

primary growth and secondary mass disappeared, so that, at the end of the twelve months, no growth could be discovered—just a normal sized uterus and cervix, somewhat fixed to the left side of the pelvis with scar tissue; her general health was much improved, and she was free from pain. Unfortunately, this good result did not last long. Soon the pelvic mass re-formed, and continued to grow in spite of further applications of radium. The bladder and rectum became involved, and the patient died at the end of the second year from my first seeing her. The net benefit was probably one year's extra life, and I do not think the final stage was so distressing as is often the case.

Since that time Dr. Burrows has treated a large number of my cases of carcinoma of the cervix with radium. A large percentage of these cases showed a marked improvement with the treatment, in many the disease had apparently disappeared when the patient was examined two months after the application, but in only one case of mine has the improvement lasted more than one year. This is very disappointing. The initial improvement is, however, so marked that I still hope further experiments with different methods of application may lead to complete cure.

We must also remember that all these cases were far advanced and inoperable, probably better results would be obtained in early cases, but neither Dr. Burrows nor myself yet feel justified in treating early cases with radium alone.

The one exception I mentioned above was seen by me in March, 1918, and then had carcinoma of the cervix which was quite inoperable. Radium was applied in the Christie Hospital in 1918, 1919, and 1920. She was 47 years of age when first seen, and since the last application has been quite free from haemorrhage. I last saw her in May, 1921, and found the cervix quite smooth and with no trace of friability.

Wertheim's Hysterectomy after Radium.

In November, 1916, I was asked to see a patient with Dr. Christie of Longsight. She was 45 years of age, had not passed the menopause, but had had excessive haemorrhage for six months. We found that she had a large friable carcinoma of the cervix extending on to the vaginal walls. At that time I was advising Wertheim's operation in all cases where operation was possible, but this case was far too advanced for me to attempt operation. Dr. Burrows treated her with radium in December, 1916, and in February, 1917, we again examined her. The result was excellent; the cervix had contracted to little above normal size, had lost all its friability, and, so far as we could tell, was not fixed. Apparently the case was now operable, and Dr. Burrows urged me to operate, as our previous experience led us to believe that while radium killed most of the malignant cells a few were left in the deep tissues which could not be reached with radium, and these would soon break into active growth. In March, 1917, I did an extensive Wertheim's hysterectomy and found it more difficult than I had expected. What had been new growth previously had contracted into hard, cartilaginous tissue from which the ureters could only be dissected with great difficulty. This I subsequently found to occur in all cases treated with radium, and difficult as an ordinary Wertheim operation is, the difficulties in these late cases treated with radium are increased tenfold. For this reason I have had to abandon several subsequent operations, as I found it impossible to dissect out the ureters. In this first case I was able to complete the operation and remove all the sclerosed tissue.

I have seen this patient at intervals since the operation, and to-day, over four years since my first examination, she is very fit and well, putting on weight, doing her housework, and during her last summer holiday walked seven miles on each of four consecutive days. Since that time I have operated upon 10 cases which were far too advanced for operation, and I have had only two deaths from the operation, though it is very much more difficult and severe than an ordinary Wertheim operation in an early case. In 5 other cases, however, I have had to abandon the operation owing to the impossibility of separating the ureters.

Of the 8 cases which recovered from the operation, 5 are well to-day, one four years and another three and a half years after the operation. In 3 recurrence has taken

place. One of the patients had malignant cells in one of the iliac glands, though the cervix showed none on microscopical examination, the growth in the cervix having been entirely killed by the radium, and this patient is very well—two years after the operation. In fact, when I saw her three months ago she had become so stout I did not recognize her, and yet two years ago she was a thin, poor woman obviously dying from cancer.

We must remember that all these cases were too far advanced for operation when first seen, but radium made operation possible, though with this alone recurrence would probably have occurred within one year. So impressed have I been with these results of the combination of radium and operation that I now never operate upon any case of carcinoma of the cervix without a preliminary application of radium. I operate one week after the application of radium and find the tissues have not been sclerosed in this short interval, and so the difficulties of the operation are not increased and the patient has the benefit of both treatments.

