Class C contains those cases which show the original disease in a still active form, or have had some other sign of tuberculous infection. Of these there are 6.

Class D includes patients who have died since discharge. There are 6 of these, and with one possible exception, in which death is stated to have been due to "influenza," they have all died of tuberculosis of lung or kidney.

The main fact which emerges is that out of 129 patients who are known, no fewer than 110 remain perfectly well. These figures are in welcome contrast to the gloomy views often expressed, which are usually the vaguest of impressions not backed by any actual figures. Pessimism in tuberculosis is due mainly to the fact that, as with other diseases, it is chiefly the failures that come back.

Finally, it is contended—and probably with reason—that operative treatment may shorten the length of the time needed for recovery. In this respect it is worth noting that the average residence in the institution of these 170 patients was three years and two months.

REFERENCE.

¹The Results of Institutional Treatment in Surgical Tuberculosis. *British Medical Journal*, July 2nd, 1921.

RADIUM IN THE TREATMENT OF MENORRHAGIA AND IRREGULAR UTERINE HAEMORRHAGE.*

BY

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So much work has been done in the treatment of malignant disease by radiotherapy that it is easy to overlook the value of such treatment in non-malignant conditions, such as haemorrhage and menorrhagia caused by fibroids or associated with the menopause.

Twenty or thirty years ago students were taught that if a patient was diagnosed (after curettage) as having "menopausal haemorrhage" it was only necessary to use palliative remedies and to reassure the patient that all would be well in a year or so, when the "change of life" was over. In actual practice this meant that the unfortunate woman was doomed to a C3 life for several years, and only if she became dangerously anaemic was hysterectomy resorted to. Nowadays all that is entirely changed.

DIAGNOSIS OF IRREGULAR HAEMORRHAGE.

At the present time it would be superfluous to emphasize the importance of a careful physical examination if a patient complains of this symptom. Irregular haemorrhage is so often the first symptom of malignant disease that every student is taught that to treat a patient suffering from irregular haemorrhage or menorrhagia without such an examination is malpraxis almost amounting to criminal negligence.

It is unfortunate that the public is not equally aware of the importance of irregular haemorrhage and menorrhagia. It is true that very often such symptoms are of a temporary nature and have no serious consequences, and it is this fact that makes it so difficult to educate women to regard them as needing immediate attention. In the past the medical profession has contributed to this attitude of mind by the "wait and see" principle of treatment, which was very frequently adopted, especially in cases of menopausal haemorrhage.

What, then, are the rules which should be laid down for dealing with the patient who complains of menorrhagia or irregular bleeding? The first thing is to take a careful history, which, together with a general physical examination, will exclude such conditions as haemorrhage connected with pregnancy, high blood pressure, etc. Next, a physical examination of the genital organs, especially the cervix uteri, will exclude such conditions as carcinoma

of the cervix, fibroids, etc. If there are no gross abnormalities, it is then permissible to treat the patient symptomatically for a week or two. If at the end of a month there is no improvement the uterus must be explored. Only after such exploration is it justifiable to say that the condition is due to an endocrine disturbance, such as is found at the time of the menopause.

TREATMENT.

Having now decided that the patient is suffering from an endocrine disturbance which is not benefited by drugs, the question of treatment will depend, first, on the age of the patient. If the patient is over 40 then there is no doubt that the right treatment is to create an artificial menopause by means of radiotherapy.

Before discussing the particular technique it is as well to consider the pros and cons of such a procedure. The advantage of getting rid of this troublesome symptom of haemorrhage once and for all is obvious, and borne out by the numerous letters of gratitude that one receives. What, then, are the disadvantages?

The objection, of course, is the onset of menopausal symptoms—namely, flushing, sweating, headaches, etc. The question has been asked whether these symptoms are any more pronounced in a menopause which is artificially produced than those which occur when nature brings about the menopause in the course of time. It is a point which it is almost impossible to solve by means of statistics, but my impression is that, after the age of 40, there is really very little difference.

