Treatment of Early Mammary Carcinoma *

A Cooperative International Study

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CARCINOMA of the breast is the most frequent form of cancer in women and has been intensively studied for 100 years. Yet there is today the widest possible disagreement as to how best to treat it. Some statisticians suggest that treatment has no demonstrable effect upon the course of the disease. Many clinicians go too far in the opposite direction and enthusiastically attack the disease in every patient with the most radical forms of surgery, irradiation, hormonal therapy, and chemotherapy, all administered concurrently. This kind of injudicious attack penalizes the patient unnecessarily, and does not increase her chance of cure.

Surgeons, over a period of 75 years, have resolutely extended the scope of their method of attack, until today the so-called super-radical mastectomy may include dissection of the regional lymph nodes in the supraclavicular area and the mediastinum. They have shown that these super-radical dissections can be safely performed, although with a considerable morbidity, but they have not provided convincing evidence that the results of the extended operations are superior.

On the other hand, radiotherapeutists, using improved technics and equipment, are unquestionably improving their results with breast carcinoma. Some of them, indeed, claim that radical mastectomy is outmoded, and wish to treat all patients primarily with irradiation at any stage of the disease. It is imperative that we attempt by every possible means to find the truth and to dispell the confusion brought by varied opinions.

Statistical Methods

Although experience and common sense are sufficient guides in selecting the best treatment for most diseases, they can not decide how best to treat breast carcinoma. This complex and difficult question will have to be decided by statistical comparison of long-term results of different methods. Unfortunately, the many variables concerned in a statistical problem of this kind make comparison very difficult. Large numbers of patients treated in a uniform manner are needed to overcome the disturbing effects of these variables. Nevertheless, comparisons must be made.

There are certain basic requirements for all comparative studies of the results of treatment of breast carcinoma. Complete case records, containing accurate and detailed clinical descriptions, are essential. The precise site of the tumor in the breast, its size as measured in centimeters, its degree of fixation to the overlying skin and the underlying chest wall, changes in the skin such as redness, edema, and satellite tumor nodules, are all basic features which must be recorded. The clinical status of the axillary and supraclavicular lymph nodes must be stated—that is, whether or not they are clinically involved, and if so their number, their size as measured in centimeters, and whether or not they are fixed to the overlying skin or deeper structures. Roentgen films of the chest and the bones should be included in the study of every patient. There must be microscopic proof of the carcinomatous nature of the disease.

The follow up must be complete. Any patients lost track of must be counted as succumbing to mammary carcinoma. They cannot be excluded in the compilation of end results.

It would be preferable if comparisons of the results of different methods of treatment could be made in terms of freedom from evidence of persisting or recurrent breast carcinoma—that is, clinical cure. In case-series treated by irradiation only this is not practical because of the impossibility of determining whether or not the disease persists in irradiated breasts. The degree of fibrosis in such breasts is often so great that no reasonably accurate estimate of the status of the carcinoma can be made. Comparisons of results of treatment must therefore be made in terms of simple survival.

Although five years after treatment is the traditional time at which to determine its result, we are well aware that this period is too short. Ten-year results will come closer to the truth. All of us contributing to the present study will continue to follow our patients; we hope to present another cooperative report in five years. We are impelled to present our five-year results now, not because they permit final conclusions, but because we wish to stimulate interest in our method of comparison, and because our five-year comparison does provide suggestive and provocative data.

There are three general kinds of statistical comparison of the results of treatment of mammary carcinoma which can be made:

1. *Absolute Results*—an over-all figure representing the end results for all patients with the disease seeking treatment at the hospital or clinic in which the study is being made.

2. *Relative Results*—results in a selected series of cases treated by a special method.

3. *Clinical Staging*—results achieved in all cases treated by a special method, and *classified as to the stage of advancement of the disease determined clinically.*

The term *absolute* result was devised 30 years ago by the Cancer Commission of the old League of Nations studying the results of treatment of uterine cancer. This concept of statistical comparison requires that all patients with the disease coming to the hospital in which the study is being made be included in the statistic. No treated cases are excluded in calculating the per-

centage of survivors. The annual follow up reports from the Radiumhemmet are a model for determining *absolute* survival rates.

The *absolute* survival rates give us the most accurate general estimate of what we achieve with all methods of treatment of a disease without regard to its stage of advancement. These absolute rates are, however, of no help in comparing the results of different methods of treating mammary carcinoma in its different stages. In this disease, as in many others, we lack a universal method of treatment that is equally effective at all stages. Each of the different methods of treatment that has a proven value—surgery, radiotherapy and hormones —must be adapted to the stage of the disease. In the great majority of patients with breast carcinoma the disease has already reached a comparatively advanced stage when they first come for treatment. In these advanced cases the results of all methods of treatment are poor. In absolute cure rates the levelling effect of failure in these advanced cases hides whatever advantage any special method of treatment may have. For example, the superiority of a particular method of treatment in the relatively small group of early cases will be obscured by the poor results of the method in the majority group of advanced cases.

The *relative* cure rates for carcinoma of the breast are derived from selected series of cases. A good example of a report presenting *relative* results is that by Harrington from the Mayo Clinic. Unfortunately such relative results are of little or no help in determining the best method of treatment for each different stage of breast carcinoma. These reports are based on selected series of cases, and if any valid conclusions are to be drawn from them the criteria for selection must be defined precisely and in detail. Careful study of these reports fails to reveal the exact clinical criteria upon which the selection was based. Lacking this information the stage of disease re-

mains unknown and results of treatment cannot be compared with results in other case series. When we compare we must make certain we are comparing the same biological phenomena.

Staging the disease makes a valid comparison of the results of treatment possible. Our aim must be to classify our cases accurately as to stage of advancement and to compare the results of different methods of treatment in each stage separately. In breast carcinoma our knowledge of the natural history of the disease and its clinical manifestations is complete enough to enable us to classify cases as to stage of advancement with a considerable degree of accuracy. The primary lesion is easily accessible for exact description. Criteria of classification as regards the status of the regional lymph nodes can be only clinical when microscopic information on this vital point is lacking in case series in which the regional lymph nodes are not dissected: nevertheless, clinical regional lymph node criteria can be exact enough to provide reliable staging.

There have been few attempts to compare in this manner the results of different methods of treatment in carefully staged series of cases of breast carcinoma. The main reason has been lack of a reliable method of clinical staging.

Treatment of Early Breast Carcinoma

The crucial question regarding the treatment of mammary carcinoma today is how best to treat *early* breast carcinoma. No experienced physician can doubt that the disease can be cured in its early stages, or can be ignorant of the incurability of the disease in its more advanced stages.

A clinical classification aimed primarily at distinguishing the earlier stages of the disease in which the choice of treatment is most critical and most controversial is our foremost requirement. Such a classification must be simple enough to be generally ap-

plicable. Most important of all it must be as precise as possible. The clinical features upon which it depends must be apparent to reasonably skilled examiners.