Whether in the future new methods of application will make it possible to cure cancer of the cervix by radium alone and to discard this very severe operation of Wertheim's hysterectomy, time alone will show. I sincerely hope it will be so, but the time is not yet. At the present time the best hope of complete cure of cancer of the cervix lies in the combination of radium with Wertheim's hysterectomy.

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THE RADICAL ABDOMINAL OPERATION FOR CARCINOMA OF THE CERVIX.

RESULT OF ONE HUNDRED CASES BASED UPON FIVE YEARS' FREEDOM FROM RECURRENCE.

BY

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In the BRITISH MEDICAL JOURNAL for September 30th, 1916, my colleague Comyns Berkeley and myself published the results of our first one hundred radical abdominal operations for carcinoma of the cervix (Wertheim's operation) reckoned on the basis of five years' freedom from recurrence. Of the 100 operations performed between April, 1907, and September, 1911, 51 were done by Berkeley and 49 by me. Between April, 1907, and July, 1915, I myself performed the operation 100 times, and by keeping in touch with the recovered cases was by July, 1920, in a position to review my results on the basis of five years' freedom from recurrence. In the manner of setting forth these results I am following the general plan of the paper written jointly by my colleague and myself in 1916, so that comparison of the results of the two series of cases can be more easily made, and the further to facilitate this I have contrasted the figures in parallel columns in the tables.

The Character of the Operation.

The operation performed has been the most thorough possible, for with the uterus and its appendages have been removed in all the cases the upper half or two-thirds of the vagina, the parametric and paravaginal tissue out to the pelvic side wall and down to the levatores ani and the glands in the obturator fossae and along the iliac vessels.

The Cases Operated On.

Every case has been operated on in which there appeared any chance, however small, of removing the growth, and amongst the patients were many who had been dismissed from other hospitals as inoperable. This policy, which has been steadfastly pursued by my colleague and myself since we took up the operation, is naturally followed in a number of cases by the necessity of closing

the abdomen on account of the growth proving on inspection to be absolutely untouchable, while in others, though the removal is effected, yet the operator is, so to speak, "riding for a fall"; on the other hand, a certain number of great triumphs are obtained which, in our opinion, outweigh all the failures.

Keeping in Touch with the Recovered Cases.

I have been exceedingly successful in keeping in touch with the patients, only 4 out of the 80 recovered cases having been lost sight of. Every patient has been written to at least once a year, and experience shows that, in order to allow of this to be done, not merely should the name and address of the woman be taken, but the names and addresses of at least two of her relatives, so that in the event of her moving and not notifying her change of address, her relatives can be applied to as to her whereabouts.

The Result in 100 Cases.

The results obtained are shown in the following table. The figures in brackets are those of the joint series published by Berkeley and myself in 1916, and are inserted here for comparison.

Died of the operation...	...	...	20	...	(20)
Died of recurrent growth	...	...	33	...	(32)
Died of other disease	...	...	3	...	(2)
Lost sight of	...	...	4	...	(7)
Well after five years	...	...	40	...	(39)
			100	...	(100)

It will be seen that the results of the two series are closely similar. Under the head "Died of the operation" is included every case of death due to the operation, whether occurring in the first few days or after an interval of several weeks. Post-operative sepsis and shock are the commonest causes of death.

Cases with Glandular Involvement.

In every case the regional glands removed at the operation were microscopically examined; in 38 cases they were found to be malignant. This is a larger figure than in the conjoint series, in which 35 cases were found to be carcinomatous. As might be expected, these 38 cases show a much higher operative mortality and a much greater percentage of recurrences than do the 62 cases in which the regional glands were not malignant, but nevertheless a certain proportion of them were alive and well five years or more after the operation.

Table of Cases in which the Regional Glands were and were not Carcinomatous.

	Glands carcinomatous.	Glands not carcinomatous.
Died of the operation	9 (9)	11 (11)
Died of recurrent growth	17 (16)	17 (16)
Died of other disease	1 (1)	2 (1)
Lost sight of	2 (2)	1 (5)
Well 5 or more years after	9 (7)	31 (32)
	38 (35)	62 (65)

The corresponding figures for the conjoint series are placed in brackets for comparison.

