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ROCHESTER INSTITUTE OF TECHNOLOGY

A Thesis Submitted to the Faculty of
The College of Fine and Applied Arts
in Candidacy for the Degree of
MASTER OF FINE ARTS

**Breast Cancer:
Options In Care and Treatment**

**By
Elliot Friedman**

August 8, 1988

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Forward

After investigating information regarding the facts of breast cancer, I came to the conclusion that most of the written material were presented as oversimplified pamphlets, or extremely detailed statistical studies that could be only interpreted by a physician. The intention of this thesis is to create an informative document that would describe information on breast cancer, but with terms that could be understood by the patient. My thesis presents this information as one, in a series of pamphlets and video productions, that would communicate these facts using illustrations as well as documentation. This brochure is intended to be used as a prototype, from which, an entire series of related topics could be constructed using the same format and comprehensive language. The areas presented here are facts regarding breast cancer development, types of breast cancers and their treatments. Included, will be the surgical procedures practiced most widely in today's hospitals.

I have also created a series of graphics (in video format) depicting the surgical procedure of a modified radical mastectomy. This would be used by the surgeon or oncologist, in the office, to explain one option in surgery to the patient. These illustrations are intended to support the information contained in the corresponding brochure, *Options in Surgery*. The surgical graphics will also be created as an example, with the future intent of using the same format to clarify other areas of concern to the patient.

1

Cancer Development

he Cancer Cell

Cancer is a disease characterized by the uncontrolled growth and spread of abnormal tissue cells. At a specific time in the life cycle of a normal cell, mitosis occurs. This is the moment when the cell, along with all of its components, duplicate themselves exactly. Before this can occur, the genes, attached to the chromosomes within the nucleus of the cell, have to replicate themselves to provide a blueprint for the two daughter cells. Normally, after division takes place, the daughter cells acquire the unique characteristics allowing them to contribute to the function and existence of the living organism.

In a cancerous situation, certain cancer causing agents, or carcinogens, have influenced the genetic makeup of the dividing cell forming two abnormal cells. This is a multi-stepped process, whereby, certain chemical compounds act as an initiator permanently altering these cells. Some time later, the cells are exposed to another carcinogen, which acts as a promoter, further altering them to reproduce continuously and form an abnormal growth or tumor.¹

Usually, the cell's structures and functions are limited to its tissue's general characteristics. Cells that form cancerous growths are characterized by an uncontrolled rate of division and the ability to invade adjacent tissues. They are further characterized as having the life threatening potential of metastasizing. This is the process where cancerous cells can detach themselves from a primary tumor site, travel via the lymphatic system or bloodstream, and establish a completely isolated secondary site in another area of the body.

Not all abnormal growths are considered cancerous. Benign tumors are encapsulated abnormal tissues which do not have the ability to metastasize and are, therefore, in most cases, not life threatening. The ability of this type of growth to produce harmful effects, is by the physical volume of its mass and the location of the site. Usually, they can be excised entirely by surgery, without the chance of recurrence.

2

Cancer of the Breast

Anatomy of the Breast

The breasts or mammary glands are organs of the female reproductive system that are specialized for the production and secretion of milk following pregnancy. They developed from parts of the skin and are actually modified sweat glands. Each gland is composed of fifteen to twenty irregular shaped lobes with their ducts leading to the external surface of the nipple. The lobes are separated from each other by dense connective tissue and adipose (fat) cells. These tissues help by supporting and attaching the structures to the pectoralis muscles located directly behind them. The entire gland; the breast's lobes and lobules (smaller lobes), along with its blood supply and supporting structures, is enclosed by a membrane called the fascia. Additional connective tissues called suspensory or Cooper's ligaments, extending from the skin of the breast to the fascia, aid in supporting the weight of the breast (plate 1).

The Lymphatic System

Another major system that is associated with the breast is the regional lymphatic system. Lymph is the accumulation of tissue fluids between cells of any organ. Usually free of red blood cells, except in cases of injury, lymph is composed of white blood cells and a rich volume of protein. Lymph is collected in microscopic, thin walled vessels forming the lymphatic drainage system. Lymph from the outer quadrants (quarter sections) of the breast flows to the axillary lymph nodes and then through subgroups of nodes in the armpit, neck and near the first rib. Lymph from the inner or central half of the breast flows towards the sternum and through spaces between the ribs.

The lymph node is a structure approximately the size and shape of a kidney bean. It is composed predominately of two cell types; lymphocytes (white blood cells) and histocytes (macrophages), which are both utilized in various types of immune mechanisms. It is known that these tiny structures are active in the filtration of bacteria and toxic products as well as

immunological responses. It is not clear, however, whether the lymph node acts as a filtration system, preventing cancer cells from spreading beyond this anatomical position, or if the lymphocytes and histocytes within each organ, have an active role in the destruction of the cancer cell.

Function of the Breast

The breast's primary purpose is for the lactation of milk. To achieve this, the breast tissue is highly sensitive to changes in levels of naturally occurring hormones. At adolescence, the breast tissue and milk ducts enlarge. The branching system of lactiferous ducts increase in size and number, terminating at the lobules which are triggered for further development at the time of pregnancy. Throughout the menstrual cycle, the glandular tissues of the breast undergo monthly changes. During the early months of pregnancy, major diversification of the lobular structures takes place and, just before birth, complex changes occur in preparation for lactation. Milk is produced as long as the baby is feeding and when terminated, the lobules decrease in size and number, with the breast, as a whole, shrinking in size and weight. Following menopause, fatty tissue replaces glandular tissue within the breast. This synopsis of the functional process of the breast illustrates that mammary tissue and cell division are constantly being influenced by hormonal activity. Breast activity is the result of the normal aging process and by natural physiological changes such as the menstrual cycle, pregnancy, lactation and menopause activity.

Breast Cancers

Cancers are usually named by the body tissue from which they have originated. Breast cancer cells originate in the tissues of the breast. Should metastasis occur, the secondary sites are also composed of breast cancer cells. This enables pathologists to determine whether the tumor cells under observation, are from a primary or secondary site. In most cases, cancerous tumors arise in the epithelial tissues of the breast's milk producing apparatus and are called carcinomas. About ninety per cent originate in the lactiferous ducts. Lobular carcinomas account for about five per cent with the remainder falling into two special categories; Paget's disease or inflammatory cancer.²

Breast cancers are further classified as non-aggressive or aggressive types. Non-aggressive tumors are confined to the ducts of the breast. Aggressive types, have left the primary tissue site to invade the borders of the ducts by entering either the fatty or fibrous tissue of the gland.

Growth rate, Size and Contour

The rate, by which newly cancerous tumors grow, expand and invade foreign tissues, varies greatly. This growth rate is usually termed as its *doubling time*. That is the time it takes to double the tumors diameter and increase its volume eight fold. It can vary from more than a year to just a few days. As a tumor advances in age, so does the length of its doubling time. Normally, a tumor has to be from one to one and a half centimeters in size before it can be felt by physical examination. To reach this size, a tumor would have to be developing in the body for years with the possibility of metastasis taking place.