The several methods of clinical classification for breast carcinoma in current use all have disadvantages. They are not sufficiently precise, and do not distinguish the very early cases.

The classification which we shall use in the present study has been evolved at the Columbia-Presbyterian Medical Center for the special purpose of distinguishing the early group of cases. It has been worked out from detailed clinical data from case histories recorded on punch cards, and has been tested over a number of years in several clinics.

In essence this classification depends upon the absence or presence of six comparatively simple clinical features of breast carcinoma as follows:

Edema of the Skin of Limited Extent. Edema of limited extent is defined as edema involving less than one-third of the skin over the breast. More extensive edema necessitates classifying the disease in a more advanced category.

Solid Fixation of the Carcinoma to the Chest Wall. Most breast carcinomas are fixed to some degree in the breast tissue which surrounds them, but the tumor and the surrounding breast tissue can still be moved over the underlying structures of the chest wall. As it progresses locally, breast carcinoma may become abnormally attached to the underlying pectoralis major muscle; such carcinomas may be movable when the pectoral muscle is relaxed, but are fixed in position when it is contracted. These phenomena are not what we mean by solid fixation. Solid fixation means definite and firm fixation of the carcinoma and the breast tissue surrounding it to the underlying thoracic wall under all circumstances.

Ulceration of the Skin. This phenomenon needs no definition except to point out that even a very small ulcer of the skin over the tumor counts as ulceration. Nipple erosion of the Paget's type of carcinoma is not counted as ulceration.

Clinically Involved Axillary Nodes. Clinically involved nodes are axillary nodes which, in the examiner's opinion, contain metastases. For example, we do not regard one or two 5.0 mm., not particularly firm, movable, axillary nodes as an indication of metastases. But a firm 1.0 cm. node means axillary involvement. It may be objected that palpation of the axilla is so inaccurate that no definite conclusions can be drawn from it. This is surely too pessimistic a view; most skilled examiners will agree as to their findings in axillary palpation—and they will be correct in their estimation of the presence of metastasis in approximately two-thirds of the cases. It is possible to make useful comparisons of different case series despite this large factor of error because it can be assumed that the percentage of error will be approximately the same in different case series. When the same kind and degree of error occurs in case series being compared the comparison remains valid.

Massively Involved Axillary Nodes. Massive axillary involvement is defined as a single node, or a group of nodes, measuring 2.5 cm. or more in transverse diameter. It is emphasized that the measurement is transverse and not vertical. Several small nodes one above the other may form a series extending vertically in the axilla and measuring more than 2.5 cm. This is not, however, the dimension to which we here refer. By massive axillary metastasis we mean a node or group of nodes forming a sphere measuring 2.5 cm. or more in diameter.

Fixation of Axillary Nodes. When palpation suggests that clinically involved axillary nodes are abnormally adherent to the deeper structures of the axilla or to the overlying skin they are classified as fixed.

Utilizing these clinical features all cases of breast cancer can be classified into four clinical stages:

Stage A. No skin edema, ulceration, or solid fixation of tumor to chest wall. Axillary nodes not clinically involved.

Stage B. No skin edema, ulceration, or solid fixation of tumor to chest wall. Clinically involved axillary nodes, but less than 2.5 cm. in transverse diameter and not fixed to overlying skin or deeper structures of axilla.

Stage C. Any *one* of five grave signs of comparatively advanced carcinoma
1. Edema of skin of limited extent (involving less than one-third of the skin over the breast)

2. Skin ulceration
3. Solid fixation of tumor to chest wall
4. Massive involvement of axillary lymph nodes (measuring 2.5 cm. or more in transverse diameter)
5. Fixation of the axillary nodes to overlying skin or deeper structures of axilla

Stage D. All other patients with more advanced breast carcinoma, including

1. A combination of any *two or more* of the five grave signs listed in Stage C.
2. Extensive edema of skin (involving more than one-third of the skin over the breast)
3. Satellite skin nodules
4. The inflammatory type of carcinoma
5. Supraclavicular metastases (clinically apparent)
6. Parasternal metastases (clinically apparent)

7. Edema of the arm
8. Distant metastases

It should be noted that no distinction as to the size of the primary tumor and its position in the breast has been made in this classification. Pathological type or grade is likewise ignored. These and other features of breast carcinoma are of course of prognostic significance, but to subdivide cases on these grounds makes our classification too complex.

Each one of us in reporting our experience with the special plan of treatment which he has used, has included a detailed description of the treatment, so that it will be possible to duplicate our clinical experiments.

Simple Mastectomy for Mammary Carcinoma

CHARLES S. KENNEDY, M.D., ELMER MILLER, M.D.

Grace Hospital, Detroit

IN 1927, one of us (C. S. K.) began to treat breast carcinoma by simple mastectomy, based on the impression that the results of this limited operation were approximately equal to the results of the more ambitious and much more penalizing surgical procedures which were being performed by his colleagues. The operation which was done was a rapid (average operating time 38 minutes, shortest time 14 minutes; longest time 70 minutes) elliptical excision of the gross breast tissue just wide enough to allow approximation of skin without tension and yet without any redundancy. Care was taken to plan the excision so that the closure was almost as closing a linear wound. Seventy-five per cent of the excisions were transverse. Oc-

casionally body contour made it preferable to use a predominantly vertical excision.

The operation was planned to remove the fascia overlying the pectoralis major under the breast, but not to remove any muscle. The axilla was not disturbed ex-

TABLE 1. *Age Distribution of Patients with Mammary Carcinoma Treated by Simple Mastectomy*

	No.	%
Under 45	43	20.3
45–54	57	26.9
55–64	58	27.3
65 and over	54	25.5
Total	212	

Mean age—56.

TABLE 2. *Simple Mastectomy for Mammary Carcinoma; 5-Year Survival*

Columbia Clinical Classification	No. Patients	No. Survived	% Survival	Aver. Age Survivors	Average Age Nonsurvivors
A	115	71	62	56	57
B	34	14	41	52	52
C	18	4	22	70	60
D	45	7	13	60	56
Totals	212	91	45		

cept on a few occasions when an unusually large node was removed at the base of the axilla. The only sutures placed were to approximate the skin. The wounds were routinely drained. There were no operative deaths, and no important postoperative complications.

Following these operations the patients were treated prophylactically by x-ray. It is not possible to define the exact dosage, but it can be stated that it was so limited in amount that the patients did not develop any skin reaction or any of the other side effects usually associated with therapeutic radiation. As nearly as can be determined, the majority of the patients received a total of 1,000 roentgen units or less. These fig-

ures are the estimates of a radiologist reviewing what notes are available as to the treatment given. It is our impression that the amount of irradiation our patients received was so small that it has not been a factor in determining the survival rate.

Prophylactic oophorectomy was not done in any of the patients. Our case series includes all of the patients treated by simple mastectomy by Dr. Charles S. Kennedy from 1927 to 1956, as well as all Grace Hospital patients receiving this treatment from 1951 through 1956 inclusive.

