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CARCINOMA OF THE BREAST*

I—RESULTS OF TREATMENT

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AMONG most of those who deal with carcinoma of the breast today, there has been a sobering realization that the high hopes of the curative value of radiation that were held a decade or more ago have not been fulfilled. We face the fact that we must turn back to surgical removal of the disease, try to choose our cases for radical mastectomy with more exactitude, and perform the operation with more skill. In this task many factors of clinical and pathological judgment play a part, and our primary need is for more and better data upon which to base our decisions. It is with this end in view that we present the data regarding the treatment of carcinoma of the female breast at the Presbyterian Hospital in New York over a 20-year period, from 1915 to 1934, inclusive.

These data have several advantages. The number of cases is fairly large, totaling 1040. The unit records of these cases have been kept with comparative completeness. Most of them include clinical photographs. Dr. Hugh Auchincloss, who has had a special interest in this group of cases, made careful descriptions of the clinical findings, and sketches in many cases. The histologic study of the tissues removed has been carried out with thoroughness. Finally, the follow-up has been fairly complete.

The Method of Analysis: In studying this material we have utilized a method which we believe is specially advantageous when a detailed analysis of a large number of cases has to be made, namely, the punch-card method. We have been fortunate in having the advice and assistance of Miss Dorothy Kurtz, Supervisor of the Presbyterian Hospital Record Room, an authority on the use of the punch-card method in medical problems.

A special summary sheet listing some 700 different items to which reference might be made was first drawn up, and mimeographed. The data from the individual case histories were then carefully transferred to these summary sheets. Where contradictory clinical findings were found recorded, as sometimes happened, they were studied critically and the truth determined as well as possible by checking the descriptions against

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the photographs, *etc.* Cards were finally punched from the summary sheets, and these cards sorted in the tabulating machine to determine the correlations in which we were interested.

In this way it is not only possible to work out the correlations between any number of different factors with ease, but the findings can be checked and counterchecked in a way that is scarcely possible by hand sorting and arithmetic. Our experience with the punch-card method leads us to recommend it strongly to all who wish to analyze extensive and complex medical data.

In this first communication we propose to present the basic facts about carcinoma of the female breast which the study has revealed. They are recorded for what they are worth, without comparison with the findings of others, because the variables influencing statistics as they have been computed in the past are so numerous and so dependent upon human emotions that in regard to this subject comparisons are indeed odious. The few comments which we have made express our own opinions, and not necessarily those of the other members of the staff of our institution. In future studies we shall discuss certain phases of the subject in greater detail, such as the criteria governing our choice of treatment, the relationship of histopathology to prognosis, *etc.*

The Data.—The records of all women with proved or presumed carcinoma of the breast coming to the Presbyterian Hospital between the years 1915 and 1934, inclusive, were included (Table I).

TABLE I

CARCINOMA OF THE FEMALE MAMMARY GLAND

Presbyterian Hospital (1915 *to* 1934, *inclusive*)

Total number of patients applying for treatment	1040
I—Patients examined in Out-Patient Department and turned away, detailed unit records not made	54
II—Patients accepted for study and detailed unit records made	986
A—Previously treated elsewhere	110
B—Primary cases	873
1—Private cases	253
2—Ward cases	626

Presenting Symptoms.—There are some features of interest regarding the symptomatology which led these patients to seek medical aid. Table II lists the presenting symptoms in the ward cases. Private cases have not been included because their histories were often less complete than those of ward patients.

The fact that in 6.6 per cent of these patients an unsuspected carcinoma was discovered in the course of a routine physical examination, made when the patient came for symptoms elsewhere than in the breast, is striking proof of the value of careful and complete physical examination of every patient.

The infrequency of pain as the presenting symptom of breast carcinoma is well known. Only 1.6 per cent of our patients sought medical aid because of pain.

TABLE II

PRESENTING SYMPTOMS IN PRIMARY WARD CASES

Total number primary ward cases	623	
Manner of diagnosis not stated	14, or	2.2%
Came to hospital complaining of symptoms elsewhere than in breast. Breast carcinoma discovered during routine physical examination	41, or	6.6%
Came to hospital complaining of symptoms in breast	568, or	91.2%
Complained of tumor in breast	536	
Complained of other breast symptoms	32	
Erosion of nipple	13	
Pain in breast	9	
Retraction of nipple	8	
Enlargement of breast	8	
Discharge from nipple	6	
Itching or burning of nipple	4	
Redness of skin over breast	3	
Generalized hardness of breast	2	
Shrinkage of breast	1	

Disposition of Cases.—The disposition of the 986 cases studied by us is shown in Table III.