In general, the larger the tumor is, the greater are the chances of secondary sites being established. Size and metastasis correlate directly with prognosis. Larger tumors, and tumors with infected lymph nodes are harder to control and cure. Prognosis is also influenced by the shape and contour of the tumor. If evenly rounded and smooth growths are observed, the chances of control and cure are increased. Those that are observed with jagged or irregular edges have a greater ability to invade adjacent tissues or vessels.³

Benign verses Malignant

The word tumor, in the dictionary, simply means "a swelling". Usually a physician will precede the word tumor with either benign or malignant. Benign and malignant tumors are differentiated by 1) cell characteristics, 2) growth procedures, 3) growth rate, 4) potential for metastasis, 5) recurrence, 6) and the tendency to cause tissue damage.

Benign tumors consist of well differentiated mature cell types. Expanding slowly, benign growths put pressure on the surrounding tissues. It is believed that the adjacent structures, reacting to this growth, produce a fibrous capsule which encapsulates the tumor entirely. By doing this, the capsule leaves a clear demarcation between normal tissue and the abnormal growth allowing for easier removal and less chance of recurrence.

Benign tumors rarely cause fatalities unless the location of the growth interferes with vital functions. If their presence disturbs the function of adjacent or distant structures by producing pressures on tissues, blood vessels or nerves, subsequent damage could occur.

In contrast, malignant tumors tend to grow very rapidly, spread widely and have the capacity to destroy regardless of their location. This destructive nature is due to their rate of growth, cell characteristics and the ability to spread. Primary malignant cells are found in the originating organ while secondary sites, found in other areas, consist of the same originating cell type. Metastasis occurs when an abnormal cell invades the lymphatic or vascular systems. After entering the lymph ducts, tumor cells lodge in regional lymph nodes for a short period. Eventually they break off, allowing for easy access to distant nodes and the bloodstream.

Classifying Tumors

Benign tumors are described by adding the suffix -oma to the name of the tissue from which it originates. Connective tissues can be made of fat, fibrous, cartilaginous, bone, blood or lymph vessel cells. Benign tumors of fatty origins are called lipomas from the word lipid for fat. Most tumors pertaining to glandular material are called adenomas. The most common, benign tumor of the breast affects the fibrous connective tissue and is therefore called a fibroadenoma.

Malignant tumors are classified a little differently. Cancers of the connective tissues are indicated by suffix -sarcoma, therefore, a cancerous tumor from fibrous tissue is called a fibrosarcoma. Epithelial and glandular tissue cancers are completed by the suffix -carcinoma. So cancers arising from the cells, lining the lactiferous ducts of the breast are, called adenocarcinomas, the most common form of malignant breast cancer.

The following is a brief description of major benign and malignant breast diseases:

Mastitis: Actually an inflammatory disease of the breast, mastitis frequently occurs during the period of lactation. During the early weeks of nursing, breast tissues are particularly vulnerable to infection due to

minute cracks and fissures that occur as a result of vigorous suckling. The breast area becomes tender, reddish and inflamed. If proper therapy is not constituted within a reasonable time, the possibility of an abscess may develop. Treatment for mastitis includes the application of heat or cold, antibiotics or excision in case of an abscess.

Intraductal papiloma: Originating in the lining of the mammary ducts, these small wart-like growths can occur at any age and should be removed because occasionally, they have found to be capable of producing malignancies. They are usually associated with bleeding from the nipple. Treatment, by excision, is capable of total cure.

Fibroadenoma: Usually found in younger premenopausal women, fibroadenomas are composed of fibrous and glandular tissues. They are asymptomatic and are usually noticed by accident. Clinical findings show a sharply defined round mass with solid characteristics. Treatment is confined to simple excision.

Fibrocystic disease: Cysts are fluid filled sacs of various sizes. Fibrocystic disease is the development of fibrous and cystic tissue formation. They are normally granular nodules of mass that develop after years of hormonal stimulation to the breast during the menstrual cycle. There is controversy towards the overuse of the term fibrocystic disease. Physicians are unsure whether it is nothing more than a natural artifact of mammatory changes or if it has a pathological relation to cancer. Treatment is usually symptomatic. Aspirin, heat and cold applications, dietary or surgical therapies are utilized.

Malignancies

Invasive ductal cancer: Characterized by an ill-defined lump within the breast, invasive ductal cancer infiltrates along the suspensory ligaments or the lactiferous ducts. It is the most common type of cancerous breast disease. Due to the undifferentiated histological appearance of these cells, it is also classified as "NOS" standing for, *not otherwise specified*. Originating as abnormal cells scattered throughout the fibrous connective tissue, they migrate rapidly into the lactiferous ducts and eventually the lymphatic system with the likelihood of metastasizing in other areas. Treatment is by excision and, if needed, other adjuvant therapies. The

less advanced this cancer is at the time of diagnosis, the better are the chances of control and cure without recurrence.

Lobular invasive cancer: Relatively uncommon when compared to ductal cancer, lobular invasive cancer behaves much in the respects as the earlier type. As the name implies, it primarily originates in the lobules of the breast and spreads to the surrounding regions very rapidly.

Staging

After a positive diagnosis has been established, it is critical to assess the most exact description to the clinical progress of the disease. A system has been devised to accomplish this through precise cataloging of cell characteristics and their spreading factors. It is called the TNM system. The T stands for the characteristics and size of the cell, M indicates the regional lymph node infestation and N stands for signs of secondary sites being present. The T is given a subscript of zero or a number from one to four progressing directly with the increase in tumor size. The N is given a zero or a number according to the degree of infected regional lymph nodes and the M is classified with either a zero or a one if signs of distant metastasis are evident.

A second, more informal, type of staging refers to cancer development as stages one through four. Stage 1 is when the disease is confined to the breast area alone. In stage 2, the disease is thought to have infiltrated into the regional lymph nodes. Stage 3 is a locally advanced state which is treated with radiotherapy following surgery. Stage 4, with its evidence of distant metastasis, is usually treated by some form of systemic therapy.

As an example, a tumor size of two centimeters, with no evidence of nodal infection or metastasis, would be ranked as T₁ N₀ M₀ with a stage 1 classification. If a tumor has grown to a size of five centimeters with infiltration into a secondary lymph region without evidence of metastasis, it would be summarized as T₃ N₂ M₀ with a stage 3 classification.

3

Treatments for Breast Cancer

Surgery

At one time, the removal of cancerous material from the breast and its surrounding tissues was a simple, non-controversial choice. The "Halsted" method was thought to be the only treatment to achieve this goal and was accepted to be a reasonable price to pay for the life of the patient. Today, it is no longer that simple to define the objectives of surgery or to select the most applicable procedures.

In the past thirty years, studies have shown that more conservative treatments can be applied under certain circumstances. No one form of surgery is now applied as a superior form of treatment. The prognosis is based upon the suspicion of hidden metastasis rather than on the extent of the primary surgery at the time of diagnosis.

Surgery as a Cure

The *Halsted radical mastectomy* removes the pectoralis major and pectoralis minor muscles and all of the axillary lymphatic contents up to the apex of the axilla (armpit). Postoperatively, there is a concavity beneath the collar-bone where the ribs, normally covered by the pectoralis muscles, can be seen. The addition of major scarring, swelling, loss of muscle power and the restriction of shoulder movement makes it a procedure that is avoided if at all possible.