If, however, the question arises of producing an artificial menopause in a patient under the age of 40, the problem is very different. First, there is an obvious objection to cutting short the youthful characteristics of such a patient at an early age. Secondly, there is some evidence that the symptoms caused are distinctly more severe than those found in patients over 40. It is true that in some of the young patients in whom those symptoms have been noticed the treatment has consisted of a small dose of irradiation, purposely administered in the hope of causing a temporary amenorrhoea, and it is possible that the increased symptoms are due to a partial destruction of the ovarian activity. The same sequelae have been observed in a patient who has had an operation leaving only a small portion of one ovary.

When once the decision has been made that it is advisable to create an artificial menopause, the question arises as to what method should be employed. There are two radiological methods by which the artificial menopause may be brought about: (a) radium, (b) x rays.

If a patient is suffering from irregular haemorrhage it is impossible without exploring the uterus to exclude a cause, such as malignant disease or a polypus. For this examination an anaesthetic is necessary, and under these circumstances the correct procedure is to place 50 mg. of radium in the uterus. If, on the other hand, the patient is suffering purely from menorrhagia, then it is fairly certain that the condition is not due to malignant disease. In these circumstances it is justifiable to use x rays without any exploration of the uterus, the advantage of this method being the fact that no anaesthetic is required, and the patient is not obliged to lie up in bed.

Technique of Radium Treatment.

The technique for using radium in the case of a patient who is over 40 is very simple. The patient is given an anaesthetic, and after a careful bimanual examination the uterus is dilated and carefully curetted. If nothing abnormal is discovered, then a tube containing 50 mg. of radium element, the length of which is not more than 2 inches, is placed inside the cavity of the uterus. The walls of this tube must be the equivalent of at least 0.5 mm. of platinum, and in addition it is better to screen the metal filter with 2 mm. of rubber so as to cut off secondary rays. The length of time which this tube should be left in is still a matter of controversy. The majority of gynaecologists consider twenty-four hours sufficient, but in a large uterus, with the ovaries near the pelvic wall, this sometimes fails to produce a permanent

*Read in opening a discussion in the Section of Radiology at the Annual Meeting of the British Medical Association, Winnipeg, 1930.

amenorrhoea. At St. Bartholomew's Hospital we did a series using seventy-two hours, the results of which will be discussed later. We are now doing a series leaving the radium in for forty-eight hours, and this, in my opinion, is the optimum duration for the application.

Technique of X-Ray Treatment.

My colleague Dr. Finzi has sent me the following description of his methods.

"As used in England, α rays are generally employed in doses that will cause complete sterilization in patients over 38 or 40. Smaller doses have been used with the idea of reducing the menorrhagia, but their use is very tricky, and they take a long time to act. The larger doses will produce a temporary sterilization in younger patients, but there is then a danger that, if conception takes place when the ovaries are just beginning to recover, the offspring may be malformed, microcephaly being the most usual abnormality.

"The action of α rays is not entirely an action on the ovaries, but in the case of fibroids there is a direct action on these also.

"The method which I have used for many years and have found so satisfactory that I have not thought advisable to drop it as a routine, is a split dose, repeated method.

"A filter of 5 mm. of aluminium is used, 140 to 150 kilovolts (interrupted current), and a moderately full erythema dose is given to the skin. Two anterior ports of entry are used, and the applicator, applied with compression, is sloped, so that both ovaries get some of the rays. One or two posterior fields are employed, according to the stoutness of the patient, generally one. One of these fields is given on each of three or four successive days. This series of fields must be repeated on two further occasions, and it is most important that the beginning of the second series should be four weeks after the first, and the beginning of the third series four weeks after the second. The dose is slightly reduced for these subsequent treatments to compensate for the decreased tolerance of the skin.

"This method results in very little discomfort to most patients, and they can usually continue their ordinary avocations even during the treatment.