TABLE III

DISPOSITION OF CASES

I—Patients previously treated elsewhere	110
A—No further treatment by surgery or radiation	60
B—Further treatment by radiation	35
C—Further treatment by surgery	15
1—Palliative limited operation	3
2—Radical mastectomy	12
II—Primary cases	876
A—Not treated by surgery or radiation	119
B—Treated by radiation only	71
C—Treated principally or exclusively by surgery	686
1—Palliative limited operation	46
2—Radical mastectomy	640

It is upon this group of primary cases that we will focus our attention. The patients who had received treatment elsewhere before coming to the Presbyterian Hospital do not merit further discussion, for, in most instances, we have no exact description of the kind of treatment they had. Moreover, the number in which it seemed wise to do anything further was so small that the end-results in the group have no statistical significance.

Operability.—It is customary to refer to the proportion of cases in which radical mastectomy is performed as the operability rate. This may be calculated in either of two ways, as follows: (1) *Relative* operability (the number of cases in which radical operation was done divided by the number of primary cases accepted in the clinic, or 640 divided by 876) 73.1%. (2) *Absolute* operability (the number of cases in which radical operation was done divided by the total number of cases of all types seen in the clinic, or 640 divided by 1040) 61.5%.

The latter figure is distorted to some extent by the fact that it contains a number of the patients who shop around from one hospital to another when their disease recurs and becomes incurable. Yet, it has the advantage of including all of the hopelessly advanced cases who are turned away without a detailed examination, and for this reason more closely approximates the

true limitations of surgery in the disease. Expressed on this so-called absolute basis our operability rate is seen to be low.

There was a total of 236 primary cases in our series in which radical operation was not done. The reasons for this are detailed in Table IV.

TABLE IV

CLASSIFICATION OF PRIMARY CASES *Not* TREATED BY RADICAL MASTECTOMY

I—Constitutionally inoperable	28
(13 of these also inoperable because of extent of carcinoma)	
II—Inoperable because of extent of carcinoma	133
III—Refused radical mastectomy	59
IV—Died of intercurrent disease before radical operation could be carried out	1
V—Referred elsewhere because of lack of accommodations	3
VI—Failed to return to Clinic	2
VII—Carcinoma mistaken for a benign lesion and radical mastectomy not done	10
Total	236

The question of the criteria of operability for breast carcinoma is such a complex one that we shall not discuss it further here, but will make it the subject of a separate paper.

Follow-Up.—The course of the disease in these patients was followed in the Out-Patient Department by the various attending surgeons who were responsible for their care. A carefully planned follow-up system has long been a feature of the organization of the Department of Surgery of the Presbyterian Hospital, and all patients with malignant tumors who are accepted for treatment are followed for the remainder of their lives. With ward patients this system has proved very satisfactory—417 of the total 422 ward patients with primary breast carcinoma treated by radical mastectomy were followed until they died, or for a minimal period of five years after operation. This follow-up percentage of 98.8 per cent is, we believe, a good record for work done in a large city such as New York, where the poor change their residence frequently.

With private patients the initiative for the follow-up is left to the attending surgeon, and it is an unfortunate fact that they have not done very well in the matter. Only 182, or 83.5 per cent, of the total of 218 private patients with primary breast carcinoma treated by radical mastectomy were followed until death or for a minimal period of five years. It should be stated that most of these failures in the follow-up occurred some years ago, in the practice of surgeons now retired from the hospital staff.

Of the whole group of 640 primary cases treated by radical mastectomy, including both private and ward patients, 599, or 93.6 per cent, were followed until death, or for the minimal five-year period.

Results of Radical Mastectomy.—We have tried to make our presentation of the results of radical mastectomy in this series of cases as complete as possible. Throughout all of the tables in which the correlations of results with a variety of different factors are considered, we have presented the local recurrence rate in the field of operation as well as the clinical cure rate. Both of these computations have been made on the basis of five-year

results. When local recurrence, metastasis, or death occurred later than five years after operation, as has been the case in a small percentage of patients, we have, nevertheless, counted these cases as five-year clinical cures. We have also presented the five-year survival rate following radical mastectomy. This group includes not only the patients who are still well but those who survive with known carcinoma at the end of five years.

We have chosen the term *"five-year clinical cure"* to designate the group of patients who did not develop any further evidence of cancer during the five-year period following treatment, because it describes this group more accurately than any other word or phrase. The phrase "five-year cure rate" has become common parlance among those who present cancer statistics, because it is shorter and grammatically more adaptable than the phrase "percentage of patients well at the end of five years." None of these phrases imply, of course, that permanent cures have been obtained. We have added the adjective "clinical" to the phrase "five-year cure" merely to indicate our awareness of this fact.

Table V shows the results in the total series of ward and private cases treated by radical mastectomy.