The *Patey, or Modified radical mastectomy*, involves the removal of all breast tissue. This procedure leaves the pectoralis major muscle intact. The pectoralis minor muscle is sometimes removed to gain ease of access to the armpit so that all of its contents, which includes the lymph nodes within a pad of fat, may be cleaned out. This operation is the type most often practiced today, should circumstances permit. It accounts for decreased swelling and scarring allowing for easier methods of breast reconstruction.

The *total, or simple mastectomy*, as with the previous methods, removes all of the breast tissue including the axillary tail (breast tissue

extending into the armpit region) and an ellipse of the skin containing the nipple and the areola. It is conventional to take small samples of the regional lymph nodes that are conveniently at hand to test for the possibility of further spreading. The pectoralis muscles are left intact. Unfortunately, undetected metastasis is more likely to occur.

The *partial, or segmented mastectomy* removes just the portion of the breast infected, along with the covering membrane of the underlying pectoralis muscle. Infected lymph nodes may go undetected and the possibility of an abnormal breast shape following surgery may be possible.

A *lumpectomy* does not include the removal of the entire breast tissue, but only the breast area infected with the region of nodes to be tested for any spread of the disease.

Surgery for Local Control

Unfortunately, whatever method of surgery and complementary therapy is decided upon, there is a chance that local recurrence can occur. After scrutinizing the statistics, the surgeon is confronted with the decision as to the type of procedure to use. Psychological distress and rehabilitation periods can be minimized by simpler methods of surgery but if they are not adequate, the likelihood of recurrence is greater. The more extensive the surgery, the greater is the risk of lymphoedema (swelling by fluid) and the greater is the reconstruction process.

Surgery for Staging

Pathological status of the regional lymph nodes are the most significant variable affecting the stability of the patient. During primary surgery, it is necessary to extract samples of the lymph tissue in order to evaluate the extent of metastasis. The degree of surgical staging is varied among surgeons. Some believe total extracting of nodes up to the apex of the axilla is necessary while others remove only the lower third of the axilla. Still others feel that further extracting of nodes between the spaces of the first and second ribs give a clearer picture towards the spread of the disease.

Sampling of Tumor

Ideally, a portion of the primary tumor should be available for testing in order to evaluate its responsiveness to chemical and endocrine adjuvant therapies. This will allow the surgeon to analyze the effects of

supplemental procedures without the need of further surgery. Another benefit for sampling is to prepare specimens for biological research of cancer treatments in the future.

Breast Conservation

As stated earlier, today's surgeons are well aware of the psychological ramifications following the ordeal of a mastectomy. Surgical procedures are recommended to the patient with the understanding of such dilemmas. There are methods allowing for the removal of breast tissue without removing the skin or nipple (subcutaneous mastectomy) which enables that area to be replaced with a silicone implant. Other cases can be treated by local injection in conjunction with radiotherapy, or by radiotherapy alone.

The patient should be totally aware of alternative methods and approaches of surgery. Confiding with the surgeon and thoroughly investigating all of the options before treatment, aids in the accomplishments of proper decisions and confidence in the programs chosen.

Complementary Therapy

Surgery is not always an efficient means of totally removing all traces of cancer within the body. Complementary treatments are often necessary to rid the patient of any spread of abnormal growth that may have gone undetected or to prevent any new growth from occurring.

Complementary therapy can be divided into two select groups. Postoperative radiotherapy, utilized to improve local control, and adjuvant systemic therapy, which is used to destroy hidden elements of cancer throughout the entire body.

Radiation Therapy

Radiation therapy is used primarily to enforce local control and to prevent further metastasis of cancerous cells. In earlier diagnosed cases, for patients with smaller breast cancers, it is sometimes used alone. For external radiation treatments, a machine beams X-rays into the breast and possibly the underarm lymph nodes. In slightly more severe cases, it is a postoperative treatment used following a lumpectomy or a segmented

mastectomy. The area is treated for four to six weeks following recovery of surgery.

Side effects are common with the use of radiation therapy. As it destroys the cancerous cells, it can also destroy healthy tissues in the same region. Radiation also increases the the chance of lymphoedema when used in more radical treatments. It does not cause hair to fall out but can produce the symptoms of malaise and nausea. It is not known,however, whether these reactions are caused by psychological or biological conditions.

Adjuvant Systemic Therapies

More than two thirds of women subjected to a mastectomy have the likelihood that some form of cancerous tumor cells have migrated to a secondary site.⁴ Systemic therapies are treatments directed towards other vital organs. It may be used following a mastectomy, lumpectomy, or radiation. There are basically two types of systemic treatments; endocrine and cytotoxic (chemo) therapies. These systems have a range of side effects, therefore, it is necessary to have an accurate method of staging the spread of disease before prescribing a specific treatment.

Endocrine or hormonal therapy is used to treat breast cancers that have recurred or metastasized. Studies have shown that an oophorectomy(removal of the ovaries) or radiation of the ovaries, in conjunction with long term treatment of corticosteroids, can produce considerable improvements of survival as well as delaying further metastasis.

Adjunctive chemo-therapy is aimed at the destruction of established secondary sites and migrating cells. It is the use of singular or combinations of cytotoxic programs. No form of anti-cancer drug attacks only the abnormal cells, however, the differences in growth rates can be used to the normal cell's advantage. Unfortunately, this form of therapy also has a host of ill side effects. Chemotherapy can produce temporary hair loss, diarrhea, nausea, vomiting as well as affecting the auto-immune response.

4

The Modified Radical Mastectomy

Introduction

The advantages of the modified radical mastectomy are chiefly cosmetic. This operation stresses the preservation of the pectoralis major muscle with its nerve supply intact. It maintains the normal contour of the axillary region and allows for a better fitting prosthesis. Second, with the use of a transverse incision, no scar is visible, even with low-cut necklines. Third, the arm retains better strength and function with the incidence of arm edema (swelling) at a minimum.

The objections of surgeons performing this operation is that it is a more difficult procedure to do correctly. It will take the beginner longer to complete with more opportunities to get into difficulties and make errors.

The Operation

The operation could be divided into four parts: 1) The incision and elevation of the flaps. 2) Dissection of the breast from the underlying pectoralis major muscle, including its fascia. 3) The axillary dissection. 4) The skin closure and final dressing.

Incision, Formation of Flaps

An elliptical incision is oriented so that it slopes more laterally into the armpit area than towards the middle of the chest region. This allows for less visible scarring when the operation is completed. The nipple-areola complex are included within the ellipse with no attempt of preserving these structures. After marking the necessary region around the tumor, the elliptical incision is continued laterally towards the axillary region and medially towards the middle of the chest conserving as much skin as possible (plate 2).

The upper skin flap that is formed, is raised towards the level of the collar bone and the lower one retracted towards the abdomen, exposing the mammary gland. (plate 3) The importance here, is to dissect the skin and

underlying fat tissue without retaining any abnormal growth cells within the flap. Usually, there is a natural plane of dissection found between the subcutaneous layer of fat and the breast tissue. With careful attention, there is little chance that any breast tissue will be retained in the flaps of skin.