The age distribution of the patients is indicated in Table 1. All of the patients have been followed, and the five-year survival rates are shown in Table 2.

Conservative Radical Mastectomy (Patey's Operation)

R. S. HANDLEY, M.D., A. C. THACKRAY, M.D.

The Middlesex Hospital, London

IN 1946, we began to investigate the state of the internal mammary lymph nodes, in operable breast carcinoma, by doing biopsies of the intercostal spaces at the time of the primary radical surgery; these biospies were not intended as a therapy but as a pathological reconnaissance. It soon became apparent that about a third

of the patients undergoing radical mastectomy already had deposits in the internal mammary nodes and that the operation was therefore not radical in the true sense of the word. In considering the therapeutic implications of this fact, we believed three possible courses lay open as alternatives to the classical radical mastectomy.

The first was to abandon surgery altogether and hand our patients over to radiotherapy, a plan which, for various reasons, we discarded. The second was to add an excision of the internal mammary chain to radical mastectomy. This did not appear feasible to us at that time, which was before Dr. J. Urban had published his work. The third alternative was to do something less than the radical mastectomy which preserved the advantages of the classical Halsted operation while causing less deformity. It was on this that we decided, perhaps because we were familiar with the conservative radical mastectomy as described and practiced by D. H. Patey. In brief, Patey's operation leaves the pectoralis major virtually intact while removing the breast, the pectoralis minor muscle and the axillary contents in one piece, and its great advantage is that it leaves the patient flat below her clavicle instead of hollow and thus enables her to wear conventional evening dress and bathing wear without her deformity being immediately obvious. Convinced as we are that the quality of a person's life is at least as important as its quantity, we think that preservation of the pectoralis major is of great psychological importance to our patients and a real contribution to the quality of their lives. We hope to show that this advantage in quality of life seems to be secured without loss of its quantity.

The series of patients in whom internal mammary node biopsies were done during primary surgery was begun in 1946 and reached 250 cases in 1956. Of these, 143

TABLE 3. *Age Distribution of 143 Patients*

Age	%
Under 45 years	22
45–54 years	35
55–64 years	25
65 years or over	18
Mean age = 53.6 years	

TABLE 4. *5-Year Survival*

Columbia Clinical Classification	Total	% Alive at 5 Years
A	77	75
B	58	57
C	8	25
Total	143	

were treated by the conservative radical mastectomy of Patey, the remainder receiving classical radical mastectomies (especially in the earlier years), extended radical or simple mastectomies. It is with the 143 cases of Patey's operation that the remainder of this report is concerned. Their selection for the operation was quite haphazard and became more frequent as our confidence in the operation grew, and our interest in extended radical operations diminished.

The opening steps of the operation itself are the same as for a classical radical mastectomy. The incision begins as a circle, two inches clear of the edge of the tumor, and is either enlarged by incisions toward the coracoid process and xiphisternum or by transverse incisions. The flaps are thin but not entirely devoid of fat and are cut back to the midline, the clavicle, the latissimus dorsi and to one inch caudad to the breast. The breast is then dissected off the pectoralis major, the pectoral fascia being removed as completely as possible, often with a few muscle fibers, and the dissection proceeding from the medial to the lateral side. An intercostal biopsy is done at this stage on the first, second and often the third space (and, latterly, evidence of invasion of these nodes has been taken as an indication to terminate the operation as a wide simple mastectomy). The arm, which has been wrapped in sterile towels so that it can be handled by the surgeon's scrubbed assistants, is now lifted so that the elbow points directly to the ceiling. The pecto-

TABLE 5. *Frequency of Microscopical Axillary, Internal Mammary, and Axillary plus Internal Mammary Metastases*

Columbia Clinical Classification	No.	All Nodes Free	Axillary Metastases Only	Internal Mammary Metas.	Both Sets of Nodes Involved
A	77	41 = 53%	28	2	6
B	58	13 = 22%	23	0	22
C	8	0	3	0	5

ralis major, with the lateral pectoral nerve and the pectoral branch of the thoraco-acromial artery is separated from the pectoralis minor and chest wall and retracted upwards. The pectoralis minor is now sectioned close to the coracoid process and a dainty division of the cost-coracoid membrane, together with caudal traction of the divided pectoralis major reveals the axillary vein. Tissue in front of and below the axillary vein is removed in the usual way, with ligation of vessels etc., as far medially as the first rib, care being taken to preserve the thoraco-acromial artery. The long thoracic nerve of Bell is always preserved but the thoracodorsal nerve is sacrificed if this should seem necessary. The operation is terminated in the usual way, about half

TABLE 6. *Frequency of Postoperative Irradiation*

Columbia Clinical Classification	Patients	Irradiated	% Irradiated
A	77	21	27
B	58	35	60
C	8	7	87
Totals	143	63	44

the patients receiving grafts and all being drained with suction for three or four days.

Those who have neither practiced nor witnessed this operation find it impossible to believe that the axilla can be efficiently exposed without sacrifice of the pectoralis major. It can, with a small addition to the time and trouble of the operation. Our operating time varies between two and three hours.

The details of the 143 patients subjected to this operation five or more years ago follow.

No patient has been lost to follow up. There was no operative mortality. No prophylactic oophorectomy or other form of prophylactic hormone treatment was given. Only patients with histological node invasion were given radiotherapy, and some with only one or two nodes low in the axilla were not irradiated.

Table 3 shows the age distribution of the series. Table 4 shows the survival rates of the patients. Table 5 shows the frequency of axillary and internal mammary node metastases in the various clinical stages, as judged by histological examination. Table 6 shows the frequency with which the various stages were irradiated.

Radical Mastectomy for Mammary Carcinoma

HARVEY R. BUTCHER, JR., M.D.

Barnes Hospital, St. Louis

A STUDY of survival from mammary cancer was undertaken at Washington University to evaluate the Columbia method of clinical staging.

Material and Methods

Of 601 patients ill of mammary cancer seen in the Barnes Hospital, St. Louis, Missouri, between January 1, 1950 and January 1, 1955, 425 underwent radical mastectomy. The age distribution of these patients treated by radical mastectomy is shown in Table 7. Their mean age was 55 years. All were followed up until death or for at least 60 months after operation.

For the most part, the radical mastectomies performed followed the technic described by Haagensen. However, the thoroughness of the axillary dissection, the thickness of skin flaps, and the extent of mammary skin removed was more varied than in Dr. Haagensen's series because the operations were performed by many different surgeons. Sixty-five per cent of the radical mastectomies performed had cutaneous autografts used to complete closure

of the wound.* The mean time of anesthesia was 221 minutes.* Fifteen per cent (59/399) had postoperative irradiation. Nearly all patients receiving postoperative roentgen therapy had many axillary metastases. In 14 of these 59 patients the disease was classified as Stage A, 24 as Stage B, 12 as Stage C, and nine as Stage D. None had prophylactic oophorectomy.