TABLE V

FIVE-YEAR RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES

I—Number of radical mastectomies	640	
II—Operative deaths	20, or	3.1%
III—Lost track of before 5 years	41, or	6.4%
IV—Died of unknown cause before 5 years	13, or	2.0%
V—Died of intercurrent disease before 5 years, without evidence of recurrence of carcinoma	12, or	1.9%
VI—Died of breast carcinoma before 5 years	290, or	45.3%
VII—Alive, with recurrence 5 years after operation	33, or	5.2%
VIII—Alive, without recurrence 5 years after operation	231, or	36.1%

THESE RESULTS MAY BE EXPRESSED IN TERMS OF RELATIVE AND ABSOLUTE CURE AND SURVIVAL RATES, AS FOLLOWS:

Relative 5-year clinical cure rate (5-year clinical cures ÷ number radical mastectomies, or 231 ÷ 640) =	36.1%
Absolute 5-year clinical cure rate (5-year clinical cures ÷ total number patients seen, or 231 ÷ 1040 =	22.2%
Relative 5-year survival rate (5-year survivals ÷ number radical mastectomies, or 264 ÷ 640) =	41.3%
Absolute 5-year survival rate (5-year survivals ÷ total number patients seen, or 264 ÷ 1040) =	25.3%

The frequency and distribution of local recurrence and metastasis in the primary cases treated by radical mastectomy is shown in Table VI.

We know that if our information were complete regarding the clinical findings at death in all of the patients who succumbed, the frequency of both local recurrence and metastases would be found to be higher than our figures indicate. An effort was, indeed, made to follow all of our patients to the end, but in a considerable number this was impossible, either because death occurred in a distant place, or because the patient was bedridden at home for a long time before she died, or because death took place in a nursing home or hospital that could not provide us with complete clinical data.

Surgeons will do well to bear in mind the fact that the incidence of local recurrence in the field of operation continues to be distressingly high. At the end of five years after operation it was 22.8 per cent in this series. The

TABLE VI

FREQUENCY AND DISTRIBUTION OF LOCAL RECURRENCES AND METASTASES WITHIN FIVE YEARS FOLLOWING RADICAL MASTECTOMY IN PRIMARY CASES

I—Total number of radical mastectomies	640
II—Number known to develop local recurrence within 5 years after operation	146, or 22.8%
A—In the operative field on the chest wall	130, or 20.3%
B—In the homolateral axilla	42, or 6.6%
III—Number known to develop metastases within 5 years after operation	316, or 49.4%
A—In lung or pleura	138, or 21.6%
B—In bone	114, or 17.8%
C—In supraclavicular regions	89, or 13.9%
D—In liver or peritoneum	63, or 9.8%
E—In opposite breast	58, or 9.1%
F—In contralateral axilla	49, or 7.7%
G—In regional skin, or as *en cuirasse*	31, or 4.8%
H—Distant skin metastases	21, or 3.3%
I—In other sites	39, or 6.1%

obvious conclusion is that cases must be selected more carefully and the operation must be performed more thoroughly.

Types of Radical Mastectomy.—The 640 radical mastectomies in this series were performed by, or under the direction of, 36 different attending surgeons. This fact makes it difficult to classify the different types of operations that were undertaken, particularly since there was no general agreement among this group as to which type of operation is best. We have, nevertheless, divided the operations that were done into five groups, as follows:

I—*Mastectomy and Axillary Dissection:* The breast was removed first, not including the pectoral muscles. A limited axillary dissection was then done. This type of procedure was done only a few times, and usually in those cases where the patient's general condition was poor.

II—*Limited Radical Mastectomy:* The breast, pectoralis major, and axillary contents were removed in one piece, but the pectoralis minor was not removed.

III—*Radical Mastectomy—Breast and Axillary Contents Removed Separately:* In this operation the breast and pectoral muscles were removed first, and then the axillary contents dissected out separately. This was the method preferred by the late Dr. George E. Brewer, and one or two surgeons have continued to use it in the Presbyterian Hospital.

IV—*Radical Mastectomy—Skin Flaps Approximated Without Grafting:* This is the usual type of radical operation, both pectoral muscles being included and the tissues removed in one piece. The amount of skin removed was limited, however, by the necessity of bringing the flaps together.

V—*Radical Mastectomy—Wound Grafted:* This was a more radical procedure, particularly as regards the removal of skin and subcutaneous tissue on the chest wall. Either pinch or Thiersch grafts were used to cover the defect.

Unfortunately this series fails to provide any significant information regarding the superiority of the classical Halsted technic for radical mastectomy. Only one of the ten operators who performed more than 25 of the operations in this series carried out the classical Halsted procedure, with wide removal

of skin and subcutaneous tissue and immediate Thiersch grafting of the defect. This operator had a total of only 32 cases, and his results are, therefore, without statistical significance.