As stated earlier, the nipple-areola complex is not considered for preservation and is, therefore, included within the elliptical specimen to be dissected from the body. Should reconstruction be decided upon later, a nipple-areola reconstruction gives such excellent results that there is no reason to preserve the area if there is a chance of tumor infection. Past studies have shown that there is a 33% incident of involvement of nipple-areola tissues with cancer.⁶

Pectoralis Major and Minor muscles

The difference between the modified operation and the standard radical mastectomy is the preservation of the pectoralis muscles. After the skin flaps have been retracted, the breast tissue is dissected away from the underlying pectoralis major muscle starting at the midline of the sternum and proceeding outwardly, allowing the breast tissue to be reflected back and exposing the pectoralis muscles (plate 4). By doing this, the surgeon is able to gain better access to the axillary tail of the breast and its accompanying lymph nodes (plate 5). Many surgeons feel, however, that adequate dissection of the axillary region is only possible if the pectoralis minor muscle is removed. The axillary lymph nodes are found at three levels; level three is adjacent to the pectoralis minor muscle, level two is beneath the minor muscle, and level one is between the latissimus muscles and the minor. By removing the pectoralis minor muscle, the axillary artery and vein with the underlying nodal tissue is clearly visible. The average number of nodes removed is thirty seven.

Unfortunately, when the pectoralis *minor* muscle is removed, many of the nerves innervating the pectoralis *major* muscle are also affected unless certain procedures and routes of dissection are followed. The upper parts of both muscles are innervated from branches of the intercostal nerve which can be left intact by utilizing careful procedure.

Thoracodorsal Vessels and Nerves

Up to this point, the specimens removed are the breast tissue, axillary tail, nodal material, fascia and the pectoralis minor muscle. Another area of concern is the deep thoracodorsal artery, vein and nerves that supply function to the latissimus dorsi muscle of the upper back. Surgeons usually do not hesitate to remove these structures in order to gain a wide margin of safety around the tumor. Final control and cosmetic results would be minimally affected if the decision is made to remove these structures. When in doubt, the tendency is towards excision, preventing the chance of missing an infected area.

Closure

The skin is closed with an interrupted style of suturing, using 4-0 silk (plate 6). Two medium catheters are placed and brought through the lower flap in order to minimize scarring. This step creates a closed drainage system that is on continuous suction and is functioning during final closure. As the last sutures are being tied, creating a vacuum, axillary molding is taking place. This assures that the axillary skin flap is sucked up well behind the pectoralis major muscle making a major difference in the eventual appearance and speed of healing.

5

Production of Brochure and Surgical Plates

The purpose of creating these supplemental methods of communication is to complement any information that a surgeon or oncologist might wish to convey to the patient. The presentation has to be clear and explicit in order to achieve maximum comprehension. After carefully reviewing the data that I've accumulated during my investigation, I decided to explore the options in surgery in greater detail, although, any of the topics in my investigation could be used to construct a series of informative brochures to aid in the overall knowledge of the disease. I considered that the options in surgery might be the next step a patient would face following the outcome of a positive diagnosis. Any of the procedures could be rendered in video format as a visual aid to the patient's understanding. I chose the modified radical mastectomy as the example, because it is the operation most often used as a procedure for cure. Careful planning had to be utilized to avoid discouraging the patient when observing the video plates or reviewing the pamphlet.

Brochure

When I composed the data that was to be incorporated into the surgical brochure, I wanted to begin by stating that in the past there were very few options open to the surgeon in regards to surgical procedures. The only operations performed were radically oriented consisting of wide spread removal of tissue and major recuperative after effects. I wanted to make the patient aware that today's methods of treatment are far more conservative and offer more options to the surgeon. I then proceeded to list, with a brief description of each, the most widely used procedures today. Adjacent to this list, I included a simplified illustration of the normal breast with references to the structural tissues mentioned in the descriptions of the surgical procedures. Following the procedures, I continued to state other reasons why surgery is used when combatting the issues of breast cancer. I wanted the patient to understand that preventive measures are

surgically practiced to try and eliminate any further spread of the disease. The final areas of concentration were primarily concerned with making the patient aware that doctors are concerned with the patient's needs. They are attuned to breast conservation and psychological ramifications. I also stressed the importance of establishing a line of communication between patient and doctor in order to maximize confidentiality. Finally I concluded with a list of sources for further information.

The entire brochure, except for the drawing of the breast, was produced on the Macintosh computer, using the "Ready, Set, Go" program. Now I believe that the line drawing should have been done on the computer as well. Currently, I am more familiar with the programs available which would have saved a lot of time and copying problems. My intentions were to present an informative brochure without making it appear too flowery. Originally, it had a regimented "computerish" look, but after experimenting with the various patterns and rules available, I was able to create a brochure with a more open and feminine appearance.

Surgical Plates

The images I produced, depicting the surgical procedure of a modified radical mastectomy, are meant to be viewed, on TV, by the patient as the operation is explained by the surgeon. I realize that not everyone who is subjected to the ordeal of this operation would want to see the actual procedure laid out in front of them. I am sure, however, that there are many individuals who do want to obtain as much information about their condition and treatment as possible. I may be a little biased, but whenever I've had a medical problem, I would always inquire exactly what the steps are to full recovery, with as much detail as the doctor was willing to explain. In today's society, with greater emphasis on health and good fitness, I feel many people, in a circumstance such as this, would want to know as much of the facts as they can.

I still had to be quite tactful as I prepared to render these illustrations. I had to portray the operation accurately and clearly without offending either the surgeon or the patient. By starting the series with an anatomical cross-section of the breast, I felt that the patient would have a reference that could be of aid when viewing the rest of the video images. It is the

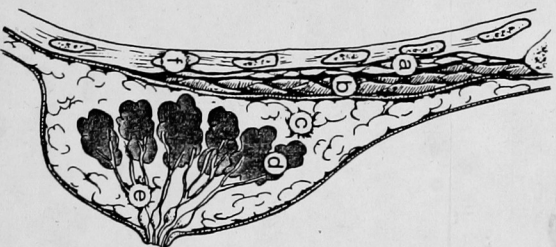
same illustration that I had used for the brochure only rendered in color. I also decided, by not showing any blood or actual cutting of tissue in my rendition of the surgery, offended patients would be kept to a minimum. I chose the steps which, I felt, were significant to understand the goals of the procedure. I also had to consider the format of presentation. The television medium plays havoc with illustrative material. The pieces had to be brightly colored and sharply rendered. To do this, I chose as a medium, colored pencils on colored paper. I was hoping that this technique would be more appealing to the patient as well. Each tissue or object was carefully cut out of individual pieces of paper, rendered, and replaced to form the final image. Having never worked with this conglomeration of materials before, this technique was completely experimental. The result was quite pleasing when I was finally able to view the finished pieces as a whole.

**Brochure and Surgical Plate
Illustrations**

CLINICAL FINDINGS

At one time, the removal of cancerous material from the breast and its surrounding region was a simple and non-controversial decision. The "Halsted" method was thought to be the treatment to achieve this goal and was accepted to be a reasonable price to pay for the life of the patient. Today, it is no longer that simple to define the objectives of surgery or to select the most applicable procedure.