"The other method, which I employ for patients who live far away, is to sterilize in one treatment. This is a far more severe procedure for most patients. A filter of 0.5 mm. of copper or zinc is used, 180 kilovolts continuous current, and two, three, or four fields at a 30 cm. distance. Less than an erythema dose is needed.

"Whichever method is used, the result is very certain in competent hands. I have not failed out of more than sixty cases which I have treated myself.

"Compared to radium its action is slower, as there is no direct action on the mucous membrane of the uterus as with radium. One period, often very prolonged, is the rule after the first α -ray treatment and, during this, the menorrhagia is not diminished. A second period may occur, but is usually much less severe. A third period is very rare. This applies whether the single dose or the split dose technique is used.

"One advantage over radium is that α rays can be satisfactorily used with quite large fibroids. (My second case had a mass reaching the ensiform cartilage, and it gradually disappeared.)

" X rays, I find, is usually—not always—less trying to patients than radium in the uterus. The fact, however, that α rays can be used without an anaesthetic is rather a snag, as the examination under an anaesthetic may be necessary to determine whether there are any contraindications to the treatment."

ACTION OF RADIUM IN PRODUCING MENOPAUSE.

It was at one time thought that radium brought about amenorrhoea in a different way to α rays. It was suggested that the radium acted purely on the endometrium, while α rays acted entirely on the ovary. This theory was upheld by Forsdike in his Jacksonian Essay, "The effects of radium upon living tissues." His evidence, however, that it is not due to destruction of the ovary, is a little confusing. He states that only two out of ten young women between the ages of 29 and 38 suffered from flushes. This certainly is a small proportion, but if even two suffered in this way, is it not evidence that the ovaries were affected?

Turning to his histological evidence, he bases this on sections of an ovary removed after irradiation. The experimental evidence, where radium was placed 8 cm. from the ovary, is certainly more convincing.

In my experience there is considerable evidence against the theory that radium acts only on the endometrium.

For instance, in quite a large number of cases there have been two periods following the radium application. It might be argued that in these cases sufficient changes had not taken place in the endometrium to prevent the flow of blood, but if this is so, why did the same dose produce in some of the young women only a temporary amenorrhoea? It would be very difficult to explain these observed facts by an action on the endometrium, but it is not so difficult to explain them if we believe that radium acts on the ovaries. It is well known that menstruation is related to ovulation, and the Graafian follicle which is ruptured or is mature enough to be on the point of rupturing is not so readily affected by radium as the young rapidly growing follicle. In the elderly patient it is probable that the follicles that are likely to be associated with menstruation within the next few years are destroyed by the radium, but not those one or two follicles which are already mature, and this would explain the fact that patients sometimes menstruate once, or even twice, after irradiation.

Again, in the case of a young patient, the cells which will eventually become a follicle are not undergoing sufficient active metabolism to be affected by the rays, and therefore, a year later, will become mature follicles, and will then rupture to form a corpus luteum, which on degeneration will be associated with menstruation.

DISCUSSION OF RESULTS.

The results of creating an artificial menopause are fairly well known; statistics obtained at University College have recently been published by Asherson.¹

In this series, 63 cases were treated for menopausal menorrhagia. Of these 63, 55 were cured by one application of radium. Six required two applications, 4 were untraced, and 1 had a small dose without results. These patients were all over 40 years of age. Six of them required a second dose, compared with two in the Bartholomew's series, which suggests that the rather larger dose used in the latter institution is more certain in its results.

In the same series, 23 cases were treated for "essential menorrhagia." These are of particular interest. All of them were under the age of 40, and of these, 16 cases had a restoration of normal menstruation. Five cases had permanent amenorrhoea. The dose given to these patients varied from 50 mg. used for eight hours up to 50 mg. for fifty hours.