The results in the five different types of operations that we have described are shown in Table VII.

TABLE VII

RESULTS OF DIFFERENT TYPES OF RADICAL MASTECTOMY IN PRIMARY CASES

	Type of Operation	No. of Cases	Operative Deaths No.	Operative Deaths Per Cent	5-Year Local Recurrence No.	5-Year Local Recurrence Per Cent	5-Year Clinical Cures No.	5-Year Clinical Cures Per Cent
I.	Mastectomy and axillary dissect.	11	0	—	7	63.6%	2	18.2%
II.	Limited radical—pect. minor not removed	8	0	—	2	25.0%	3	37.5%
III	Radical—breast and axillary contents removed separately	53	1	1.9%	12	32.6%	21	39.6%
IV	Radical—skin flaps approximated, without grafting	401	14	3.5%	88	21.9%	140	34.9%
V	Radical—wound grafted	167	5	3.0%	37	22.2%	65	38.9%
	Totals	640	20, or	3.1%	146, or	22.8%	231, or	36.1%

There is surprisingly little difference in the local recurrence and clinical cure rates for the two different types of operation represented by enough cases to be of some significance, that is Types IV and V. We would warn the reader, however, against drawing any conclusions regarding operative methods from this evidence, for we believe that the technics of the many different surgeons who performed these operations varied so widely, even within the limits of the classification that we have made, that the evidence is of but little value.

A different kind of evidence regarding operative technic, and a kind which probably does have some real value, is that which concerns the length of time required for the operation. This is shown in Table VIII.

TABLE VIII

RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES ACCORDING TO LENGTH OF OPERATIONS

	Length of Operation in Minutes	No. of Cases	Operative Deaths No.	Operative Deaths Per Cent	5-Year Local Recurrence No.	5-Year Local Recurrence Per Cent	5-Year Clinical Cures No.	5-Year Clinical Cures Per Cent
I.	1 to 59 mins.	56	1	1.8%	13	23.2%	16	28.6%
II.	60 to 119 mins.	255	7	2.7%	51	20.0%	90	35.3%
III.	120 to 179 mins.	239	11	4.6%	58	24.3%	82	34.3%
IV.	180 to 239 mins.	71	0	—	21	29.6%	31	43.7%
V.	240 or more mins.	16	1	6.3%	2	12.5%	9	56.3%
	Time not stated	3	0	—	1	—	3	—
	Totals	640	20, or	3.1%	146, or	22.8%	231, or	36.1%

We must point out that the number of cases included in Group V, in which the operation lasted 240 minutes, or more, is so small that the differences in local recurrence and clinical cure rates between this group and other groups are not statistically significant. The difference in clinical cure rates between Group III and Group IV, however, is possibly indicative of true improvement in operative technic.

The operative mortality, in these data, shows a slight increase as the duration of the procedure is prolonged beyond two hours. This again, however, is a factor which depends more upon the technic of the individual

operator than upon the actual length of the operation. The operative mortality of 3.1 per cent which occurred in this series of cases as a whole, between 1915 and 1934, is certainly somewhat higher than we need anticipate with present-day surgical technic. If proper care is taken to avoid operative shock by gentle handling of the tissues, the use of sharp dissection rather than scraping, tearing, and ripping apart of the tissues, and avoidance of dehydration of the tissues by keeping them covered with moist towels and compresses, we know that four or five hours can be devoted to the performance of this operation without raising the operative mortality above one per cent. It is our personal belief that this length of time is, indeed, needed to carry out the extensive and meticulous dissection required in the Halsted type of radical mastectomy.

As evidence that the surgical staff of the Presbyterian Hospital, as a whole, is coming around to the point of view that the more meticulous type of radical mastectomy is worth doing, Table IX, showing the length of radical mastectomy according to five-year periods, is presented.

TABLE IX

LENGTH OF RADICAL MASTECTOMY IN PRIMARY CASES ACCORDING TO FIVE-YEAR PERIODS

Length of Operation	No. of Cases 1915 - 1919	No. of Cases 1920 - 1924	No. of Cases 1925 - 1929	No. of Case 1930 - 1934s
0 - 59 mins.	28	15	11	2
60 - 119 mins.	65	52	81	57
120 - 179 mins.	32	58	60	89
180 - 239 mins.	2	2	6	61
240 or more mins.	0	0	1	15
Time not stated	1	0	1	1
Totals	128	127	160	225

During the most recent five-year period, in which the length of time devoted to the operation has been increased, the clinical cure rate has shown a definite and rather striking rise, as indicated in Table X.