In the past thirty years, studies have shown that more conservative methods can be applied under certain circumstances. No one method of surgery can be used as a superior form of treatment. The type of procedure used is based on the extent of hidden metastasis (spreading of the disease) rather than on the extent of the primary surgery at the time of diagnosis.



- a. Pectoralis minor m.
- b. Pectoralis major m.
- c. Fat body
- d. Mammary lobes
- e. Mammary ducts
- f. Rib

SURGERY AS A CURE

The "Halsted" radical mastectomy includes the removal of the entire breast, the underlying pectoralis muscles along with the axillary content up to the apex of the armpit. In some cases today, it is still being used but leads to major scarring and a hollow chest region following surgery. The addition of swelling, loss of muscle power and restriction of shoulder motion, makes it a treatment to be avoided if possible.

The "Patey" or modified radical mastectomy involves the removal of the breast, the underarm lymph nodes and the lining over the pectoralis chest muscles. Occasionally, the pectoralis minor muscle is extracted. This procedure is the most often type practiced today and accounts for decreased swelling and scarring which allows for easier methods of breast reconstruction.

The "Total" or "Simple" mastectomy includes the removal of the breast and only the nodes close to the breast region. The pectoralis muscles are left intact allowing for decreased swelling and easier reconstruction. Unfortunately, the chance of undetected metastasis is more likely to occur.

The "Partial" or "Segmented" mastectomy removes just the infected portion of the breast and the lining of the pectoralis muscle below. Infected lymph nodes may go undetected and the normal breast shape is most likely to be altered.

A "Lumpectomy" does not include the removal of the breast, but only the breast area infected and the immediate region of nodes to be tested for further metastasis.

SURGERY FOR LOCAL CONTROL

Unfortunately, whatever method of surgery and complementary therapy is decided upon, there is a chance that local recurrence can occur. After scrutinizing the statistics, surgeons are confronted with the decision of which procedure to use. Psychological distress and rehabilitation periods can be minimized by simpler methods of surgery but if they are not adequate, the likelihood of recurrence is greater. The more extensive the surgery, the greater the risk of lymphoedema (swelling by fluid) leading to a more difficult process of reconstruction.

SURGERY FOR DISEASE STAGING

Pathological status of the regional lymph nodes is the most significant variable affecting the stability of the patient. During primary surgery, it is necessary to extract samples of regional lymph nodes to stage the extent of metastasis. The degree of staging is varied among surgeons. Some believe that total extraction of nodes up to the apex of the axilla (armpit) is necessary while others feel that only the lower third of lymph tissue is needed for adequate evaluation. Still others agree that further extraction of nodes between the spaces of the first and second rib give a clearer picture as to the extent of the disease.

SAMPLING OF TUMOR

Ideally, a portion of the primary tumor should be available for testing in order to evaluate its responsiveness to chemical and endocrine adjuvant therapy. It will allow the surgeon to analyze the effect of subsequent therapy.

As stated above, today's surgeon is well aware of the psychological effects following the ordeal of mastectomy. Surgical procedures are recommended to the patient with the understanding of such dilemmas.

CONSULT WITH THE SURGEON

There are treatments allowing for the removal of breast tissue without removing the skin or nipple (Subcutaneous mastectomy). This enables the area to be replaced with a silicone implant. Other cases can be treated by local injection in conjunction with radiotherapy or by radiotherapy alone.

The patient should be totally aware of alternative methods and approaches in surgery. Confiding in the surgeon and thoroughly investigating all of the options involved in surgery, is necessary for proper decision making and confidence with the program chosen.

FOR ADDITIONAL INFORMATION

American Cancer Society
777 Third Avenue
New York, NY 10017
(212) 599-8200

American College of Surgeons
55 East Erie Street
Chicago, IL 60611
(312) 644-4050

American Society of Clinical Oncology, Inc.
435 N. Michigan Avenue
Suite 1717
Chicago, IL 60611
(312) 644-0828

Association of American Physicians and Surgeons
5201 Lyngate Court
Burke, VA 22015
(703) 425-6300

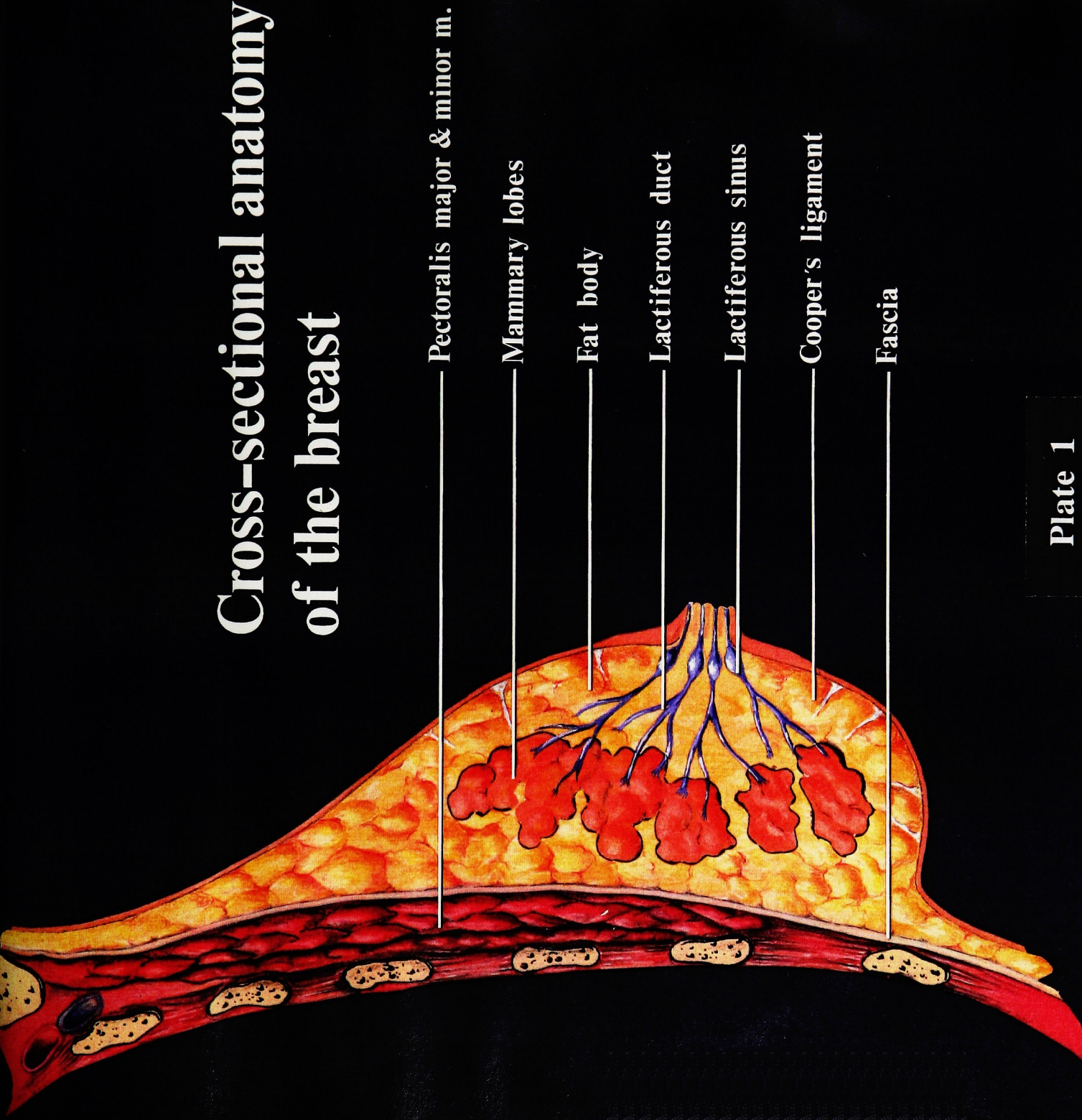
Medical Society of the State of New York
420 Lakeville Road
Lake Success, NY 11042
(516) 488-6100

