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A description of breast cancer treatment

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Abstract

Treatment for breast cancer is interdisciplinary. Most women with early-stage breast cancer are candidates for mastectomy or breast-conserving surgery combined with radiation. With these methods, there is no difference in the risk of local recurrence or the likelihood of survival. Axillary staging is done via sentinel node biopsy, and in women who test positive for sentinel nodes, axillary dissection is becoming less necessary. Molecular profiling to individualize treatment based on risk is now a clinical reality for patients with hormone receptor-positive malignancies. Adjuvant systemic therapy is used in the majority of women due to its shown benefit in terms of survival. A history, physical examination, and annual mammography make up follow-up surveillance. There is currently no proof that routine imaging improves outcomes after adjuvant systemic therapy in the absence of symptoms. New methods for early tumour identification are good, but they must first show that they are clinically useful in trials that are prospective.

Keywords: Breast cancer, Local therapy, Breast cancer surveillance, Endocrine therapy, neoadjuvant chemotherapy

Introduction

The identification and management of invasive breast cancer necessitate interdisciplinary cooperation. Establishing a diagnosis and informing surgical decisions about the care of the primary tumour, staging of the axilla, and the order of therapy all depend heavily on diagnostic imaging work-up and biopsy. After a breast cancer diagnosis has been made, the severity of the disease is evaluated, which largely decides whether or not preoperative (neoadjuvant) systemic therapy is necessary. Stage IV breast cancer that has been confirmed is thought to be incurable; unless there is a reason for palliative resection of the primary tumour, systemic therapy alone is used as treatment. This condition is not further described. Finding the clinical criteria of inoperability that call for the use of neoadjuvant therapy is a crucial component of the initial clinical examination of a patient with non-metastatic breast cancer. These include lymphedema in the ipsilateral arm, inflammatory carcinoma, tumours fixed to the bony chest wall (ribs, sternum), extensive skin involvement with ulceration or satellite skin nodules, fixed/matted axillary lymphadenopathy, involvement of neurovascular structures of the axilla, and extensive skin involvement with ulceration. All of these physical examination abnormalities are easily recognizable and should elicit an imaging assessment for distant metastases. In these situations, systemic medication is used as the first line of defence to lessen tumour volume and will make 80% of the patients operational [1].

The order of systemic medication and surgical resection varies among patients who have the operable illness. When mastectomy would otherwise be required, preoperative systemic therapy can minimize the amount of tumour in the breast, allowing for breast preservation. It can also lessen the necessity for Axillary Lymph Node Dissection (ALND). Removing the tumour is usually the first step in managing patients who have stage I or stage II disease. Patients then have the choice of breast conservation or mastectomy.

Breast-conserving therapy: BCT involves lumpectomy, which entails removing the tumour, and adjuvant Whole Breast Irradiation (WBI). The patient must be able to receive radiation, the tumour must be excised to negative margins with an acceptable cosmetic result, and the breast must be suitable for the follow-up to allow early diagnosis of local recurrence. These prerequisites logically lead to the limitations of BCT. The presence of widespread suspicious or malignant-appearing calcifications, the disease that cannot be resected to negative margins with a satisfactory cosmetic outcome, and conditions that preclude the delivery of radiation, such as active scleroderma or prior treatment of the breast field, are all contraindications to BCT [2]. "No ink on the tumour" is the definition of a negative margin. Wider clean margins are not necessary for BCT and do not increase local control of invasive breast cancer. No matter the size of the tumour, a lumpectomy can be performed if negative margins can be reached with a respectable cosmetic result. Neoadjuvant Chemotherapy (NAC) can be used to downstage tumours in women with big tumours in comparison to their breast size. BCT is not contraindicated in cases of young age, aggressive tumour subtype (HER2 positive and triple negative), or lobular histology. A bilateral mastectomy is an option for patients who have BRCA1/2 mutations because the risk of developing new primary breast cancer in the 20 years after diagnosis can vary from 26% to 40%, depending on the age at which first cancer appeared, whether oophorectomy was performed and whether endocrine therapy was used.