TABLE X

RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES ACCORDING TO FIVE-YEAR PERIODS

Five-Year Periods	No. of Operations	Operative Deaths No.	Operative Deaths Per Cent	5-Year Local Recurrence No.	5-Year Local Recurrence Per Cent	5-Year Clinica Cures No.	5-Year Clinica Cures Per Cent
I—1915-1919	128	3	2.3%	32	25.0%	34	26.6%
II—1920-1924	127	7	5.5%	24	18.9%	37	29.1%
III—1925-1929	160	8	5.0%	42	26.3%	53	33.1%
IV—1930-1934	225	2	0.9%	48	21.3%	107	47.6%
Totals	640	20, or	3.1%	146, or	22.8%	231, or	36.1%

It cannot be assumed that the steady improvement in the clinical cure rate over this 20-year period is entirely due to the fact that as time has gone by the operative attack has been progressively more thorough. The more careful selection of cases during recent years certainly has also played a part in this improvement in results. In a separate paper devoted to the question of operability we will discuss this matter of the selection of cases in detail.

Biopsy.—The question of the harmfulness of biopsy in breast carcinoma has been long debated. At the Presbyterian Hospital it has been the custom

to do biopsies in all cases where a sure diagnosis cannot be made from the clinical findings. This has included about one-third of the cases. Table XI shows the relationship of biopsy to results.

TABLE XI

THE INFLUENCE OF BIOPSY ON THE RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES

Procedure	No. of Operations	5-Year Local Recurrence No.	5-Year Local Recurrence Per Cent	5-Year Clinical Cures No.	5-Year Clinical Cures Per Cent
No biopsy done	401	102	25.4%	112	27.9%
Biopsy, 6 days or less preoperative	5	1	20.0%	3	60.0%
7 to 12 days preoperative	7	2	28.6%	3	42.9%
13 days or more preoperative	7	2	28.6%	3	42.9%
Biopsy at operation	220	39	17.7%	110	50.0%
Totals	640	146, or	22.8%	231, or	36.1%

From these data it is hardly fair to draw any conclusion, because biopsy is more often done in the early than in the advanced cases, and the prognosis is, of course, better in this early group of cases. In order to exclude this disturbing factor we have prepared Table XII, which includes only those cases in which the primary tumor measured more than two centimeters in diameter (pathologic measurements) and yet was operable according to the criteria which today we rely upon. Thus, the earliest, as well as the most advanced cases, have been excluded.

TABLE XII

THE INFLUENCE OF BIOPSY ON THE RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES IN WHICH THE TUMOR MEASURED MORE THAN TWO CENTIMETERS (PATHOLOGIC MEASUREMENTS) AND WAS OPERABLE ACCORDING TO HAAGENSEN-STOUT CRITERIA

Procedure	No. of Operations	5-Year Local Recurrence No.	5-Year Local Recurrence Per Cent	5-Year Clinical Cures No.	5-Year Clinical Cures Per Cent
No biopsy	234	47	20.1%	79	33.8%
Biopsy some days before operation	7	1	14.3%	3	42.9%
Biopsy at operation	123	20	16.3%	61	49.6%
Totals	364	68, or	18.7%	143, or	39.3%

From these data it would appear that biopsy does not prejudice the end-results of radical mastectomy. Greenough[1] reached a similar conclusion from his study of the results at the Massachusetts General Hospital. Thus, we do not hesitate to employ biopsy if any doubt regarding the diagnosis remains. If the lesion is clearly a carcinoma and operable we do not, however, biopsy it. Careful study of the clinical features of every case, and an extensive background of experience with lesions of the breast, are necessary if this policy is to be safely pursued. It will be easier and safer for the less experienced to biopsy all breast lesions. There are certain indolent forms of breast abscess, and forms of fat necrosis, which can be clinically indistinguishable from mammary carcinoma. The damage that is done by a radical mastectomy carried out for one of these benign lesions far outweighs the inconvenience of biopsy and the theoretic objections to it.

It is our personal practice to reduce the trauma of biopsy to a minimum by making only a small incision, and excising only a very small wedge of tissue from the superficial part of the lesion. We do not excise the whole tumor, because if this is of considerable size excision will open up tissue planes widely, and possibly increase the danger of spreading the disease.

We find that a small wedge serves adequately for frozen sections in the great majority of cases. If this is not satisfactory we, of course, remove a large piece.

Ward versus Private Cases.—It has been the general experience that results are better with private than with ward patients, and this is confirmed by the data in the present series (Table XIII).