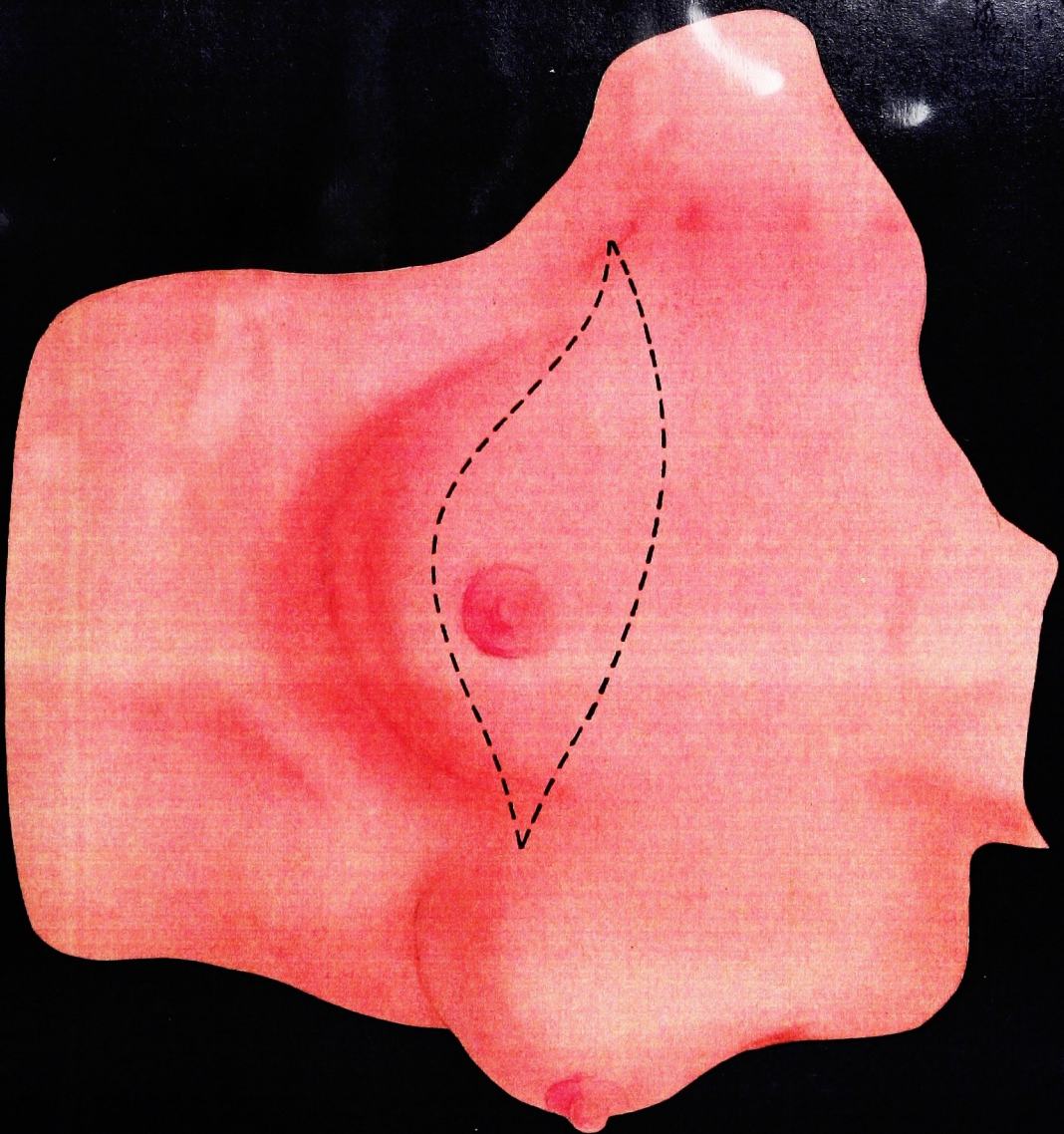
United Cancer Council, Inc.
1441 East Avenue
Rochester, NY 14610
(716) 473-8230

