for the patient. Patients can be helped greatly by making them thoroughly understand beforehand what they must expect in the way of nervousness, hot flashes, and so forth, and that these symptoms will sooner or later disappear and will in no way interfere with life. Patients who have the most trouble are those with a poor nervous background.

From the answers to a recent questionnaire, it was learned that pregnancy had occurred twenty-three times in 151 married women on whom myomectomy was performed since Nov. 1, 1921. Eleven had had one child each; five had had one miscarriage, one had had two miscarriages, and five were pregnant at the time they answered the inquiry. In a series of 600 cases in

5. Miller, C. J.: Radium Treatment of Myoma of the Uterus and Myopathic Bleeding: Final Results in One Hundred and Eighty-Three Cases, *Surg. Gynec. Obst.* 34: 593-597 (May) 1922.

6. Corscaden (footnote 1). Rouffart, E.: État actuel de la curi-thérapie dans le cancer utérin: quelques opérations récentes pour cancer utérin, *Gynéc. et obstét.* 9: 201-207, 388-394, 1924.

which radium treatment was given, Stacy⁷ reported sixty-nine patients less than 35, only three of whom had given birth to full-term normal children; two to stillborn children, and one to a monstrosity; one had had two miscarriages, and two were pregnant at the time the questionnaire was answered. Previously, Stacy⁸ had reported 203 cases of myomectomy, followed by pregnancy in twenty-eight. If a myoma causes serious trouble during pregnancy, it should be removed. Degeneration of the tumor occasionally develops as the result of interference with the blood supply brought about by the increased size of the uterus, especially if the tumor is of the subserous pedunculated type. During the last five years, removal of fibromyomas during pregnancy was necessary at the Mayo Clinic in fourteen cases. Under no circumstances should radium or roentgen rays be used during pregnancy, on account of their action on the fetus.

As the patient grows older, the indications for myomectomy become fewer. After the patient is 38, and if she has children, I do not hesitate to recommend roentgen rays, radium or abdominal hysterectomy. In performing hysterectomy, I always leave at least part of one ovary if the patient is less than 40. If there is associated chronic pelvic infection, I transplant the most normal appearing parts of one of the ovaries into the abdominal wall. Stopping the menstrual flow by the removal of the uterus frequently produces marked nervousness and other symptoms suggestive of the artificial menopause produced by the removal of the ovaries or extensive irradiation. This is no contra-indication to the operation, however, as the results are very satisfactory in most cases. If patients are more than 40 and the tumors 15 cm. or less in diameter, radium is advisable, provided there is no acute or sub-acute infection in the cervix such as persists for several weeks after cauterization; in such cases, deep roentgen-ray exposures are preferable. There is probably less danger of relighting an old pelvic infection by the use of radium than was formerly believed.

Abdominal hysterectomy is especially indicated for patients more than 40, with symptoms and disorders as follows: 1. Uterine tumors greater than 15 cm. in diameter, particularly if growth has been rapid. 2. Pain as the result of pressure or position of the tumors. 3. Urinary disturbance. 4. Metrorrhagia. 5. Foul uterine discharge. 6. Degeneration of the tumor. 7. Signs of the development of sarcoma in the tumor or carcinoma in the uterus. 8. Marked secondary anemia when further loss of blood might have serious consequences. In such cases, transfusion is given, and, provided there is no reaction, is followed in twenty-four hours by hysterectomy, which is safer than radium, as bleeding sometimes continues for several weeks after irradiation and demands repeated transfusions. Furthermore, if the tumor is degenerating, cachexia will be increased. 9. Possible coexisting disease in the pelvis, or symptoms too vague for a definite diagnosis.

REPORT OF CASE

A woman, aged 51, came to the Mayo Clinic, in 1925, with "fibroids," as diagnosed by her home physician, for which radium had been advised. She complained chiefly of a bearing-down sensation in the pelvis, more marked during the last three months. Menstruation was normal. There was no metrorrhagia or leukorrhea. She had had three children

and two miscarriages. The general examination was negative. On pelvic examination, the uterus was found to be about the size of a three months' pregnancy and to contain multiple small fibromyomas. The adnexa felt normal, but examination was rather unsatisfactory on account of the thick abdominal wall. Radium was first advised by the consultant, but the patient was opposed to any form of treatment except surgical. After further consultation, this procedure seemed justifiable, although it was not urged. Total abdominal hysterectomy was performed, with removal of both tubes and ovaries. The pathologist reported: in the uterus, multiple fibromyomas (the largest, 2.5 cm.); sclerosis of the blood vessels; hypertrophy of the endometrium; chronic cystic cervicitis; multilocular cystic oophoritis; two distinct squamous cell epitheliomatous nodules, grade 3 (1 and 1.5 cm. in diameter), in the left ovary; chronic cystic oophoritis; in the left tube, squamous cell epithelioma, grade 3, involving the fimbriated end of the fallopian tube; in the right tube, chronic salpingitis; also chronic appendicitis with obliteration of the mucosa of the distal half of the appendix.

COMMENT

This case illustrates the absolute impossibility of recognizing early malignant disease in the ovaries, and it is certain that if this patient had not insisted on surgical removal much valuable time would have been lost. In many recent publications in which radiotherapy and the radical operation are compared, radiotherapy was advocated on the ground that death did not occur and morbidity was minimal. On the whole, I agree with Robins⁹ that such comparisons are not possible, as many of the fatalities following operation occur in complicated cases in which irradiation could not be considered, and in which removal of the fibromyoma was of secondary importance. I think most of us will agree with Gellhorn,¹⁰ who says, "With the exception of a limited number of cases, there are well defined fields wherein either one or the other of the two methods gives the best results and hence has to be employed to the exclusion of the other. The man who administers radiotherapy indiscriminately disregards the best interests of his patients as much as the man who adheres exclusively to surgery."