It is clearly shown from these results: (1) that the younger patients will stand a much bigger dose without producing amenorrhoea; (2) that this method of treatment must seriously be considered in certain cases even if the patient is under 40 before resorting to hysterectomy.

The disadvantage is the fact that, owing to the position of the ovary being unknown, it is impossible to be certain of getting a dose that will be efficient and yet not produce permanent amenorrhoea.

The other series recorded by M. L. Kreitmayer, in his paper on page 815, consisted of 122 cases treated at St. Bartholomew's Hospital. Of these patients, 97 were traced, and answered a questionnaire. As the author states, a questionnaire is not the ideal method of getting evidence, but the answers were sufficiently definite to justify publication. It is hoped that these patients will be persuaded to return to the hospital so that more details can be obtained.

It would appear from these figures that of 97 cases, 90 patients were cured with one dose, while 7 required further treatment. Of these 7, 5 were under the age of 40, thus bearing out the idea that it is more difficult to produce an artificial menopause in a young patient.

With regard to menopausal symptoms, the answers were not very definite; it would appear, however, that 15 patients had no flushes at all. Of those who had flushes, some have continued for as long as five years.

There is some controversy as to whether these menopausal symptoms are more severe after a menopause artificially produced than one occurring as a result of age. This, of course, is a very difficult problem to solve by statistics. It is my impression that there is little differ-

¹Journ. Obstet. and Gynaecol., 1929, xxxvi, No. 4, 778.

ence in patients who are treated over the age of 40, but that in the younger patients the symptoms tend to be more severe.

A question often asked by patients before submitting to this treatment is, "Shall I get fat?" It would appear from this series that 50 per cent. definitely put on weight, but details of how much are not recorded.

Another important symptom is the question of dyspareunia, which occurred in only 7 cases out of the 93; and loss of inclination was experienced in 8. In 31 cases it is definitely stated that the relations were unaltered. Forty of the remaining patients, however, were spinsters or widows, and in 5 the answers were too indefinite to be of value. The small number of cases suffering from dyspareunia suggests that there is no real trouble caused by cicatrization or adhesions in the vagina, in spite of the large dose—that is, 3,600 mg. hours.

TREATMENT OF FIBROIDS BY RADIOTHERAPY.

The treatment of fibroids may be divided under three headings—surgical, radiological, and palliative.

A few years ago the palliative treatment was frequently employed, especially when the patient was over 40 and approaching the menopause, with the idea that once the menopause was complete the symptoms of menorrhagia would cease and the fibroids diminish in size. Unfortunately this process often lasted over a period of several years.

Such treatment is now confined purely to cases where the patient is young, the symptoms very slight, the fibroids small, and where it is undesirable that the patient should have any drastic treatment until all hope of pregnancy is abandoned, when some more radical measure, such as myomectomy, is undertaken, which will not only relieve the symptoms, but may bring about fertility.

The indications for radiological treatment are at present somewhat limited. The majority of gynaecologists consider that, if the patient is over 40 and the symptoms are menorrhagia or irregular haemorrhage, and the fibroid is not sufficiently large to cause pressure symptoms—that is to say, not larger than a fist—and if there is no inflammatory condition in the pelvis, then such a case should undoubtedly be treated by radiotherapy.

The question then arises whether radium or x rays should be employed. Here, again, the rule is very much the same as in the case of creating artificial menopause. If the fibroids are associated with irregular bleeding it is essential that the uterus should be explored. Fibroids are very frequently associated with sterility, and it is in the nulliparous patients that carcinoma of the body is most likely to occur. If, therefore, the uterus is to be explored in order to exclude malignant disease, then a 50 mg. tube of radium element should be inserted into the body of the uterus to bring about an artificial menopause and thus to stop the symptoms of haemorrhage due to the fibroid.

On the other hand, when the fibroid produces pure menorrhagia, it is quite justifiable in such a case to use x rays, as mentioned in the preceding section.

CONCLUSIONS.