The imaging modalities that are typically used to choose patients for BCT include physical examinations, mammography, and diagnostic ultrasound. 88% of the 1,984 women in population-based research who had ductal carcinoma in situ and stage I or stage II invasive cancer underwent BCT successfully. Given that many women underwent mastectomy without making an effort at re-excision, the number of women who were eligible for BCT is likely underestimated. It is debatable whether Magnetic Resonance Imaging (MRI) should be used before surgery. In a meta-analysis, MRI was found to be more sensitive than mammography or ultrasound in identifying extra illnesses in 16% of individuals [3]. It was thought that MRI would enhance lumpectomy candidate selection and lower reoperation rates. The idea that local recurrence is influenced by tumour biology and the use of efficient adjuvant systemic therapy is consistent with the inability of the diagnosis of subclinical disease using MRI to translate into improved local

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recurrence outcomes. The usual use of preoperative MRI is not recommended in the absence of a specific clinical question. Particular situations where a preoperative MRI might be clinically helpful include mammographically and/or sonographically occult tumours, Paget's disease, determining the extent of residual disease after NAC in patients desiring conservation, and when there are appreciable differences in the estimation of tumour size by physical examination, mammography, and ultrasound.

Mastectomy: The majority of patients who need a mastectomy have the option of a total mastectomy (simple mastectomy), a skin-sparing mastectomy, or a nipple areolar-sparing mastectomy. The chest wall's extra skin, nipple-areolar complex, and breast parenchyma are all removed during a total mastectomy, leaving just enough skin to cover the incision. When the patient won't have an immediate reconstruction, it is typically employed. The skin-sparing mastectomy, which eliminates the breast parenchyma and nipple-areolar complex to provide room for a tissue expander/implant or an autologous flap, was created to allow for rapid reconstruction. With local recurrence rates of about 6%, comparable to those seen for the conventional simple mastectomy, numerous studies have verified the oncologic safety of the skin-sparing mastectomy. The nipple areolar-sparing mastectomy, which originally served largely as a preventative measure but is now increasingly employed in patients with invasive cancer, maintains the nipple-areolar complex in addition to the skin envelope. A median follow-up of 2 years to 5 years is recorded, with local recurrence rates of 2% to 5%. Patients should be carefully chosen for this surgery until long-term oncologic safety has been proven, as the majority of these data reflect single-institution retrospective series with minimal follow-up. Although eligibility requirements differ by institution, we advise restricting this treatment to patients with tumours that are less than 3 cm in size, at least 1 cm away from the nipple, and without significant calcifications that would indicate a significant intraductal component [4].

Post-mastectomy radiation: In the case of patients with advanced disease, Post Mastectomy Radiation Therapy (PMRT) is a well-established part of breast cancer treatment. The use of PMRT in patients with early illness and those receiving NAC is still being developed. The severity of axillary nodal illness is the most significant predictor of LRR following mastectomy. A patient's probability of having an LRR is 25% or higher if they have 4 or more positive axillary lymph nodes. The chance of a chest wall recurrence is also elevated by more than 20% when the tumour is smaller than 5 cm. For this reason, PMRT has long been regarded as standard care for these patients. There is a continuous discussion regarding the use of PMRT in women who have T1-2 breast tumours and 1-3 positive lymph nodes. After PMRT, women with 1-3 positive lymph nodes have a lower risk of local recurrence and mortality, according to an EBCTCG meta-analysis. However, because the trials used in this meta-analysis were conducted before contemporary systemic treatments were accessible, the rates of LRR in the control groups (20%) were significantly higher than predicted based on more recent research. 15% of 1331 women who underwent selective radiation therapy after mastectomy between 1995 and 2006 who had T1-2 tumours and 1-3 positive axillary lymph nodes had PMRT, according to research at Memorial Sloan Kettering Cancer Center. In the group getting PMRT, the LRR rate at 5 years was 3.2% compared to 4.3% in the group not receiving radiation (p=0.57).

