

Review Article

IMPORTANCE OF LYMPHATIC'S IN DISSEMINATION OF BREAST CANCER

Anatomical, Pathological, Surgical and Prognostic Implications

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ABSTRACT

Background: The Breast cancer is one of the most common cancers in females with many subtypes. Breast cancer can spread via hematogenous route as well as lymphatic routes. Knowledge of the lymphatic drainage of breast is required not only for the performance of surgical procedures but also in planning therapeutic radiation, predicting sites of locally recurrent disease. The lymphatic drainage of the breast is considered rich, and identification of the major pathways allows a surgeon to predict the sites most commonly containing lymph-borne metastases. Careful inspection and palpation of Axillary, supraclavicular and parasternal sites for nodal involvement is thoroughly performed for recording location, size, consistency, shape, mobility, fixation, and other characteristics of any palpable lymphadenopathy. Local implications of lymphatic obstruction can be Peau D orange appearance and edema while as distant manifestations can be involvement of Nodes along with dissemination to other organs.

The further the lymphatic dissemination, the lesser the favourable prognosis. Pathologic stage combines the findings from pathologic examination of the resected primary breast cancer and axillary or other regional lymph nodes.

This connotes the importance of Status of Lymphatics in Breast Cancer.

KEY WORDS: BREAST; AXILLARY; SUPRACLAVICULAR; METASTASIS; PEAU D ORANGE; MAMMARY; MASTECTOMY.

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ANATOMICAL PERSPECTIVE

Lymphatic channels within the breast follow centrifugal pathways from the subareolar plexus along major lactiferous ducts and then along efferent veins to draining nodal beds. The major and most important site of drainage is to central axillary nodes. The internal mammary and interpectoral nodes, although primary routes of lymph flow, are rarely the sites of nodal metastasis from breast cancer in the absence of

simultaneous axillary disease. Secondly, the lymphatic spread of cancer is into the high axillary nodes in the subclavicular chain and from there to the into the supraclavicular fossa[1]. Lymphatic drainage is divided into

Superficial Lymphatics : Drain Skin Over breast Except Nipple and areola .They pass to Axillary , Internal Mammary , Supraclavicular Lymph nodes.

Deep Lymphatics :Drain Parenchyma of the breast plus Nipple and areola .They pass to Axillary , Posterior Intercostal nodes

Axillary nodes receive more than 75% of the lymph from the breast. They are

- Pectoral (anterior)
- Subscapular (posterior)
- Central and
- Apical.

Surgically, the nodes are described in relation to pectoralis minor.

- Those lying below pectoralis minor are the low nodes (level 1),
- Those behind the muscle are the middle group (level 2),
- while the nodes between the upper border of pectoralis minor and the lower border of the clavicle are the upper or apical nodes (level 3).

The subareolar plexus of Sappey is a collection of large lymph vessels situated under the areola and is not to be considered as a collecting zone of lymph and it communicates with the lymphatics of the breast tissue.

Lake of Stiles: Plexus of lymph situated on anterior sheath (deep fascia) of pectoralis major is called Lake of Stiles, It receives lymphatic communications from subareolar plexus of Sappy.

The internal mammary nodes receive lymph from both the medial and lateral portions of the breast. Lymph enters the thorax along the anterior perforating branches of the internal mammary artery and along the lateral perforating branches of the intercostal vessels. Most of the lymph goes to the internal mammary chain, but a small amount may pass to the posterior intercostal nodes along the heads of the ribs[2,3].

Malignancies of the lymphoid tissue of breast are also seen though rare. Primary lymphomas of the breast are rare, and there are two distinct clinicopathologic variants. One type occurs in women 30-40 years of age, is frequently bilateral, and has the histologic features of Burkitt's lymphoma. The second type is seen in women 40 years or above of age and is usually of the B-cell type. Breast involvement by Hodgkin's lymphoma has been reported.