TABLE XIII

RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES
Ward versus Private Cases

Classification	No. of Operations	Operative Deaths No.	Per Cent	5-Year Local Recurrence No.	Per Cent	5-Year Clinical Cures No.	Per Cent
Ward	422	13,	or 3.1%	119,	or 28.2%	137,	or 32.5%
Private	218	7,	or 3.2%	27,	or 12.4%	94,	or 43.1%
Totals	640	20,	or 3.1%	146,	or 22.8%	231,	or 36.1%

The better results in private patients are no doubt due to the fact that they come for treatment earlier in the course of the disease. This is demonstrated in Tables XIV and XV, which show the duration of the disease and, also, the frequency of involvement of the axilla in ward and private patients.

TABLE XIV

DURATION OF DISEASE ON ADMISSION IN PRIMARY CASES
Ward versus Private Cases

Classification	No. of Operations Total	Duration Stated	Duration Less than 1 Month No.	Per Cent	Duration 1 to 5 Months No.	Per Cent	Duration 6 Months or More No.	Per Cent
Ward	422	413	51	12.3%	171	41.4%	191	46.2%
Private	218	182	49	26.9%	65	35.7%	68	37.4%
Totals	640	595	100,	or 16.8%	236,	or 39.7%	259,	or 43.5%

TABLE XV

FREQUENCY OF AXILLARY METASTASIS IN PRIMARY CASES
Ward versus Private Cases

Classification	No. of Operations Total	Microscopic Report	Disease Limited to Breast No.	Per Cent	Axillary Metastases No.	Per Cent
Ward	422	409	147	35.9%	262	64.1%
Private	218	213	90	42.3%	123	57.7%
Totals	640	622	237,	or 38.1%	385,	or 61.9%

Duration of Disease on Admission.—As might be expected, the earlier that patients came for treatment the better was their chance of clinical cure. These data are shown in Table XVI.

There are ready explanations for the two apparent paradoxes in this table. The fact that the results were better in patients who had had their tumors for more than three years than they were in those in whom the duration had been somewhat shorter, can be explained by assuming that the tumors that had been present for such a long time were slow-growing, well differentiated ones, and, therefore, more easily cured. The good results in the group of cases in which the duration of disease on admission was not stated can be explained by the fact that most of these patients with defective histories were private ones, who did better as a group.

Our data are not large enough to provide any significant conclusions

TABLE XVI

RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES ACCORDING TO DURATION OF DISEASE ON ADMISSION

Duration of Disease	No. of Cases	5-Year Local Recurrence		5-Year Clinical Cure	
		No.	Per Cent	No.	Per Cent
Under 2 weeks	50	8	16.0%	27	54.0%
2 weeks to 1 month	50	10	20.0%	17	34.0%
1 to 2 months	110	20	18.2%	44	40.0%
3 to 5 months	126	46	36.5%	45	35.7%
6 to 11 months	119	23	19.3%	34	28.6%
12 to 23 months	75	19	25.3%	20	26.7%
24 to 35 months	27	7	25.9%	6	22.2%
36 months plus	38	6	15.8%	16	42.1%
Not stated	45	7	15.6%	22	48.9%
Totals	640	146, or 22.8%		231, or 36.1%	

regarding the interesting question of whether or not patients with carcinoma of the breast are coming for treatment earlier today than previously.

While it is, of course, true, as our data show, that early diagnosis and treatment is one of the most important factors influencing the results in breast carcinoma, there is a considerable group of patients in whom the prognosis is bad even though they come for treatment soon after they discover their disease. This fact is well shown in Table XVII, in which the duration of disease and the presence of axillary metastases are correlated.

TABLE XVII

THE RELATIONSHIP OF DURATION OF DISEASE ON ADMISSION IN PRIMARY CASES TO THE PRESENCE OF AXILLARY METASTASES

Duration	No. of Operations		Limited to Breast		Axillary Metastases	
	Total	Microscopic Sections	No.	Per Cent	No.	Per Cent
Less than 1 month	100	98	49	50.0%	49	50.0%
1 to 5 months	236	229	91	39.7	138	60.3%
6 months or more	259	253	81	32.0%	172	68.0%
Duration not stated	45	42	16	38.1%	26	61.9%
Totals	640	622	237, or 38.1%		385, or 61.9%	

Axillary Involvement.—Among all of the factors influencing the prognosis in carcinoma of the breast treated by surgery that of involvement of the axillary lymph nodes is probably the most important. The relationship of the microscopic findings in the axillary lymph nodes to the end-results in the Presbyterian Hospital series is shown in Table XVIII.