Again the similarity between the results of the conjoint and the present series will be noticed. The important fact that secondary carcinomatous deposit in the regional glands may exist at the time of the operation and yet a good result be obtained is very strikingly shown, and establishes the correctness of the opinion expressed by my colleague and myself in our joint paper, that carcinomatosis of the regional glands *per se* does not contraindicate the operation, and that as it is impossible, except by the microscope, to be sure of the condition of the glands, their removal should be part of the routine of the operation in every case.

Recurrences.

Death from recurrence occurred in 33 cases.

Table showing Dates of Recurrence.

Within 2 years	...	15	...	(15)
Between 2 and 3 years	...	12	...	(10)
Between 3 and 4 years	...	3	...	(1)
Between 4 and 5 years	...	3	...	(6)
		33	...	(32)

The figures in brackets are those for the conjoint series.

There is again a general similarity between the results of the present and those of the conjoint series, the principal difference being in the number of late recurrences. In either, more than three-fourths of the recurrences take place within three years of the operation.

As in the first series so in the present the seat of early recurrence is usually in the vagina, of late recurrence higher up in the pelvis or abdomen. General cancerous metastasis practically never occurs, but recurrent growth may develop in the bony pelvis, or lumbo-sacral spine.

Deaths from other Disease.

Of the three cases that died of disease other than carcinoma one succumbed to pulmonary tuberculosis which she had at the time she was operated on, one died of acute urinary sepsis following an operation for repair of a vesical fistula undertaken a year after the radical operation, and one died suddenly of angina pectoris over three years after the operation. The two first cases are included in the joint series.

Cases Lost Sight of.

Four patients were lost sight of, one at the end of one year, two at the end of two years, and one at the end of three years. They were all well when last heard of.

Cases Well after Five Years and the Question of Absolute Cure.

The patients who remained well after five years numbered 40. The first was operated on in March, 1908, and the last in February, 1915, and the others intermediately between these dates.

In the paper written by Berkeley and myself reporting the results of our first 100 operations we followed Wertheim in considering five years' freedom from recurrence as "absolute cure." Experience has shown that this is not justified, and that a small proportion of recurrences, probably about 5 per cent. of the total number, do occur after five years.

Thus, in the present series, two of the patients who passed the five years limit subsequently developed secondary growths. In one the growth recurred in the abdomen in the sixth year, and she died six and a half years after operation. It was a columnar-cell carcinoma, and the glands removed at the operation were not carcinomatous. In the other the growth recurred in the abdomen in the sixth year, and she lingered on to die nearly seven years after the operation. It was a squamous-cell carcinoma, and the glands removed at the operation were carcinomatous.

An absolute cure should not therefore be claimed for anything under seven years' freedom from recurrence. It is of course possible for secondary growth to appear even later than this; but practically it is so rare that a patient who has survived that time may be regarded as surely cured, whereas after five years, though she is probably cured, there still remains an appreciable chance of the disease reappearing.

Operability Rate and Actual Achievement.

To appraise correctly the results actually achieved by a series of radical operations for cancer of the cervix it is necessary to know the surgeon's operability rate—that is, the number of patients operated on out of every unselected 100 presenting themselves for treatment at the institution at which he works and in his private practice, for it is obvious that no comparison of results founded on the mere enumeration of operative deaths, recurrences, and cures can be made between the performance of one surgeon who practises a restricted operation on carefully selected early growths and another who carries out a drastic procedure on every case in which there is possibility of removal.

My colleague and myself, in our paper in 1916, estimated our operability rate as being 63.5 per cent., on grounds which do not need repetition here as we fully discussed them then. The 100 cases with which this paper is concerned represent, therefore, a selection out of 160 cases originally presenting themselves for treatment.

On the Continent various formulae have been used to express the late results and actual accomplishment of this operation, but in our joint paper my colleague and I adopted a more explanatory method which I shall repeat here.

Out of 100 patients operated upon, 40 have lived five or more years free from recurrence. If from the 100 cases operated upon the 4 cases lost sight of be subtracted, then of the 96 cases operated on whose subsequent fate could be followed up, 41.6 per cent. have lived five or more years free of recurrence. And if, in addition the 3 cases be subtracted that died of disease other than carcinoma, then of 93 cases operated on in whom it has been possible to follow up the outcome of the carcinoma, 42.3 per cent. have lived five or more years free of recurrence.