The tissue sections from the 425 radical mastectomy specimens were re-examined and the diagnosis of carcinoma substantiated. The examination of the specimens was thorough. All quadrants of the breast parenchyma were studied microscopically. An average of 27 axillary lymph nodes per specimen were found.

The clinical stages of the cancers were determined from the physical signs recorded in each case history. Obviously, this method is less accurate than if the staging had been performed at the time of physical examination.

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* Based upon 20 per cent of the sample.

TABLE 7. *Age Distribution of Patients with Mammary Carcinoma Treated by Radical Mastectomy*

	No.	%
Under 45	80	20.0
45–54	120	30.1
55–64	107	26.8
65 and over	92	23.1
Total	399	

Mean age 55 years.

TABLE 8. *Radical Mastectomy for Mammary Carcinoma; 5-Year Survival*

Columbia Clinical Classification	No. Patients	No. Survived	% Survival
A	216	164	76
B	135	65	48
C	48	23	48
D	26	3	11
Total	425	225	60

TABLE 9. *Radical Mastectomy for Mammary Carcinoma. The Frequency of Axillary Metastases*

Columbia Clinical Classification	No. Patients	% Axillary Metastases	No. Axillary Nodes with Metastases			% With Less Than 3 Axillary Nodes Containing Cancer
			1 or 2	3 to 7	8+	
A	214*	32.2	37	21	12	85
B	135	75.5	36	36	30	51
C	48	89.5	4	17	22	19
Totals	397	54.2	77	74	64	65

* The axillary nodes from two specimens were lost.

Results

The operative mortality was 0.7 per cent. (Three patients died during the first three months after radical mastectomy.) The morbidity of the operation was limited to an incidence of delayed wound healing, requiring hospitalization beyond two weeks, in approximately 10 per cent of the patients.

The survival rates in the four clinical stages of the Columbia classification are shown in Table 8. The frequencies of axillary node metastases in Stages A, B, and C mammary carcinoma are shown in Table 9.

Radical Mastectomy for Mammary Carcinoma

C. D. HAAGENSEN, M.D., EDITH COOLEY

Columbia Presbyterian Medical Center, New York

THE SERIES OF CASES here reported is a personal one in that it includes all of the patients with mammary carcinoma upon whom the author (C. D. H.) performed radical mastectomy from 1935 through 1955. No patient who had the operation has been omitted. This includes ward patients in whom the resident surgeon was the operator and the author acted as his first assistant, as well as private patients where he was the operator. Included also is a small group of 15 cases in which his former associate, Joseph McDonald, performed radical mastectomy upon private patients, using the author's technic.

The basis of our treatment of mammary carcinoma has been two-fold. First, we select our patients for radical mastectomy with great care by means of specific criteria. Second, we perform as thorough and meticulous an operation as anatomic and functional limitations permit.

Criteria of Selection

Between 1935 and 1951, inclusive, we selected our patients for radical mastectomy on the basis of *clinical criteria* which we worked out with Stout from analysis of our case records. These clinical criteria have been defined elsewhere. A total of 410

patients were operated upon during these years, and in presenting our results these have been designated as Series I.

But we were not satisfied that our clinical criteria were sufficiently exclusive, and in 1952 we added *regional lymph node biopsy criteria* to our plan for selecting patients for radical mastectomy. Biopsies of the internal mammary lymph nodes in the first, second and third interspaces, and of the lymph nodes at the apex of the axilla, were performed as a preliminary separate operative procedure carried out solely for the purpose of determining more precisely whether or not the patient could be cured by radical mastectomy. These biopsies were not done in all patients with mammary carcinoma but only in those in whom occult metastases in the internal mammary nodes or the nodes at the apex of the axilla were suspected. As our knowledge of the circumstances in which these metastases occur has increased, we have learned which patients should have these regional lymph node biopsies. Our latest rule follows:

Regional Lymph Node Biopsy Criteria of Operability

I. Internal mammary biopsy of first, second and third interspaces should be done for
   a. Tumors of the outer half of the breast 5.0 cm. or more in diameter.
   b. Tumors of the inner half of the breast 3.0 cm. or more in diameter.
   c. All tumors impinging on the central zone of the breast (the subareolar area together with a 1.0 cm. zone beyond it).
   d. When axillary lymph nodes are clinically involved.
II. Apex of axilla biopsy should be done when several axillary lymph nodes are clinically involved, or if one involved axillary lymph node measures 2.5 cm.
III. Both forms of biopsy should be done when any grave clinical sign is present—edema, ulceration, fixation of axillary lymph nodes, or solid fixation of the primary tumor to chest wall.
   Note: Frozen sections should not be done unless the tissue is obviously grossly involved.

When metastases have been found in the internal mammary nodes, or in the nodes at the apex of the axilla, we have assumed that radical mastectomy is contraindicated, and we have treated these patients solely with irradiation.

Between 1952 and 1955, inclusive, we have therefore selected our patients for radical mastectomy on the basis of both *clinical* and *regional lymph node biopsy criteria*. Patients who were unsuitable by either set of criteria *have not been treated by radical mastectomy*. During these years we have chosen to perform the operation on a total of 146 patients, and in presenting our results they have been designated as Series II.

The age distribution of the patients in our series of cases as a whole is shown in Table 10.

Technic of Radical Mastectomy

The operation which has been performed is our version of the Halsted radical mastectomy. It has been described fully elsewhere. In brief, the skin over the whole of the protuberant breast is sacrificed and thin skin flaps are dissected back laterally to the latissimus muscle and medially to the midline of the sternum. The subcutaneous tissues, the breast, and the pectoral muscles are dissected off of the chest wall and allowed to fall laterally to the patient's side. The axilla is finally dissected, sacrificing the thoraco-dorsal vessels and nerve. The dissection is performed as gently as possible, avoiding traction, and is done with the knife.

TABLE 10. *Age Distribution of Patients*

Age	%
Under 45 years	27.9
45–54 years	32.9
55–64 years	20.7
65 years or over	18.5

Mean age—53 years.

TABLE 11. *Frequency of Prophylactic Postoperative Irradiation*

Columbia Clinical Classification	No. Patients	No. Radiated	% Radiated
A	344	18	5.2
B	138	17	12.3
C	63	10	15.8
D	11	4	36.4
Total	556	49	8.8

The defect on the chest wall is so large that a skin graft is almost always necessary to close the wound. Care is taken to handle the skin flaps gently, and to avoid tension upon them in closing. The wounds have not been drained. Transfusion has rarely been required.

The mean operating time in our series of cases has been five hours and 30 minutes. There were no operative deaths in this series of 556 radical mastectomies, and no serious postoperative complications. Our patients were usually in the hospital two weeks. Oophorectomy was not done prophylactically in any of the patients in our series, nor was any chemotherapeutic agent administered to them.