TABLE XVIII

RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES ACCORDING TO AXILLARY INVOLVEMENT (MICROSCOPIC)

Extent of Disease	No. of Operations	5-Year Local Recurrence		5-Year Clinical Cures	
		No.	Per Cent	No.	Per Cent
Limited to breast	237	23	9.7%	145	61.2%
Axilla involved	385	120	31.3%	81	21.0%
No microscopic sections	18	3	16.7%	5	27.8%
Totals	640	146, or 22.8%		231, or 36.1%	

The clinical cure rate is thus seen to be approximately three times as high in those in whom the disease is limited to the breast as it is in those in whom it has extended to the axillary lymph nodes. The frequency of local recurrence appears to be similarly related to the presence of axillary involvement. It is indeed worth while considering the data for local recur-

rence in relationship to axillary involvement in more detail, for they show some interesting features (Table XIX).

TABLE XIX

RELATIONSHIP OF LOCAL RECURRENCE TO AXILLARY INVOLVEMENT (MICROSCOPIC)

Radical mastectomies for which microscopic sections were available	622
I—Disease limited to breast	237, or 38.1%
A—Local recurrence on chest only	17
B—Local recurrence in axilla only	4
C—Local recurrence both chest and axilla	2
Total cases with local recurrence	23, or 9.7%
II—Axillary nodes involved	385, or 61.9%
A—Local recurrence on chest only	84
B—Local recurrence in axilla only	12
C—Local recurrence both chest and axilla	24
Total cases with local recurrence	120, or 31.2%

In the group of cases in which the disease was limited to the breast, recurrence, nevertheless, developed in the axilla in six instances. We can explain this paradox by assuming either that lymph nodes containing the disease were left behind or that the surgeon actually implanted carcinoma in the axilla.

If we could only know before operation whether or not the axillary nodes are actually involved by the disease it would be of considerable help to us in planning treatment. Unfortunately, however, clinical examination is but a poor guide, for the most careful palpation of the axilla frequently fails to detect involved nodes. The experience at the Presbyterian Hospital in this regard is shown in Table XX.

TABLE XX

THE ACCURACY OF CLINICAL DIAGNOSIS OF AXILLARY LYMPH NODE METASTASES IN PRIMARY CASES TREATED BY RADICAL MASTECTOMY

Clinical Diagnosis	No. of Operations	Microscopic Sections Available	Axillary No.	Metastases Per Cent
Axillary nodes not involved	336	325	143	44.0%
Axillary nodes involved	284	278	236	84.9%
No diagnosis made	20	19	6	31.6%
Totals	640	622	385, or	61.9%

From these data we see that when the clinician thought that there were no axillary metastases he was wrong in 44 per cent of the cases, and *vice versa,* when the thought that the axilla was involved, he was wrong in 15.1 per cent of the cases.

The mere size of the axillary nodes is of considerable value in judging whether or not they contain metastases (Table XXI).

Unfortunately, most of the case records in the present series did not contain measurements of the enlarged axillary lymph nodes expressed in centimeters. We believe that an attempt to measure the transverse diameter of palpable axillary nodes should always be made, even though the surgeon is fully aware of how difficult it is to make such measurements accurately, particularly in obese patients. It is only by the accumulation of actual measurements of this kind that we can hope to become more expert in our judgment of axillary involvement. We have seen only one patient in whom

TABLE XXI

THE FREQUENCY OF METASTASES IN AXILLARY NODES IN PRIMARY CASES ACCORDING TO THEIR SIZE BY CLINICAL MEASUREMENT

Clinical Measurement of Lymph Nodes	No. of Operations	Microscopic Sections Available	Axillary Metastases No.	Per Cent
Nodes not palpable	177	171	62	36.3%
Nodes moderately enlarged	359	349	239	68.5%
Nodes massively enlarged	61	60	56	93.3%
Nodes 2.5 cm. or more in diameter	23	23	22	95.7%
Not described	20	19	6	31.6%
Total	640	622	385, or	61.9%

enlarged axillary nodes that measured 2.5 cm. or more in transverse diameter did not contain metastases.

Preoperative Radiation.—A small proportion of the patients in this series received preoperative roentgenotherapy. Most of these cases were treated in the years 1915 to 1923, the treatment consisting of several suberythema doses, given over large fields, to the front and back of the chest. We well realize that this is a very different kind of radiation from that given today, but the results are presented for what they are worth. (Table XXII).

TABLE XXII

THE INFLUENCE OF PREOPERATIVE RADIATION ON THE RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES

Treatment	No. of Cases	5-Year Local Recurrence No.	Per Cent	5-Year Clinical Cures No.	Per Cent
No preoperative radiation	562	126	22.4%	209	37.2%
Preoperative radiation	78	20	25.6%	22	28.2%
Totals	640	146, or	22.8%	231, or	36.1%

When data of this kind are presented, the objection is always raised that results are necessarily better in the group of patients who did not receive radiation because this kind of treatment is administered more often in the advanced cases than in the early ones. This was certainly true in the present series of cases, if the presence of axillary metastases is taken as an index of the extent of the disease. In the group of patients who did not receive preoperative radiation 60.3 per cent had axillary metastases, while in the group radiated preoperatively 72.4 per cent had axillary metastases. In our data we get no closer to an answer to the question by breaking down the cases into different categories, for the numbers of cases then become so small that they have no statistical significance.