Again, the number of patients that recovered from the operation is 80, and of these 40—that is to say, 50 per cent.—have lived five or more years free of recurrence. If from these 80 recovered cases the 4 lost sight of be subtracted, then of 76 recovered cases whose after-history could be followed, 52.3 per cent. have lived five or more years free of recurrence. If, in addition, the three cases that died of disease other than carcinoma be subtracted, then of 73 recovered cases in whom it has been possible to follow up the outcome of the carcinoma, 54.8 per cent. have lived five years or more free of recurrence.

Further, it will be seen that of the 160 cases originally presenting themselves for treatment 40, that is to say 25 per cent., have by reason of the operation lived for five or more years. If from these 160 cases the 4 cases lost sight of be subtracted, then of 156 patients originally presenting themselves whose subsequent fate could be followed up 25.6 per cent. have by reason of the operation lived five years or more free of recurrence. And if, in addition, the 3 cases that died of disease other than carcinoma be subtracted, then of 153 patients originally presenting themselves in whom it has been possible to follow up the outcome of the carcinoma, 26.1 per cent. have by reason of the operation lived five or more years free of recurrence.

Prolongation of Life in Patients Recovering from the Operation.

It was shown by Archibald Leitch, from a study of over 1,000 cases, and independently confirmed by MacCormac, both working in the Cancer Research Department of the Middlesex Hospital, that in patients not operated upon the average duration of life from the onset of symptoms to death is one year and nine months. Berkeley and I found that patients presenting themselves for treatment for the first time, and suitable for operation, had on an average had symptoms for six months. The life expectation of these women therefore is on an average one year and three months. It may therefore with confidence be assumed that where a patient survives the operation three years or over her life has been prolonged by the operation.

On this basis it will be seen that out of the 80 cases of this series that recovered from the operation 48, or 60 per cent., had their life prolonged as the result of the operation, namely:

Prolongation of Life by Operation.

Well cases	38	(39)
Recurrent cases	8	(7)
Case that died of intercurrent disease	1	(0)
Cases lost sight of	1	(3)
	48	(49)

The figures in the brackets are those of the joint series.

A Review of the Operation.

To put it briefly, a surgeon undertaking a series of these operations performed in the manner of my colleague and myself as described elsewhere, and carried out on every case in which there appears a possibility of removing the growth, may expect, if his operative mortality is the same as that of this series—namely, 20 per cent.—that 25 per cent. of the patients originally presenting themselves for treatment unselected, 40 per cent. of those operated on, and 50 per cent. of those recovering from the operation, will be alive and well five years after the operation. Further, he may expect that of these about 5 per cent. will succumb to recurrence within the next two years, after which period those surviving may for practical purposes be reckoned as cured.

Such results would be exceedingly successful for carcinoma in any situation, and are remarkable beyond expectation when the anatomical difficulties that beset the operation are borne in mind. It is but justice to the

late Professor Wertheim to point out that the results of the two series absolutely confirm all the claims he made for the operation of which he was the principal pioneer from 1898 onwards.

It seems extraordinary at first sight that twenty-three years should be required to establish the value of a surgical procedure, and that even now there should be many who look askance at the operation, and others who are stated to be disappointed with its results, or even to have abandoned its practice altogether. In explanation it is to be remembered that before any individual surgeon can accumulate sufficient personal experience to form his own judgement many years must elapse (thirteen years in the case of the present series), during which he must maintain a very painstaking record of the after-fate of his patients. Many surgeons will not be troubled to do this, and as a result the successful cases drift away from them and are lost sight of, and all they see are the patients who come up to them with recurrence, a disheartening procession.

But a more important reason than this is the fact that Wertheim's operation is not, and never can become, an operation for the general. The most difficult operation in surgery, its successful practice can only be achieved by learning how to do it. Those of us who took it up years ago had no firmer basis on which to begin than the written description of the operation as practised by its deviser, and improvement could only be obtained by self-teaching. Those who come after have an easier road to travel, for the technique is established down to those minute details which count so much in success. But even so the operation cannot be learned without much practice, thought, and time, and it must be regretfully admitted that there are some who can neither teach themselves nor learn from others.