SURGICAL PERSPECTIVE

For the surgeons ,in order to standardize the extent of axillary dissection, the axillary space is divided into three levels. Level I nodes are those in the external mammary, scapular, axillary vein, and central axillary groups, which lie lateral to the lateral border of the pectoralis minor muscle. Level II nodes are those in the central axillary group, which lie under the pectoralis minor muscle. The level III nodes are usually difficult to visualize and remove unless the pectoralis minor muscle is sacrificed or divided and include those subclavicular nodes medial to the minor muscle. The apex of the axilla is defined by the costoclavicular ligament (Halsted's ligament), at which point the axillary vein passes into the thorax and becomes the subclavian vein. Lymph nodes in the space between the pectoralis major and minor muscles are known as the interpectoral group, or Rotter's nodes, described by Grossman and Rotter. Unless this group is specifically exposed, they are not encompassed in surgical procedures that preserve the pectoral muscles.

TNM Classification as far as Nodes are concerned :

- Regional lymph nodes—Clinical (N)
- NX Regional lymph nodes cannot be assessed (e.g., previously removed)
- N0 No regional lymph node metastasis
- N1 Metastasis to movable ipsilateral axillary lymph node(s)
- N2 Metastases in ipsilateral axillary lymph nodes fixed or matted, or in clinically apparent ipsilateral internal mammary nodes in the absence of clinically evident axillary lymph node metastasis
- N2a Metastasis in ipsilateral axillary lymph nodes fixed to one another (matted) or to other structures
- N3 Metastasis only in clinically apparent ipsilateral internal mammary nodes and in the absence of clinically evident axillary lymph node metastasis; metastasis in ipsilateral infraclavicular lymph node(s) with or without axillary lymph node involvement, or in clinically apparent ipsilateral internal mammary lymph node(s) and in the presence of clinically evident

axillary lymph node metastasis; or metastasis in ipsilateral supraclavicular lymph node(s) with or without axillary or internal mammary lymph node involvement

- N3a Metastasis in ipsilateral infraclavicular lymph node(s)
- N3b Metastasis in ipsilateral internal mammary lymph nodes(s) and axillary lymph node(s)
- N3c Metastasis in ipsilateral supraclavicular lymph node(s)

Edema of the skin, frequently accompanied by erythema, produces a clinical sign known as peau d'orange [4]. With growth of the cancer and invasion of the surrounding breast tissues, the accompanying desmoplastic response entraps and shortens Cooper's suspensory ligaments to produce a characteristic skin retraction. When combined with tenderness and warmth, these signs and symptoms are the hallmark of inflammatory carcinoma. These characteristic inflammatory changes with associated edema are caused by micro obstruction of dermal lymphatics with emboli of carcinoma cells.. Localized edema (peau d'orange) develops when drainage of lymph fluid from the skin is disrupted. With continued growth, cancer cells invade the skin, and eventually ulceration occurs. As new areas of skin are invaded, small satellite nodules appear near the primary ulceration.

The surgical treatment of breast cancer, for the most part, concerns the treatment of potentially curable cancer that is confined to the breast and regional lymph nodes [5].

Axillary lymph node metastases: As the size of the primary breast cancer increases, some cancer cells are shed into cellular spaces and transported via the lymphatic network of the breast to the regional lymph nodes, especially the axillary lymph nodes. Lymph nodes that contain metastatic cancer are at first ill defined and soft but become firm or hard with continued growth of the metastatic cancer.

Eventually the lymph nodes adhere to each other and form a conglomerate mass. Cancer cells may grow through the lymph node capsule and fix to contiguous structures in the axilla, including the chest wall.

Once breast cancer has spread outside the confines of the breast and regional axillary lymph nodes it is not curable. However, although not curable, metastatic breast cancer can be controlled and patients can be offered palliative therapy. Occasional patients, particularly those with skeletal disease or disease in soft tissues and those whose tumors are hormone sensitive, can survive many years with advanced disease. Newer therapies such as autologous bone marrow transplantation after dose-intense chemotherapy offer the chance for improvement in survival and perhaps, someday, long-term remission or cure.

Drainage to the internal mammary nodes is more frequent with central and medial quadrant cancers. Clinical or pathologic evidence of metastatic spread to supraclavicular lymph nodes is no longer considered systemic or stage IV disease, but routine scalene or supraclavicular lymph node biopsy is not indicated.

