THE MANAGEMENT OF THE SWOLLEN ARM IN CARCINOMA OF THE BREAST

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The terms "brawny arm" and "lymphedema" have been given to the swollen arm which may complicate the inoperable, recurrent, or postoperative case of mammary cancer. Referring to those patients who have been subjected to radical mastectomy and have subsequently developed this unfortunate sequel without recurrence, Halsted coined the term *elephantiasis chirurgica* (surgical elephantiasis).

In about 10 per cent of those with advanced mammary cancer edema of the arm occurs on the side of breast involvement. Lymphedema is more common where recurrence has followed surgery and is most frequently observed as a sequel to the radical operation, even if there has been no return of the disease (25 per cent).

Brawny arm was formerly considered due to compression of the axillary vein by tumor tissue, and this view may be substantiated in certain cases. The axillary vein, however, may be excised in most instances without causing more than transient edema of the arm. This swelling is soft, in contrast to the brawny induration which is a result of lymphatic obstruction. The extirpation of the axillary lymph nodes and vessels is not wholly responsible for stasis. This complication arises when the smaller lymphatics about the shoulder have been occluded by the infiltration of tumor tissue or the fibrosis following irradiation, or postoperative infection. Halsted was convinced that postoperative infection was responsible for lymphedema when there was no recurrence of the disease. For this reason he advised loose approximation of the skin edges and Thiersch grafts in all cases where radical mastectomy was performed. He argued that necrosis of the edges of the incision followed the closure under tension and necrosis led to infection of the operative field. A low-grade streptococcal infection will cause a fibrosis of the lymph channels and once this is present in the skin there is a predisposition to subsequent attacks. A vicious circle is established.
At first the edema pits on pressure but it soon becomes solid. The arm becomes painful because of the tenseness of the skin and the compression of the nerves. It increases in size, often enlarging threefold. The skin is tense and shiny. There is a gradual diminution in muscular power until paralysis ensues.

In recurrent and inoperable cases where supraclavicular disease may be considered responsible for the swelling, irradiation by high voltage x-rays or radium packs may result in marked reduction in the size of the arm and relief of pain. It should be borne in mind that in the absence of supraclavicular disease lymphedema of the arm may result from pressure upon the innominate vein by enlarged metastatic mediastinal nodes or pleural effusion. Consequently, roentgenograms of the chest should be made in all cases where a swollen arm follows radical mastectomy.

The difficulties in the treatment of pure surgical elephantiasis are proportionate to the degree of swelling. Gentle massage of the arm from the wrist to the insertion of the deltoid muscle will often relieve minor lymphedema. The use of pressure bandages applied while the arm is held above the head, and allowed to remain for several hours, tends to diminish swelling. Suspension of the arm may prove beneficial. When swelling persists or increases in spite of these procedures, operative measures for relief may be considered.

There are two surgical procedures for the relief of lymphedema of the arm. One was proposed by Kondoleon and was developed primarily for the relief of elephantiasis of the leg. As modified for operations upon the arm, it consists of incisions extending from the wrist to the elbow on the lateral and mesial aspects of the arm and from the elbow internally to the axilla and externally to the posterior axillary border. The incisions are carried down to fascia and a strip of fascia is excised. The incisions are approximated loosely. The rationale of this operation is based upon the resulting anastomosis between deep and superficial lymphatics. In our hands this procedure is successful to a greater or less degree in about 50 per cent of the cases.

Lymphangioplasty, proposed by Handley, has not been tried as frequently. This operation consists in the introduction subcutaneously of continuous black silk from the wrist to the axilla and the scapula, through multiple puncture wounds of the skin. Through small incisions double No. 2 black silk is introduced by
means of a long probe. The silk is allowed to remain. Infection vitiates the result of this operation, for the silk acts as a seton until its removal.

Contraindications to either of these operative measures are:

(1) A condition of the patient which will not permit the use of a general anesthetic
(2) The presence of axillary, supraclavicular, or mediastinal disease
(3) Marked axillary pain

If these operations cannot be performed or have been done with little or no relief, the alternatives which remain are either:

(1) Employment of narcotics
(2) Amputation through the shoulder joint

In the absence of disease the use of narcotics seems inadvisable but when recurrence is extensive it would seem useless to resort to surgery. If fibrosis results from infection or irradiation, and palliative surgery has failed, amputation will have to be considered for the relief of pain and the encumbrance due to the hypertrophied extremity.
Two cases are appended which illustrate difficulties in the management of the swollen arm following radical mastectomy.

**Case 1:** S.W., an unmarried negress, forty-five years old, came to the Breast Clinic of the Memorial Hospital May 3, 1926. She had a carcinoma of the left breast which was operable. Preoperative irradiation consisted in the implantation of gold radon tubes in the tumor and axilla, giving a dose of 7,574 millicurie hours. One intermediate dosage x-ray cycle of four treatments was given over the left breast and lymph drainage areas. A radical mastectomy was done on May 28, 1926.

![Fig. 2. Case 1. Enormous Increase in Size of Left Arm Prior to Amputation.](image)

Postoperative convalescence was complicated by an extensive infection, which required the opening of the entire operative field. Granulations were slow in appearing, and it was not until July 16, that a Thiersch graft could be done to close the skin defect.

In December of the same year, supraclavicular induration was noted, but there was no evidence of recurrence. There was gradual swelling
of the left arm. The induration above the clavicle and in the axilla increased. This was due not to recurrence but to a combination of the fibrosis following infection and radiation. Figure 1 shows the condition of the arm in May 1927. The lymphedema became progressive and a Kondoleon operation was performed. There was temporary relief, followed by more marked swelling. Figure 2 shows the condition of the arm in August 1929. At this time the left arm had become such an encumbrance that, after consultation, disarticulation through the shoulder joint was done. The scar tissue in the axilla was so dense that the axillary vessels were practically obliterated.

The swollen arm in this instance was probably caused by the extensive postoperative infection. The resulting fibrosis occluded the lymphatics and compressed the axillary vessels. The patient is now in good general condition and is without evidence of disease, four and a half years following the breast operation.

**Case 2:** A.L., a white female, was forty-four years of age at the time
of her admission to the Memorial Hospital on September 15, 1926. She had a primary operable carcinoma of the left breast. Preoperative treatment consisted in interstitial irradiation with platinum needles inserted into the tumor. A dose of 3,000 millicurie hours was given in August, followed by 2,000 millicurie hours in January 1927. There was marked skin reaction following these treatments. The patient refused surgical intervention until October 1927, when she finally submitted to a radical mastectomy. Healing in this case was likewise complicated.

In April 1928 swelling of the left arm was noted, which increased gradually. The skin of the arm became tense and shiny, and the hand was appreciably swollen. In August 1930 lymphangioplasty was done. Three double silk threads were inserted from the dorsum of the hand to the scapula, and two double silk threads were introduced subcutaneously in the anterior surface of the arm to the left supraclavicular space. The multiple skin incisions are shown in Fig. 3. Healing was uncomplicated. There was immediate diminution in the size of the hand and relief from pain. At the time of the patient's discharge from the hospital definite improvement had been noted, but recently there has been a return of the swelling. The patient, otherwise free of disease, represents a case in which definite relief of lymphedema was not accomplished by Handley's lymphangioplasty.