CONCLUSIONS

1. If fibromyomas do not cause symptoms, no treatment is indicated.
 2. Radiotherapy is indicated for all patients over 40 who have fibromyomas less than 15 cm. in diameter, with menorrhagia as the chief complaint. It is also indicated if the patient is under 40 and refuses surgical removal, or if a major operation should carry an added risk. It is also indicated in all cases of fibrosis uteri, or cases in which there are essential uterine hemorrhages.
 3. Surgical treatment of fibromyomas is indicated for most patients less than 40; for most patients with pain or irritability of the bladder; for patients with tumors more than 15 cm. in diameter; for those whose tumors are of the pedunculated or submucous type or undergoing degeneration or inflammation; for those whose tumors may not be fibromyomas, and for those with complications that require the opening of the abdomen.
- Abdominal myomectomy is the operation of choice for the majority of patients less than 40. Vaginal myomectomy is indicated if the fibromyoma presents through the cervix. Subtotal abdominal hysterectomy should be performed in women less than 40 only when it is necessary to remove the greater part of the body.

7. Stacy, Leda J.: Radium Treatment in Six Hundred Cases of Menorrhagia, *Am. J. Roentgenol.* 7: 379-382 (Aug.) 1920.

8. Stacy, Leda J.: Results of Myomectomy, *St. Paul M. J.* 18: 344-346, 1916.

9. Robins, C. R.: Some Questions Involved in the Treatment of Fibroids of the Uterus, *Virginia M. Monthly* 62: 172-175 (June) 1925.

10. Gellhorn, George: When to Operate and When to Use Radium on Fibroids of the Uterus, *J. A. M. A.* 78: 259-261 (Jan. 28) 1922.

of the uterus and when the cervix is in good condition. Total abdominal hysterectomy is the best operation when any lesion other than carcinoma exists in the cervix and an abdominal operation is advisable, or when the history suggests the possibility of malignant change in the fibromyoma or an associated malignant condition in the body of the uterus.

ABSTRACT OF DISCUSSION

DR. ARTHUR H. CURTIS, Chicago: Since the advent of radium, if women wish the opportunity to bear children, it is possible to perform a myomectomy or multiple myomectomy more frequently, thereafter having radium in reserve to check hemorrhage if it subsequently develops. We must not forget, however, that supravaginal hysterectomy still remains the surgical procedure of choice in the care of younger women who have uterine fibroids. Most of us who employ radium for bleeding at the menopause now use light anesthesia, examine bimanually when the patient is asleep, and curet for the sake of making certain our diagnosis. We have found, through these procedures, that nearly all women who bleed sufficiently to require relief not only have the physiologic changes that come at this time but also almost invariably have in addition small uterine fibroids. The menopausal flow, in the absence of fibroids, is almost never sufficient to require intervention.

DR. HARVEY B. MATTHEWS, Brooklyn: As to the effect of irradiation on the ovaries and on subsequent menstruation and pregnancy, we have shown working with rabbits that small doses of radium can be used in the puberty bleedings, if the dosage is not more than from 600 to 800 milligram hours of radium. We have a case under observation in which 1,000 milligram hours of radium was used for uterine bleeding due to interstitial fibroids, and the patient is pregnant seven and a half months and bids fair to have a normal pregnancy and, we hope, a normal labor. Dr. John G. Clark of Philadelphia had a patient who was exposed to 1,200 milligram hours of radium and who, some years later, had a perfectly normal pregnancy and labor. Out of 872 radium cases (in the child bearing age) collected from clinics throughout the United States, there were thirty-nine pregnancies with twenty-three normal labors. Of course, irradiation during pregnancy is a different matter from irradiation before pregnancy. We know that irradiation after pregnancy (and the earlier, the more severe the anatomicopathologic results) sometimes causes deformities, but irradiation before pregnancy is possible up to 800 milligram hours of radium without mitigating against future pregnancy. In doing a supracervical hysterectomy in the class of cases Dr. Masson enumerated (women after 38 or 40, or older) the use of the cautery, preceding the hysterectomy, for the destruction of the cervix works very nicely and relieves the subsequent leukorrhea. I do not know of any other better indication for the use of the cautery than such cases. It does relieve the leukorrhea and lessens the cancerous potentialities of the remaining cervix. Since supravaginal hysterectomy is more easily performed by the majority of men than complete panhysterectomy, the use of the cautery serves to simplify the operation of hysterectomy, relieves the subsequent leukorrhea, and, furthermore, lessens (or even prevents) the occurrence of cancer in the cervical stump.

DR. JAMES C. MASSON, Rochester, Minn.: As Dr. Curtis says, most of the women who seek treatment for fibroids have tumors of such a size that an abdominal hysterectomy is advisable rather than the use of radium. However, in bleeding at the menopause, without the presence of large tumors, radium is the ideal treatment. As Dr. Curtis stressed, it is very important to examine these patients under an anesthetic, usually curetting at the same time in order to arrive at as definite diagnosis as possible. Dr. Matthews advises the use of radium in women during the childbearing period. We have used and still are using radium on some of these younger women, but in the 600 cases that I referred to, the percentage of pregnancies was not as high as in the cases in which myomectomy was performed. Furthermore, there were no

premature labors, or dead fetuses or monstrosities following myomectomies, and there were three such cases in the small group in which radium was used. Whether this was accidental or not it is difficult to say. I agree with Dr. Matthews that the destruction of the cervical canal with the cautery is a splendid addition to the subtotal operation, but I do not feel that it gives the patient the same protection against the later development of malignancy that the total removal of the cervix does. We know that malignancy, as a rule, develops on the vaginal surface rather than on the cervical mucosa, the squamous cell type being much more frequent than the glandular type.