breast cancer

options in surgery

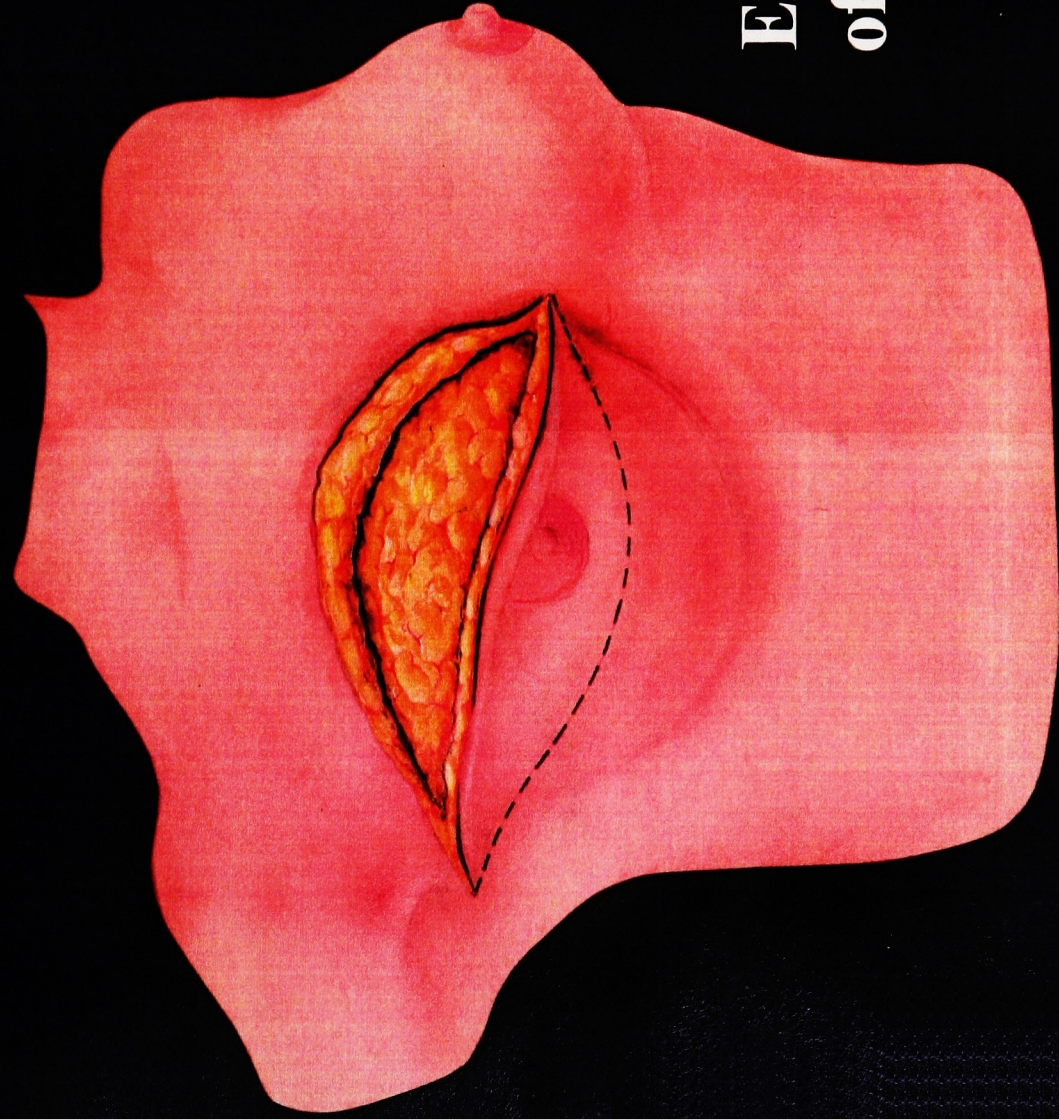
Cross-sectional anatomy of the breast

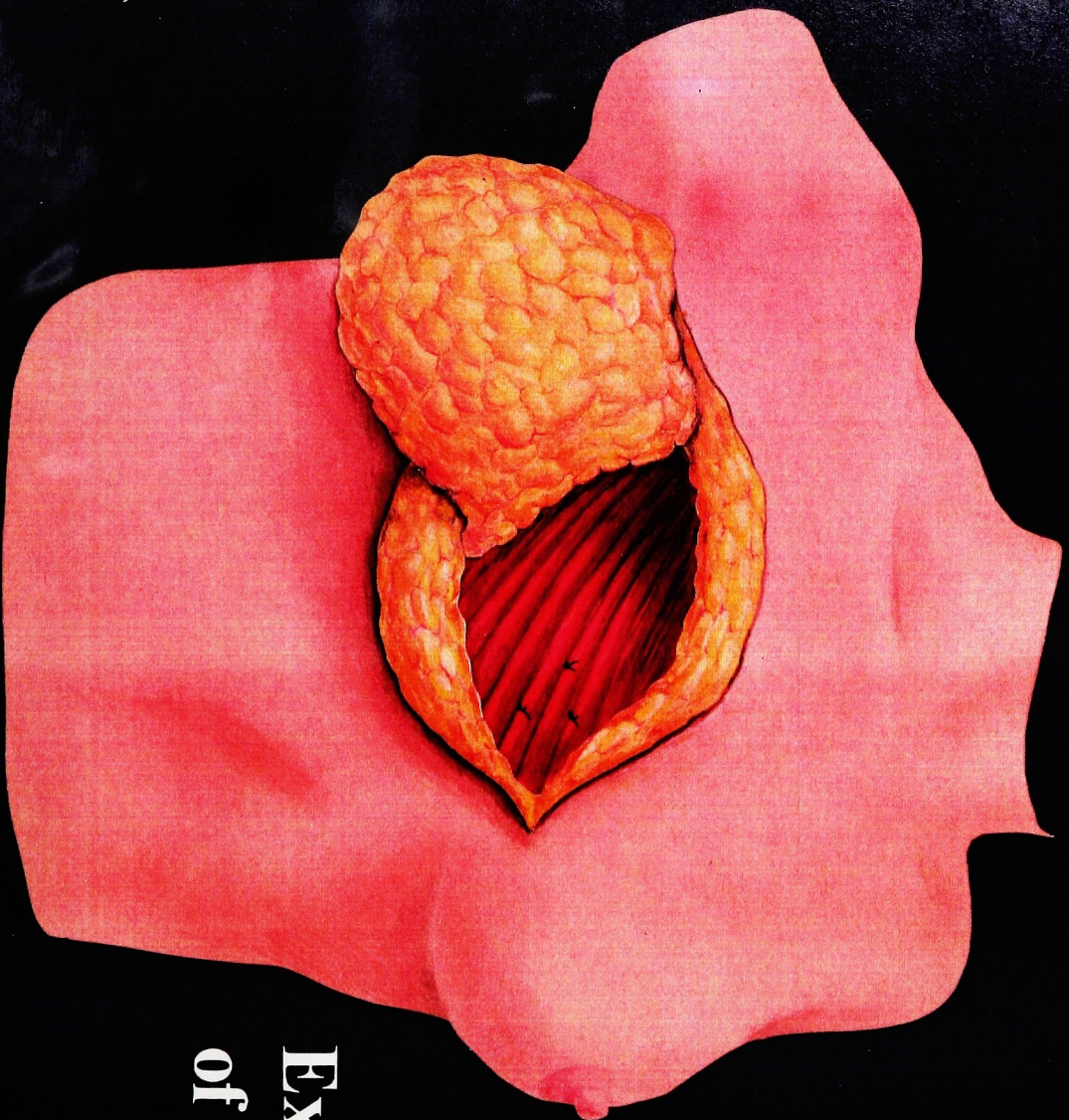




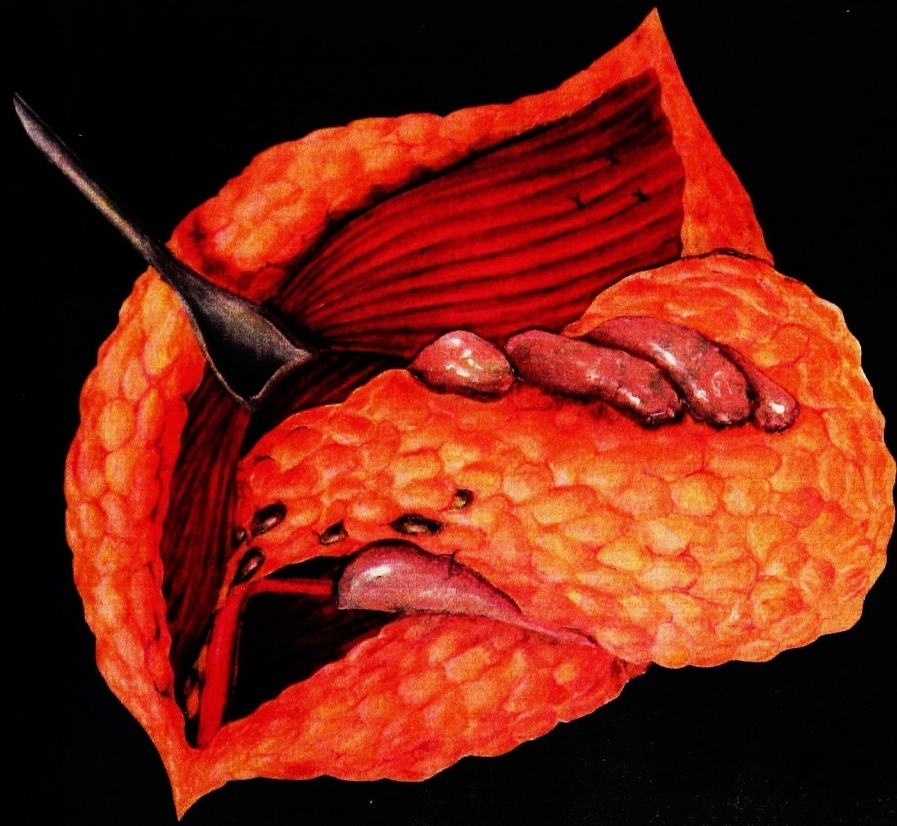
Incision

Exposure of mammary gland



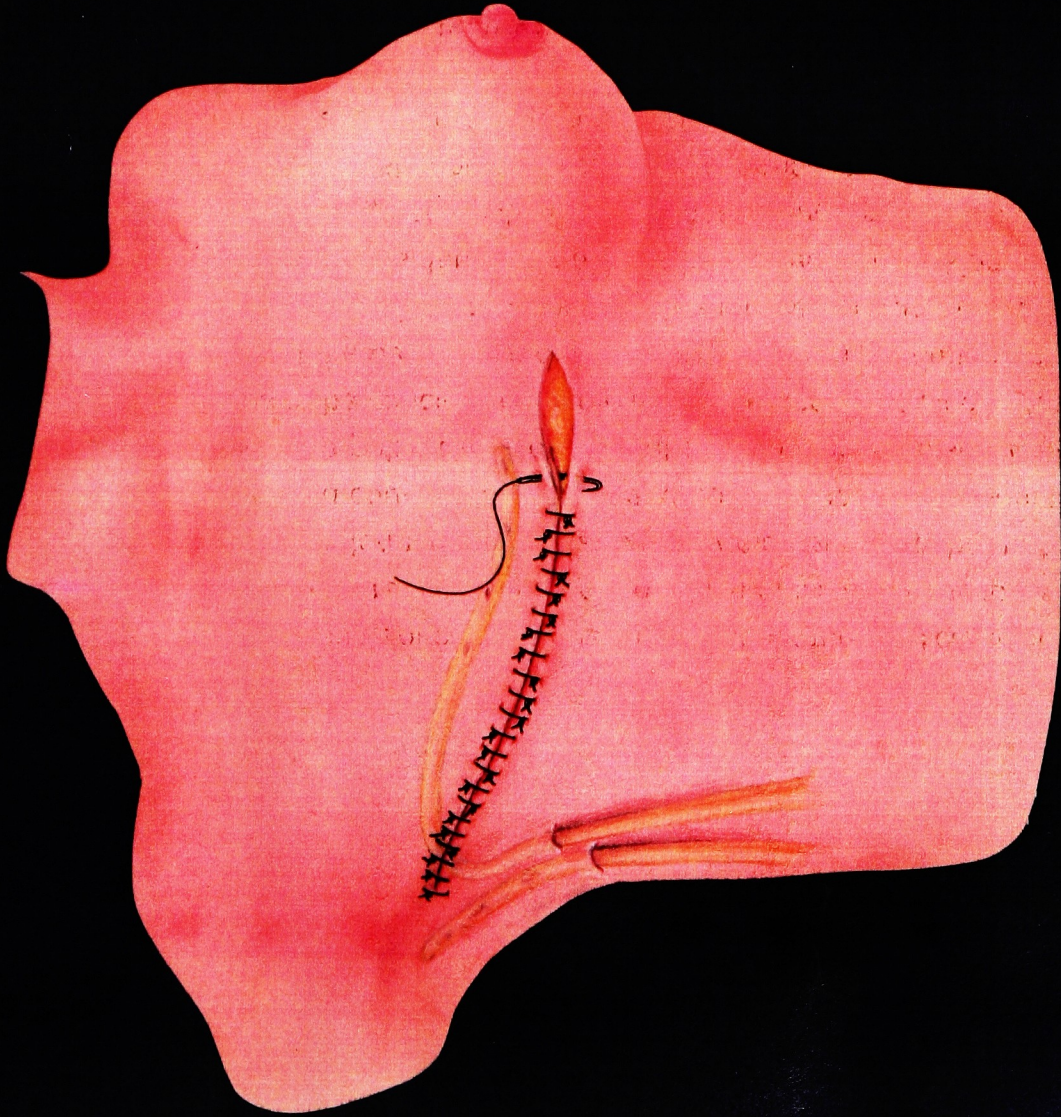


**Exposure
of Pectoralis muscles**



Removal of glandular material

Closure



Conclusions

Providing educational information about the medical aspects of breast disease can reduce the fear and sense of isolation associated with cancer. Well informed patients and family members may be more apt to follow prescribed courses of therapy and be knowledgeable about their care. Whether a patient's psychological state influences disease outcome remains to be conclusively proven, but the understanding of fears and concerns of the patient is a crucial foundation for confidence and open communication. When a patient and the families are properly informed, they should be considered as partners in the decision making process which will encourage adaptation to the disease and the treatments involved. The oncologists and surgeons are responsible for providing a foundation of information to the diagnosed patient in the clearest and most descriptive way.

Ironically, the terms, the medical field has chosen to use, when describing our own anatomy or physical ailments, are usually quite foreign to our normal vocabulary. Many medical conditions have to be thoroughly explained and translated to be understood by the lay public. Through the use of illustrative material, terms