It has not been our custom to give postoperative prophylactic irradiation except to patients in whom fairly extensive axil-lary metastases have been found at microscopic study of the surgical specimen. By extensive metastases we mean that more than three or four nodes contain foci of carcinoma, or that more than two nodes are solidly replaced with the disease which has been broken through the node capsule and infiltrates the axillary fat. Our strict criteria of operability usually protect us from operating on patients with extensive axillary metastases, but we occasionally make this error. When it happens we give postoperative irradiation to the axilla, the supraclavicular area, and to the internal mammary area, provided it was not proved to be free of metastases by preliminary biopsy. In our series of 556 radical mastectomies only 8.8 per cent of the patients were given this kind of postoperative prophylactic irradiation. It will be seen from Table 11 that only 5.2 per cent of our Stage A patients received postoperative irradiation. It is therefore fair to conclude that our results in this group of early mammary carcinomas are a surgical achievement.

Results

The five-year survival rates in our personal series of mammary carcinomas treated by radical mastectomy are shown in Table 12.

When our results in Series I, in which the patients were selected for operation

TABLE 12. *Five-Year Survival*

Columbia Clinical Classification	Series I Cases Selected by *Clinical* Criteria 1935–51		Series II Cases Selected by *Clinical* and *Regional Lymph Node Biopsy* Criteria 1952–55	
	No. Patients	% 5-year Survival	No. Patients	% 5-year Survival
A	228	82.5	116	87.9
B	122	59.0	16	62.5
C	50	38.0	13	61.5
D	10	20.0	1	0.0
Totals	410	68.5	146	82.2

solely by our clinical criteria are compared with the results in our more recent Series II, in which selection was on the basis of both clinical and regional lymph node biopsy criteria, it is clear that our increasingly strict methods of selection have resulted in a higher cure rate. This is of course what we are striving for. We do not wish to perform radical mastectomy on any patient on whom irradiation would be a better method of treatment, and our stricter criteria of operability are bringing us closer to this ideal.

Our pathologic studies of our radical mastectomy specimens have been exceptionally thorough, and our data regarding the extent of axillary metastases unusually complete. For some years the axillary specimens have been cleared. With this method we usually find from 30 to 50 axillary nodes. The extent of axillary metastases is shown in Table 13. It is interesting to note the prognostic significance of the number of axillary nodes found to be involved. In Stage A involvement of one or two nodes lowers the survival rate only a little, but in Stages B and C the same phenomenon lowers it seriously. The finding of more than two involved axillary nodes lowers the survival rate seriously in all stages.

Our findings in these detailed studies of the extent of axillary lymph node involvement strengthened our conviction that our method of clinical staging is a reliable one.

Finally, in evaluating our results in our series of cases it should be emphasized that our series is a personal one only in the sense that the author (C. D. H.) himself examined all of the patients and classified

TABLE 13. *Extent of Microscopic Axillary Node Metastases*

Columbia Clinical Classification	No. Nodes Involved	No. Cases	5-Year Survivals	
			No.	%
A	None	233	211	90.6
	1 or 2	67	57	85.1
	3–7	29	17	58.6
	8 or more	15	5	33.3
B	None	33	28	84.8
	1 or 2	33	22	66.7
	3–7	42	25	59.5
	8 or more	30	7	23.3
C	None	15	10	66.7
	1 or 2	7	3	42.9
	3–7	13	6	46.2
	8 or more	28	8	29.6

TABLE 14. *Five-Year Survival*

Columbia Clinical Classification	Private Patients Haagensen— Operator 5 Year Survival %	Ward Patients Resident Surgeon—Operator Haagensen— Assistant 5 Year Survival %
A	83.2	85.6
B	56.7	61.5

them as operable, and that his operative technic was used in all. The author wishes to emphasize that his personal skill as a surgeon is not a factor of importance in determining these results. In 282 of the 556 patients in our series (50.7%) the operator was a resident surgeon. It gives the author great satisfaction as a teacher to report that the survival rates were slightly better in the patients operated upon by his resident (Table 14).

Radical Mastectomy with Parasternal and Supraclavicular Dissection for Mammary Carcinoma

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THE RADICAL MASTECTOMIES including parasternal dissection operated upon from 1950–1955 in the Department of Surgery C, Rigshospitalet, Copenhagen have been classified according to the Columbia clinical criteria, and the five-year survival rates have been calculated for the Stages A, B, C and D. All the cases have been located after five years. Two patients living more than five years after operation have been left out of this work as the pathological report is uncertain as to malignancy.

In 1950, most of our patients were given postoperative irradiation but later on, in collaboration with the Radium Center, no x-ray treatment was given until definite signs of recurrence. Castration and hormone treatment were never given prophylactically but only in cases of recurrence.

Most of the patients were referred to us from the Radium Center and secondary treatment was given there. We are greatly indebted to Jens Nielsen, head of the Radium Center, Professor of Radiotherapy, University of Copenhagen, for his ever enthusiastic cooperation.

From the beginning it was planned to select the cases for parasternal dissection according to the clinical criteria of Haagensen and Stout, but a few cases that were inoperable according to these criteria were treated by operation when the patients insisted upon this treatment. These cases will be found in Stage D.

Material

Our material of cases of primary mammary carcinoma is divided in Series I: 59 cases of radical mastectomy including parasternal dissection, and Series II: 366 cases of radical mastectomy including parasternal and supraclavicular dissection.

Series I. Fifty-nine patients from 1950 to 1952 were operated upon by the following technic: Ordinary mastectomy with axillary dissection was followed by dissection of the internal mammary nodes through the intercostal spaces, in most cases without cutting the costal cartilages.

The mean duration of the operation was 66 minutes. Forty-one of the patients in Series I (69%), received prophylactic postoperative irradiation.

Series II. Three hundred sixty-six patients with primary mammary carcinoma who were operated upon from 1951 to 1955. In this series the operation consisted of radical mastectomy including supraclavicular and parasternal dissection.

The supraclavicular dissection was performed by the technic described by Andreassen and Dahl-Iversen, in 1949. A transverse incision above and parallel to the clavicle, from the sternomastoid muscle and extending laterally 6.0 to 8.0 cm. was used. The platysma was divided with the skin. The fatty tissue was moved upward and the sternomastoid retracted medially until the omohyoid muscle was presenting. The omohyoid fascia was incised and then the supraclavicular nodes were taken out betwen the clavicle and the junction between the subclavian vein and the internal jugular vein. The wound was closed by catgut in the deeper layers and agraffes or silk sutures in the skin.

The skin incision for the mastectomy was done elliptically, depending upon the configuration of the breast and the site of the primary tumor, with an extension upward that should not go lateral to the coracoid process to ensure normal function of the arm later on, and with an extension downward. The lateral skin flap was dissected to the latissmus muscle, then the medial flap was dissected out to the middle of the sternum. The breast was then removed together with pectoralis major except for the clavicular part, and with the pectoralis minor and the axillary contents. The dissection of the axilla was started just below the clavicle where the axillary vein disappears, and was carried laterally. The long thoracic nerve was left in the cavity.