The clinical stage of breast cancer is determined primarily through physical examination of the skin, breast tissue, and regional lymph nodes (axillary, supraclavicular, and cervical) [6]. However, clinical determination of axillary lymph node metastases has an accuracy of only 33%. Mammography, chest radiography, and intraoperative findings (primary tumor size, chest wall invasion) also provide necessary staging information. Pathologic stage combines the findings from pathologic examination of the resected primary breast cancer and axillary or other regional lymph nodes. Fisher and colleagues found that accurate predictions regarding the occurrence of distant metastases were possible after resection and pathologic analysis of 10 or more level I and II axillary

lymph nodes. A frequently used staging system is the TNM (tumor, nodes, and metastasis) system. The American Joint Committee on Cancer (AJCC) has modified the TNM system for breast cancer. Koscielny and colleagues demonstrated that tumor size correlates with the presence of axillary lymph node metastases. Others have shown an association between tumor size, axillary lymph node metastases, and disease-free survival. The single most important predictor of 10- and 20-year survival rates in

breast cancer is the number of axillary lymph nodes involved with metastatic disease. Routine biopsy of internal mammary lymph nodes is not generally performed; however, with the advent of sentinel lymph node dissection and the use of preoperative lymphoscintigraphy for localization of the sentinel nodes, surgeons have begun to biopsy the internal mammary nodes in some cases.

Sentinel lymph node dissection is primarily used to assess the regional lymph nodes in women with early breast cancers who are clinically node negative by physical examination and imaging studies [7,8,9,10,11,12,13,14,15]. This method also is accurate in women with larger tumors (T3 N0), but nearly 75% of these women will prove to have axillary lymph node metastases on histologic examination

Currently, mastectomy with assessment of axillary lymph node status and breast conserving surgery with assessment of axillary lymph node status and radiation therapy are considered equivalent treatments for patients with stage I and II breast cancer.

Axillary lymphadenopathy confirmed to be metastatic disease or metastatic disease in a sentinel lymph node necessitates an axillary lymph node dissection. Traditionally, dissection of the level I and II axillary lymph nodes has been performed in early invasive breast cancer. Sentinel lymph node dissection is now considered the standard for evaluation of the axillary lymph node status in women who have clinically negative lymph nodes.

A skin-sparing mastectomy removes all breast tissue, the nipple-areola complex, and scars from any prior biopsy procedures. There is a recurrence rate of less than 6 to 8%, comparable to the long-term recurrence rates reported with standard mastectomy, when skin-sparing mastectomy is used for patients with T1 to T3 cancers.

A total or simple mastectomy without skin sparing removes all breast tissue, the nipple-areola complex, and skin.

An extended simple mastectomy removes all breast tissue, the nipple-areola complex, skin, and the level I axillary lymph nodes.

A modified radical mastectomy removes all breast tissue, the nipple-areola complex, skin, and the level I and level II axillary lymph nodes [16].

The Halsted radical mastectomy removes all breast tissue and skin, the nipple-areola complex, the pectoralis major and pectoralis minor muscles, and the level I, II, and III axillary lymph nodes. The use of systemic chemotherapy and hormonal therapy as well as adjuvant radiation therapy for breast cancer have nearly eliminated the need for the radical mastectomy.

A modified radical mastectomy preserves both the pectoralis major and pectoralis minor muscles, allowing removal of level I and level II axillary lymph nodes but not the level III (apical) axillary lymph nodes .

The Patey modification removes the pectoralis minor muscle and allows complete dissection of the level III axillary lymph nodes.

In case of rare tumors of breast like an occult breast lymphoma may be diagnosed after detection of prominent and palpable axillary lymphadenopathy. Treatment depends on the stage of disease. Lumpectomy or mastectomy may be required. Axillary dissection for staging and for clearance of palpable disease is appropriate.

CONCLUSION

Lymphatics of Breast assume great significance in dissemination of cancer cells. The biopsy of sentinel nodes as well as adjacent nodes and the TNM classification have prognostic values. Further more the The lymphatic drainage of the breast is considered rich this further compounds the problem of spread of breast cancer. For a surgeon lymphatics are of utmost importance while carrying on surgery for breast cancers.

Competing interests: Nil

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