It is not our practice today, at the Presbyterian Hospital, to give preoperative radiation to patients with operable carcinoma of the breast. This decision is based upon experience with radiation in patients treated subsequent to 1934, and, therefore, not included in the present report.

Postoperative Prophylactic Radiation.—Postoperative radiation, with the intent of preventing reappearance of the disease, was administered more frequently in this series of cases. Indeed, about three-fifths of the patients received it. Many of these patients were treated subsequent to 1923, and received the modern type of radiation. The factors usually were: 130 kilovolts, 0.25 Mm. of copper and 1 Mm. of aluminum filter, tube-skin distance 40cm. The dosage was 400 r. over the field of operation on the chest wall

and anterior axilla, as well as the supraclavicular area and sometimes the opposite axilla. This series of treatments was repeated at least once, after from four to eight weeks. The results of this treatment are shown in Table XXIII.

TABLE XXIII

THE INFLUENCE OF POSTOPERATIVE PROPHYLACTIC RADIATION ON THE RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES

Treatment	No. of Cases	5-Year Local Recurrence No.	Per Cent	5-Year Clinical Cures No.	Per Cent
No postoperative prophylactic radiation..	372	73	19.6%	137	36.8%
Postoperative prophylactic radiation.....	268	73	27.2%	94	35.1%
Totals.....	640	146, or	22.8%	231, or	36.1%

In evaluating these data we again meet with the fact that postoperative prophylactic radiation is more often administered to advanced than to early cases, which prejudices the results. This was, indeed, the case in the present series of cases, for only 53.9 per cent of the patients who did not receive the radiation had axillary metastases, while 72.5 per cent of those who were given postoperative prophylactic radiation had axillary involvement. In order to reduce the disturbing effect of this factor we have prepared Table XXIV, which includes only those cases in which axillary metastases were present, and yet were operable according to the criteria that we today rely upon. Thus, the earlier, as well as the most advanced cases, have been excluded.

TABLE XXIV

THE INFLUENCE OF POSTOPERATIVE PROPHYLACTIC RADIATION ON THE RESULTS OF RADICAL MASTECTOMY IN PRIMARY CASES IN WHICH AXILLARY METASTASES WERE PRESENT, YET OPERABLE ACCORDING TO HAAGENSEN-STOUT CRITERIA

Treatment	No. of Cases	5-Year Local Recurrence No.	Per Cent	5-Year Clinical Cures No.	Per Cent
No postoperative prophylactic radiation..	154	34	22.1%	38	24.7%
Postoperative prophylactic radiation.....	143	40	28.0%	45	31.5%
Totals.....	297	74, or	24.9%	83, or	27.9%

These differences in results in the two groups of cases are not of statistical significance, and we are forced to conclude that this kind of radiation has not been of any demonstrable value in our series.

Palliative Radiation for Recurrence.—The usefulness of roentgenotherapy for recurrent disease is quite another matter. It has been of the greatest palliative value in controlling pain due to bone metastases, and in clearing up small local recurrences in the field of operation.

When persistent pain develops in the back, pelvis, or legs of a patient who has had a radical mastectomy for carcinoma of the breast we begin radiation at once, even though the roentgenograms fail to reveal any definite bone lesion.

SUMMARY

In studying a series of 1040 carcinomata of the female breast, seen at the Presbyterian Hospital between 1915 and 1934, inclusive, we have been aided by the punch-card method of analysis, which we heartily recommend for investigations of this sort.

We have stressed the importance of calculating operability and five-year clinical cure rates in *absolute* terms, that is on the basis of the total number of patients seen in the clinic, and without any deductions whatever for patients lost track of, treatment not completed, *etc.* Only in this way can strictly comparable statistics from different clinics be obtained.

A total of 640 radical mastectomies were performed by a variety of methods. Local recurrence in the operative field on the chest and in the axilla was distressingly frequent. It had developed in 22.8 per cent of the 640 patients within five years after operation. Death was usually due, of course, to distant metastases, which developed most frequently in lungs, pleura, and bones.

During the course of the years covered by the present report there was an increasing tendency of the surgeons of the hospital staff to take a longer time to carry out radical mastectomy, and to increase the extent of the dissection. There was suggestive evidence that these more radical operations gave better results.

REFERENCE

[1] Greenough, R. B.: Early Diagnosis of Breast Cancer. ANNALS OF SURGERY, **102**, 233, August, 1935.