The parasternal dissection was done by cutting the costal cartilages with an ordinary scalpel, approximately 1.0 cm. from the edge of the sternum. The costal cartilages were then lifted by a strip of gauze so that the whole parasternal area, directly on the pleura, could be inspected. In the beginning only the fatty tissue and nodes were removed. Later on the following technic was used: A double ligature was made on the internal mammary vessels just below the first costal cartilage, and then the vessels were removed together with nodes and fatty tissue. By this procedure bleeding from the smaller arterial branches was avoided. The cartilages were sewn together with catgut sutures, and then the mastectomy wound was closed with silk sutures.

Drainage was always used in the axilla. Primary closure without grafts was always performed because of the cutting of the cartilages. This gave in many cases quite some tension on the suture line. In most cases the second, third, and fourth costal cartilages, were cut. In some cases it was impossible to cut them because of calcification. Then the nodes were removed through the interspaces.

The mean duration of the operation was 107 minutes. Twenty-two patients in Se-

TABLE 15. *Age Distribution of Patients with Mammary Carcinoma Treated by Radical Mastectomy with Regional Node Dissection*

Age	Series I		Series II	
	No.	%	No.	%
Under 45 years	12	20	86	23.5
45–54	15	25	107	29
55–64	20	34	88	24
65 years and over	12	20	86	23.5
Mean age	54		54	
Totals	59		366	

ries II (6.0%) received prophylactic preoperative or postoperative x-ray treatment. The mean age of our patients was 54 years. The age distribution is shown in Table 15.

Mortality and Morbidity

The mortality of Series I and II together was approximately 1.0 per cent. In Series I, one patient was lost the thirtieth day after operation because of uremia caused by lung and kidney infarctions.

In Series II, three patients were lost. The first died of embolus in the pulmonary artery two days after the operation. The second died the twelfth day because of a perforated diverticulum of colon, with peritonitis. The third died the thirty-ninth day in her home because of embolus in the pulmonary artery. All these four patients were between 63 and 65 years of age.

In Series I the parasternal dissection was complicated in five instances with pleural perforation. The anesthetist kept the lungs expanded during closure of the wound. In only two instances needle aspiration was necessary later in the postoperative stay. These patients were followed radiographically. A patient with pulmonary infarction was treated with anticoagulants.

In Series II there were the following complications. The supraclavicular dissection was complicated in one case of bleeding from the suprascapular artery close to the subclavian artery, and the medial third of the clavicle had to be resected to get

HAAGENSEN AND OTHERS

TABLE 16. *Five-Year Survival;*
Series I—59 Cases—1950–1952

Columbia Clinical Classification	No. Patients	No. Surviving Five Years	% Surviving Five Years
A	40	22	55
B	8	4	50
C	6	4	66
D	5	0	0
Totals	59	30	51

TABLE 17. *Five-Year Survival;*
Series II—366 Cases—1951–55

Columbia Clinical Classification	No. Patients	No. Surviving Five Years	% Surviving Five Years
A	277	213	77
B	61	29	48
C	20	10	50
D	8	3	37
Totals	366	255	70

access to the area to get a safe ligature. The patient is alive after five years with considerable edema of the arm. She was 69 years old at the time of operation. One case was complicated by lesion of the thoracic duct causing a cyst in the supraclavicular region. This was repaired successfully six months later.

In Series II the pleura was perforated in 22 instances. No special treatment was given. In one patient the opening in the pleura was so great that it was treated with suction drainage.

In seven patients postoperative pneumothorax was treated with needle aspiration. In three patients serous or hemorrhagic effusion in the pleural cavity was aspirated.

Two patients leaving the hospital without signs of pleural complications were later successfully treated in other hospitals for empyema.

In two patients subcutaneous emphysema required no treatment. Two patients with pulmonary atelectasis were treated conservatively. In 11 patients lung infarction occurred (not counting two who died).

Four patients developed abscess in the parasternal region. Two of these had necrosis of the cartilage of one or two ribs. After resection of the necrotic cartilages the wounds healed.

There were five patients with phlebitis in the lower extremities, and two in the upper extremities.

Of all our patients approximately 50 per cent were home two weeks after the operation. The mean duration of postoperative stay was 17 days in Series I and 19 days in Series II.

Seventy-one per cent of all our patients had healed wounds when leaving the hospital. The rest had a little secretion from

TABLE 18. *Series I—59 Cases—1950–52; The Frequency of Regional Lymph Node Metastases*

Columbia Clinical Classification	All Cases with Node Metastases		All Cases with Internal Mammary Metastases		Internal Mammary Metastases Alone	
	No.	Alive After 5 Years	No.	Alive After 5 Years	No.	Alive After 5 Years
A	17	6	9	4	4	0
B	7	3	1	0	0	0
C	4	2	3	1	0	0
D	5	0	2	0	0	0
Total	33	11	15	5	4	0
5-Year Survival Rate		33%		33%		0%

TABLE 19. *Series II—366 Cases—1951–55; the Frequency of Regional Lymph Node Metastases*

Columbia Clinical Classification	All Cases with Node Metastases		All Cases with Internal Mammary Metastases		Internal Mammary Metastases Alone	
	No.	Alive After 5 Years	No.	Alive After 5 Years	No.	Alive After 5 Years
A	88	58	36	22	10	6
B	47	22	18	7	1	1
C	8	0	2	0		
D	8	0	3	1		
Total	151	80	59	30	11	7
5-Year Survival Rate		53%		51%		64%

the axillary drainage, small defects or necrosis along the suture line, and so forth.

Lymphedema of the arm was estimated by measuring the upper arm around the middle part and the lower arm just below the elbow on both arms. A difference of 1.0 cm. in circumference is called normal.

In Series I and II together were found the following data: 54 patients had a circumference plus 1.5 to 2.5 cm. on the operated side on the upper arm; 19 patients had plus 3.0 cm.; one patient had plus 4.0 to 8.0 cm.

Most of these patients also had some edema of the lower arm. In ten patients we found plus 2.0 to 6.0 cm. on the lower arm without measurable edema of the upper arm. Three started with an infection in the arm, and it disappeared again in two.

Increasing edema or edema starting some time after the operation often was an early sign of recurrence.

In all, lymphedema was found in 101 of 429 patients operated upon. Most had no complaints. Approximately 20 per cent mentioned pain.

Results

In Tables 16 and 17 the survival rates have been calculated for the Stages A to D in our two series of cases.

The operation in Series II was more extensive. The mean operation time was 107 minutes in comparison to 66 minutes in Series I. The five-year survival rates are at the same time better in Series II than in Series I, even though 69 per cent received postoperative x-ray treatment in Series I, and only 6.0 per cent in Series II had preoperative or postoperative x-ray treatment.

The incidence of microscopically verified axillary as well as internal mammary metastases, and the survival rates of the patients who had such metastases is shown in Tables 18 and 19. It is interesting that internal mammary metastases not accompanied by axillary metastases, were found only in clinical Stages A and B.