and conditions that are often confusing, appear to be a lot more understandable. Illustrations have to be carefully planned. The illustrator has to define his audience, the objectives of his illustrations and their intended presentation. In my situation, I wanted to render the illustrations as clearly and simply as possible yet include all of the vital information needed to convey such a crucial message. I feel I was successful.

Endnotes

1. National Cancer Institute. "Breast Cancer Digest". Bethesda, National Institute of Health. (1984). pp. 8-12
2. Ibid.
3. Harris, J.R., Hellman, S., Henderson, I.C., Kinne, D.W. "Breast Diseases". Philadelphia, J.B. Lippincott. (1987). pp. 1-10.
4. Kuehn, P. M.D. "Breast Care Options". South Windsor, Ct., Newmark Publishing Company. (1986). pp. 29-33.
5. Ibid.
6. Strombeck, J.O., Rosato, F.E. "Surgery of the Breast". New York, Thieme Inc. (1986). pp. 110-117.

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1. Harris, J.R., Hellman, S., Henderson, I.C., Kinne, D.W. "Breast Diseases". Philadelphia, J.B. Lippincott. (1987). pp. 1-10.
2. Williams, C.J. M.D., Buchanan, R.E. "The Medical Management of Breast Cancer". Baltimore, The John Hopkins University Press. (1987). pp. 39-42.
3. Kuehn, P. M.D. "Breast Care Options". South Windsor, Ct., Newmark Publishing Company. (1986). pp. 29-33.
4. Strombeck, J.O., Rosato, F.E. "Surgery of the Breast". New York, Thieme Inc. (1986). pp. 110-117.
5. National Cancer Institute. "Breast Cancer Digest". Bethesda, National Institute of Health. (1984). pp. 8-12