The Operative Mortality and its Reduction of Recent Years.

The chief objection to the operation that has stuck in the throat of surgeons in this country is its high mortality in the past. Whether this objection is well founded in the case of a disease whose mortality untreated is 100 per cent. I shall not discuss, but there can be no doubt that a high death rate is most disheartening to a surgeon, and so burdens him with repeated anxieties and disappointments that he may lose his moral courage, and resort to picking and choosing for operation those cases in which recovery seems fairly assured, or else practise a restricted operation only applicable to quite early growths.

My colleague and I have greatly lowered our operative mortality of recent years by other means, thus:

Operation Mortality.

Death rate of the operation in our first joint 100 cases	20 per cent.
Death rate of the operation in the present series	20 "
Death rate in the last 100 cases performed by Berkeley	14 "
Death rate in the last 100 cases performed by Bonney	13 "
Death rate in the last 200 cases jointly performed	13.5 "
Death rate in the last 50 cases performed by Berkeley	8 "
Death rate in the last 50 cases performed by Bonney	10 "
Death rate in the last 100 cases jointly performed	9 "
Death rate in the last 50 cases jointly performed	6 "

This improvement is due to four factors: (1) spinal anaesthesia, (2) the use of "violet green" to sterilize the vagina, (3) suturing the vagina, and (4) increased operative dexterity.

We employ spinal anaesthesia to block shock impulses and to produce relaxation of the abdominal wall, whereby the operation is immensely facilitated, but the patient is under full inhalation anaesthesia as well.

Sterilization of the vagina by "violet green" has reduced in a remarkable way the number of cases of severe post-operative sepsis. The vagina is packed with gauze soaked in it immediately before the abdomen is opened.

In our earlier cases we always left the cut end of the vagina open for drainage, but since Mr. Thring of Sydney told us that he found the patients did better if it was

closed we have done likewise, and found that he was quite right.

Increased operative dexterity comes with practice, and after an experience of between 400 and 500 cases we naturally have learnt many little technical "tips," difficult to put into words but apparent enough in practice. The net result is lighter handling of the tissues, less damage to adjacent structures, less bleeding, and greater quickness. All but the very difficult operations are finished under an hour, and some under three-quarters of an hour, and this year I did one exceptionally easy case in thirty minutes.

The Future of the Operation.

Until some means of treating operable carcinoma of the cervix is found which will cure more than 35 per cent. of the patients, surgical extirpation will remain the proper treatment for operable cases.

Radium has not fulfilled the high hopes founded on it. It appears to cure occasional cases, but so would a red-hot poker vigorously applied. In certain quarters an improved appliance for x-ray radiation has been boomed; so were mesothorium and radium some years ago. Those of us who have had the handling and the seeing of the actual conditions that obtain in carcinoma of the cervix must be pardoned if at present these alternative methods of treatment leave us cold.

A review on the basis of five years' freedom from recurrence of not less than 100 cases treated in this country must be to hand before the results of any new method of treatment can be critically compared with the results of surgery, and the obtaining of such will require about seven years; until then, at all events, Wertheim's operation will hold the field.

Its successful results which this paper records are not its utmost achievement; improved technique and experience will better them. It is probable, however, that the advance will be more in the direction of lowered operative mortality, and prolongation of life rather than absolute cure, for it must be remembered that most of the deaths due to the operation occur in the cases of advanced growth or border-line operability, so that the "cure-expectation" rate of the lives gained by reducing the operative death rate from, say, 20 to 6 per cent. will not be great. At a hazard I should say that 4 survivals at the end of five years out of the 14 cases would be all one could expect. That the scope of the operation can be extended to growths more advanced than those now dealt with I do not believe. It has reached its limit in this direction.

THE MODERN OPERATION FOR CANCER OF THE BREAST.*

BY

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EXETER.