The prognostic importance of internal mammary invasion would appear to be of the same order as the importance of metastases to other regional nodes.

Total Mastectomy with Axillary Dissection and Irradiation for Mammary Carcinoma

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DURING the eight years 1948–1955 a total of 828 new patients with mammary carcinoma were seen or treated at St. Bartholomew's Hospital. This figure *excludes* patients who had had mastectomy elsewhere, but were referred to the hospital for postoperative irradiation.

In these 828 patients the initial treatment varied. In 314 it was radical mastectomy with or without irradiation. Others were treated by local excision of the carcinoma, or by irradiation alone. In a series of 142 patients the initial treatment was total mastectomy with axillary dissection and postoperative irradiation. It is with this last series of patients that the present report is concerned.

The age distribution of the patients in this series is shown in Table 20. Their mean age was 54 years.

Technic of Treatment

The surgery was carried out by eight surgeons and thus not quite standardized. The skin incision varied, but in the majority of patients it was transverse or oblique. The skin flaps were full thickness. In all patients careful excision of the entire breast was carried out. The pectoral muscles were

TABLE 20. *Age Distribution of Patients*

Age	%
Under 45 years	20.4
45–54 years	32.4
55–64 years	24
65 years and over	23.2

Mean age 54 years.

not removed. The wounds were closed without skin grafts.

The extent of the axillary dissection varied. Some of the eight surgeons removed only the lower axillary nodes in continuity with the breast, while others dissected the axilla as high as the first rib.

Mr. D. F. Ellison Nash who performed the operation in a number of the patients in our series commonly used a tri-radiate incision embracing the tumor at the center together with the areola. Sometimes he employed a transverse incision carried straight across the axilla. The flaps were cut fairly thick, and no attempt was made to remove the fat. Diathermy was used, and the pectoral fascia was usually taken off the surface of pectoralis major.

In Mr. Nash's technic the axilla was cleared *en bloc*, commencing at the lateral side by exposing the brachial vein, and the clearance usually extended up to the first rib. No attempt was made to remove every spot of fat in the axilla, but the key anatomical structures were defined and the highest lymph node was usually separated for specific biopsy. Great care was taken to avoid the use of retraction in the axilla, and a Czerney retractor was used only on the edge of pectoralis major. Continuous section drainage using a plastic bottle with a portex tube taken through the wound was employed. Firm bandaging and immobilization of the arm for five days was standard.

The approximate operating time in our series of 142 cases was one and one-half to two hours. There were no operative deaths (*i.e.*, within three months of mastectomy).

Radiotherapy was started on the eighth postoperative day when the wound was sufficiently healed to allow us to move the arm and position the patient. Radiation factors: 250 Kv. 15 Ma. 2.0 mm. Cu. H.V.L. The chest wall was irradiated through the medial and lateral tangential fields varying in length from 15 to 20 cm., according to the size of the patient. The average separation was 14 to 16 cm. The apex of the axilla and supraclavicular regions were irradiated through a single anterior field, the dose to the apex being supplemented through a smaller parallel posterior field.

The treatment time was four weeks. The skin dosage incident to the chest wall was 3,500 r. This gives an average of 3,800 to 4,200 r over the whole chest wall. The skin dose to the gland fields totalled 3,000 r per field. The skin dose to the apex of the axilla was 3,600 to 4,000 r. Full bolus was used, and each treatment was supervised by a medical officer. This dosage leads to an even second degree reaction which heals with pigmentation. In a few patients there is a moist severe reaction. There has been no incidence of radionecrosis of soft tissue.

TABLE 21. *Five-Year Survival*

Columbia Clinical Classification	No. Patients	5-Year Survivals	% 5-year Survivals
A	68	49	72
B	57	34	60
C	16	6	38
D	1	0	0
Totals	142	89	63

Prophylactic oophorectomy was not done in our series of patients.

Results

Our 142 patients were staged according to the Columbia Clinical Classification. The five-year survival rates by stage are shown in Table 21. Although the numbers of patients in the different stages are not large, the survival rates show the expected graded fall from Stages A to D, in keeping with the advancing extent of the disease. This fact suggests that our continuing results, as we augment our series of cases, will be similar.

Simple Mastectomy Plus Postoperative Irradiation
By the Method of McWhirter for Mammary Carcinoma

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(Chief: Professor Jens Nielsen)

SINCE November 1951 all new patients with breast cancer referred to the Radium Center, Copenhagen, and domiciled in Copenhagen, have been divided into two groups (random series). The treatment in operable cases has been as follows: In one group simple mastectomy was performed at Bispebjerg Hospital, Departments A and M, and postoperative roentgen irradiation by the McWhirter method given at the Radium Center; in the other group extended radical mastectomy by the method

TABLE 22. *Age Distribution of the Patients*

Age	%
Under 45 years	20.6
45–54 years	31.2
55–64 years	29.6
65 years or over	18.6

Mean age 54 years.

of Dahl-Iversen was performed at the University Hospital (Rigs hospitalet), Department C. The patients of the latter group did not receive postoperative irradiation. The primary examination, staging, and follow up in all of these patients took place at the Radium Center.

This report deals with the results of the former group in which the treatment was according to the principles of McWhirter. A total of 199 patients was included in this group. Their age distribution is shown in Table 22.

Technic of Treatment

The surgery in our series of patients treated by the McWhirter method consisted of simple mastectomy only. The amount of skin removed was limited in order to permit primary closure of the wound without the use of skin grafting. It was only in cases where the tumor was fixed to the pectoral fascia that this fascia was removed together with part of the pectoral muscle. No axillary dissection was carried out.

Postoperative roentgen irradiation was started as soon as the operative wound had healed, usually about two weeks after the operation. The irradiation was given to the fields used by McWhirter, an anterior and a posterior field to the axilla and supra-clavicular region (Fields I and II), and two opposed tangential fields to the chest wall including the internal mammary chain on the operated side (Fields III and IV). These fields are shown in Figure 1. The limit between the anterior field to the axilla and supraclavicular region, and the two tangential chest fields was a transverse line along the upper edge of the second costal cartilage, the shoulder being drawn well up, the arm abducted about 90° to the shoulder, and the head turned to the opposite side. The anterior field was 24 ×12 × 10 cm. reaching to the midline, and with a small lead shielding of the larynx. The posterior field was 24 × 10 cm., of an oblique course covering both the axilla and supraclavicular region. As a rule, the distance between these fields was 12 to 16 cm. The two tangential fields were 10 × 15 cm. the limit of the medial field being along
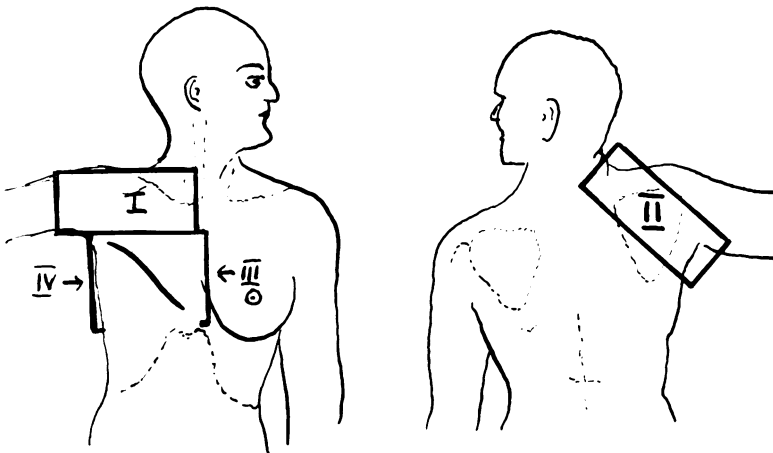

Fig. 1. Radiation fields for the McWhirter technic.