1. In cases where the patient is over 40 years of age and suffering from irregular haemorrhage without a gross pathological lesion, the production of an artificial menopause by means of radium is the treatment of choice if drugs fail.

2. The optimum dose of radium seems to be 50 mg. of the element screened with not less than 0.5 mm. of platinum and kept in the uterine cavity for forty-eight hours.

3. In cases where the patient is over 40 years of age and suffering from pure menorrhagia without any gross pathological lesion, x rays should be considered as an alternative method of producing an artificial menopause.

4. In young women, where other treatment has failed to cure the symptom of uterine haemorrhage or menorrhagia, radium has been used successfully to cure this symptom, but there is a risk of permanent amenorrhoea and severe menopausal symptoms, which perhaps makes subtotal hysterectomy preferable in the majority of cases.

AFTER-EFFECTS OF INTRAUTERINE RADIUM FOR THE PRODUCTION OF ARTIFICIAL MENOPAUSE.

Report of an Investigation.

BY

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THE present investigation was undertaken at the suggestion of Dr. Malcolm Donaldson in order to obtain definite figures for the degree of success of the primary objective—that is, the production of amenorrhoea—and also to gain some idea of the nature of the sequelae, such as menopausal symptoms. The cases in the series were all treated in the gynaecological department of St. Bartholomew's Hospital during the years 1925 to 1929 inclusive, under the care of Dr. J. Barris, Dr. M. Donaldson, and Dr. W. Shaw, to all of whom I offer thanks for permitting me to have access to the notes. Essentially the type of case treated was that in which there was excessive or irregular uterine haemorrhage with no gross abnormality detectable on visual and bimanual examination under anaesthesia. The majority of women treated were near the menopause. A small proportion were women of under 40 years of age suffering from menorrhagia, and one patient was treated for dysmenorrhoea. In no case was there found any evidence of malignant disease.

TECHNIQUE.

With the patient anaesthetized and in the lithotomy position the vagina and cervix were first inspected, and then a careful bimanual examination was made. The cervix was then dilated, and curettage for section performed. The radium in its container was then inserted, and kept in position by gauze packed into the vagina.

The dosage usually given was 50 mg. element screened by a minimum of 0.5 mm. thickness of platinum, and kept in position for seventy-two hours; in other words, a dosage of 3,600 mg. hours. Of the 97 patients forming the present series, 53 received this amount, but 1 patient received as little as 480 mg. hours, and 3 as much as 7,200. The dosage in the remainder fell between these limits. The ages of the patients ranged from 20 upwards; 3 were in the twenties, 14 in the thirties, 57 in the forties, 22 in the fifties, and 1 was in the sixties.

The actual number of patients treated was 122, but of these only 97 were traced; each of these received a questionnaire accompanied by a letter suggesting that she should consult her doctor if she had any difficulty in making out the answers. It was hoped in this way to minimize inaccuracies. The questionnaire was as follows:

- A. Have you had any bleeding or monthly period since your radium treatment?
If so, When did it start?
When did it finish?
How often did it occur?
Give dates if possible.
- B. How do you feel in yourself?
Do you feel better or worse since your radium treatment?
Do you feel the same as before your radium treatment?
- C. Have you had any "hot flushes" since your treatment?
If so, how often did they occur?
How long ago did they end?
- D. Have you had any sweating?
How long do the sweats last?
- E. Have you suffered from depression since the treatment?
If so, for how long?
- F. Are you more cheerful?
Are you more irritable?
Are you more depressed?
- G. Have you put on weight or lost it since your treatment?
- H. Have you had any pain since your treatment?
If so, where was the pain?
- I. Have your relations with your husband altered since the treatment?
If so, how?
- K. Have you had other trouble since the treatment, such as discharge (such as whites), pregnancy, indigestion, headache, nerves?

The following is an analysis of the replies.

Question A.

All the patients answered this question, 47 reporting no bleeding at all following the treatment, and 50 some