WHEN one turns one's thoughts back to the form of operation that was performed for cancer of the breast in my student days and contrasts it with any of the operations which are now undertaken for this condition, the immensity of the change is very striking. In the days of my house-surgeoncies an elliptical incision, made chiefly with the view of securing an easy coaptation of flaps, sufficed. These incisions were enlarged around the tumour until the pectoral fascia was reached and then the breast was removed; many operators advised tearing it from the underlying tissues since this method led to less haemorrhage. There was never any idea of removing any axillary glands, still less of a formal dissection of the axilla. These were almost pre-antiseptic days, and the usual result was that shortly after the operation the wound had become a big abscess which slowly healed up.

Mitchell Banks of Liverpool was an early advocate of an extended operation, and it was he who pointed out how much better flaps might be obtained by "lateralizing" the scalpel used. It was Halstead, however, who first advocated and practised an operation which included removal of the greater part of the pectoral muscles and a complete clearance of the axilla; this operation, he stated,

* A paper read before the Exeter Division of the British Medical Association on November 18th, 1921.

he could complete in favourable cases in an hour and three-quarters, the time being longer in more difficult cases. Harold Stiles of Edinburgh did much to develop and improve Halstead's technique. It is taken for granted nowadays that no surgeon has done his best by a case of cancer of the breast who has not removed the greater part of the pectoralis major, the pectoralis minor and the axillary contents. The discussion of how best to carry out these objects is what I wish to lay before you this afternoon.

Certain fundamentals must be at once laid down: (1) No longer time than is essential should be spent; the shock of an operation of such magnitude is necessarily severe, and should not be increased by using any but the quickest method compatible with effectual removal of the disease. (2) Outside the question of time every other means should be taken to obviate shock. (3) Every possible precaution should be taken to prevent any risk of infecting divided tissues during the course of the operation. (4) A complete removal must be carried out of the disease itself with a wide margin of surrounding tissues liable to infection, of the proximal lymphatic area, and of the corresponding lymph glands.

The Question of Time.

The observance of certain points will save time.

(a) Free and complete access to the axilla, so that no time may be lost in the thorough clearing of its lymphatic glands and tissues. Lockwood pointed out that it is impossible to clear the glands surrounding the axillary vein unless the pectoral muscles are divided. The time spent over this can be vastly shortened by completely turning back the tissues constituting the anterior axillary wall before the dissection is commenced.

(b) The provision of instruments calculated to help in performing the axillary dissection as rapidly and cleanly as possible. Kelly's comb greatly shortens this process.

(c) Avoidance of having repeatedly to arrest bleeding from the same vessels owing to re-dividing them; that is to say, the vessels supplying the organ should at once be divided as near their sources as the incisions allow.

(d) Lower flaps should be made first so as to avoid delay due to blood from higher flaps and incisions having to be frequently wiped away.

(e) An ample supply of pressure forceps should be available so that none should have to be tied and twisted off simply because they are wanted again; four dozen is by no means an excessive number to provide.

Shock other than that Due to Time.

This raises again the point just referred to of rapid haemostasis, but beyond this there is much to be done to minimize the shock due to so large a mutilation.

(a) Every effort must be made to keep the patient warm. In the first place a suitably cut mackintosh is wanted which will prevent loss of body heat, except at the part actually exposed for operation. The corresponding arm should be warmly wrapped up.

(b) If it can be shown that some part of the operation is necessarily slower than another, and especially if it only involves a comparatively small part of the total operation, that part should be performed first so as to avoid a prolonged exposure of the larger portion of the wound. Further, should it be shown that such a proceeding is possible, the rest of the exposed area should be carefully kept warm until the latest moment.

(c) I submit that the dissection of the axilla and the amputation of the breast practically constitute two separate operations. It is, of course, assumed that all the ordinary methods of protecting patients from shock during operation will be carried out.

Infection of Divided Tissues.

There are three chief means by which this may be reduced to the minimum:

(a) Planning incisions and flaps so as to leave a wide margin round the original growth.

(b) Avoiding any incisions or dissections which invade the line of tissue-bearing lymphatics running from the growth to the axilla, and so open lymphatic vessels which may contain malignant cells.

(c) Avoiding manipulations which may tend to push on towards the axilla any malignant cells which may already have entered lymphatic vessels.