TABLE 23. *Five-Year Survival*

Columbia Clinical Classification	No. Patients	No. 5-year Survivors	% 5-year Survival
A	159	112	70
B	28	14	50
C	9	2	22
D	3	0	0
Totals	199	128	64

the sternal border on the non-operated side and the limit of the lateral field in the mid-axillary line. The distance between the two tangential fields was usually 16 to 20 cm. In all the fields applicators were used, in the tangential chest fields with jigs fixed to the applicators. At all fields bolus bags were used. In treating the axillary and supraclavicular fields the voltage was 400 kv. and the focus skin distance 70 cm.; tangential fields: 250 kv. and 50 cm. focus-skin distance. The half-value layer was 3.5 mm. of copper. All the fields were treated daily for three weeks (18 treatment days). The maximum tissue dose was originally 4,500 r. but was later reduced to approximately 4,200 r. This resulted in dry epidermitis, and at times a limited area of moist reaction at and in front of the anterior axillary fold. The central doses varied with the distance between the fields. The mid-axillary dose was in most cases 3,800 to 4,000 r.

TABLE 24. *Random Series; 5-Year Survival*

Columbia Clinical Classification	McWhirter's Method No. Patients	McWhirter's Method % 5-year Survival	Extended Radical Mastectomy No. Patients	Extended Radical Mastectomy % 5-year Survival
A+B	187	67	166	69
A	159	70	134	74
B	28	50	32	47

TABLE 25. *Results of Treatment in Mammary Carcinoma; 5-Year Survival Columbia Clinical Classification*

Columbia Clinical Classification	Kennedy & Miller Simple Mast. No.	% Surv.	Handley & Thackray Conservative Rad. Mast. No.	% Surv.	Butcher Rad. Mast. No.	% Surv.	Haagensen & Cooley Rad. Mast. No.	% Surv.	Dahl-Iversen & Tobiassen Super-Radical No.	% Surv.	Williams & Curwen Total Mast.+Ax. Dis.+Irrad. No.	% Surv.	Kaae and Johansen McWhirter's Method No.	% Surv.
A	115	62	77	75	216	76	344	84	277	77	68	72	159	70
B	34	41	58	57	135	48	138	59	61	48	57	60	28	50
C	18	22	8	25	48	48	63	43	20	50	16	38	9	22
D	45	13	0	—	26	11	11	18	8	37	1	0	3	0
Totals	212	45	143	65	425	60	556	72	366	70	142	63	199	64

TABLE 26. *Frequency of Axillary Metastases (Percentage)*

Columbia Clinical Classification	Butcher	Haagensen and Cooley	Dahl-Iversen and Tobiassen
A	32.2	32.2	27.9
B	75.5	76	75.4
C	89.5	76.2	42.9*

* The number of cases is too small to have any statistical significance.

Results

The patients in our series were staged according to the Columbia Clinical Classification. Table 23 gives the five-year survival for the period November, 1951 to June, 1956. In Stage A there was a 70 per cent five-year survival, in Stage B, 50 per cent, and in Stages A and B together, 67 per cent.

It may perhaps seem strange that the number of patients in Stage B is relatively small compared with the number in Stage A, but this is not due to any kind of selection of cases for this form of treatment.

The survival rates for the different stages, A to D, show the expected fall in keeping with the advancing stage of the disease.

In our random series of patients treated by simple mastectomy plus postoperative irradiation by McWhirter's method, or the extended radical mastectomy by the method of Dahl-Iversen, we have found the five-year survival as shown in Table 24.

Discussion

We have called attention to the modern disagreement regarding the treatment of carcinoma of the breast, and emphasize that the choice of treatment should depend primarily upon the stage of the disease. We present a new clinical classification which makes it possible to define the earlier stages of breast carcinoma with reasonable accuracy. Applying this classification to the case material in seven clinics using different therapeutic methods, we have compared the results of treatment in the different stages of the disease (Table 25).

The first point to make regarding our comparison is that the numbers of patients in Stages C and D are too small, in several of the case series, to permit any valid comparisons. Useful comparisons between the results in the different case series are therefore limited to the earliest stages—Stages A and B. Fortunately, these are the stages in which the choice of treatment is the most controversial.

A question of the greatest importance is whether or not the Columbia Clinical Classification, upon which our comparison is based, is a reliable classification. There are two facts which suggest that it is accurate. The first is the regular manner in which the survival rates in all of the seven case series fall off with the advancing stages of the disease from A to D. The second kind of confirmation of the validity of our clas-

TABLE 27. *Age Distribution of Patients with Mammary Carcinoma (Percentage)*

	<45	45–54	55–64	65>	Mean Age
Kennedy & Miller	20.3	26.9	27.3	25.5	56
Handley & Thackray	22	35	25	18	53.6
Butcher	20	30.1	26.8	23.1	55
Haagensen & Cooley	27.9	32.9	20.7	18.5	53
Dahl-Iversen & Tobiassen	23.5	29	23.5	23	54
Williams & Curwen	20.4	32.4	24	23.2	54
Kaae & Johansen	20.6	31.2	29.6	18.6	54

sification is seen in Table 26 which shows the frequency of axillary metastases in the three-case series (Butcher, Haagensen and Cooley, and Dahl-Iversen and Tobiassen) in which the axilla was dissected. The findings are astonishingly similar in all three-case series, and lead us to believe that our method of clinical staging is reasonably accurate. It is encouraging that it is possible with our modern clinical methods to describe and classify a complex biological phenomenon like mammary carcinoma with this degree of accuracy.

The possibility of differences in the ages of the patients in seven-case series being a factor in the differences in the results is one which must be considered. Table 27 shows the age distribution of the patients.

The question of the statistical significance of the survival rates in the different case series will certainly be raised. The data here presented bear so little resemblance to the kind of material to which the usual statistical tests of significance, such as the Chi-square test, are applied, that dependence on such tests is questionable. We have therefore not presented any calculations of this kind.

Nevertheless, our belief is that our comparison is a valid and interesting one. Our hope is that these data will receive critical study, and that our clinical classification of breast carcinoma will be used in other clinics.

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