Lymph vascular invasion and age under 50 were found to be risk factors for recurrence. These findings imply that a multidisciplinary approach should be taken when deciding whether to administer PMRT to this group. Age, life expectancy, comorbidities, pathologic abnormalities in the breast and axilla linked with a low disease burden, and biologic properties of the tumour associated with greater efficiency of systemic therapy are all factors that affect a patient's risk of recurrence.

Medicinal adjuvant treatments for breast cancer: After primary breast cancer has been surgically removed, patients frequently get adjuvant systemic therapy with the aim of curing clinically and radiographically hidden micro metastatic illness that, if ignored, could progress to frank metastatic disease. Based on the patient's risk profile, adjuvant systemic medications are chosen. Risk is influenced by two factors: the disease burden (number of lymph nodes, size of the primary tumour), and the biology of the illness as revealed by HR and HER2 status, as well as genomic assays. Although individuals with triple-negative and HER2 positive tumours are typically regarded as high risk, those with HR-positive, HER2 negative tumours have significant biologic variability. Chemotherapy has been the norm for healthy women in this category based on trials showing a small but statistically significant effect for treating HR-positive, HER2 negative, and node-negative breast tumours with chemotherapy in addition to endocrine therapy. Oncotype DX (Genomic Health, Redwood City, CA, USA) and Mamma print (Agendia, Irvine, CA, USA) are two commercially available genomic assays that look at cancer-related genes in tumour-derived DNA to assess the risk of recurrence and potential benefits of chemotherapy. Clinicians now have more information on which patients should undergo chemotherapy thanks to these commercially available diagnostics.

Targeted and biologic treatments: HER2-targeted therapy is administered in conjunction with a chemotherapy foundation to patients with HER2-positive breast cancer. The prognosis of patients with HER2-positive breast tumours has significantly changed as a result of the availability of HER2-targeted therapies. Initial studies that randomly assigned patients to chemotherapy alone or chemotherapy with trastuzumab, a monoclonal antibody targeted against the HER2 receptor, showed a reduction in the rate of recurrence of approximately 50%. Currently, paclitaxel (T) and trastuzumab are frequently used in the treatment of patients with stage I HER2-positive breast cancer (H). Patients with stage 2 and 3 HER2 positive breast cancer received regimens with trastuzumab added to AC-T (AC-TH) or docetaxel and carboplatin before the United States Food and Drug Administration approved pertuzumab (P) in 2013. Recent research has demonstrated that adding pertuzumab, an inhibitor of HER2 dimerization, to trastuzumab in the neoadjuvant context increases the pathologic complete response rate. For patients with stage II-III HER2 positive breast cancer, the conventional treatment is the administration of dual-HER2 drugs (HP) in the neoadjuvant context. If these treatments were not administered neoadjuvant, the National Comprehensive Cancer Network has also approved the addition of HP to chemotherapy for patients with the same degree of illness in the adjuvant setting. In a recent study, the APHINITY trial, adjuvant HP-based therapy was found to be statistically significantly superior to H-based therapy after one year [5].

Surveillance: The main components of surveillance following adjuvant therapy for breast cancer include a history, physical

examination, and yearly mammograms. There is currently no established function for "surveillance" imaging; routine computed tomography or positron emission tomography imaging in the absence of symptoms has not been shown to increase survival. Serum tumour markers (CA 15-3 and CEA) play no part in post-adjuvant therapy surveillance in an asymptomatic patient since they are non-specific and may lead to unnecessary imaging and procedures. Patients should be urged to adopt lifestyle changes after receiving a breast cancer diagnosis, such as maintaining a normal body mass index, in order to reduce their risk of recurrence. The fact that physical activity may lower the risk of breast cancer-specific recurrence and mortality is noteworthy, but conclusive prospective data are still lacking in this area.

Conclusion

In order to treat micrometastatic disease and stop a distant recurrence, patients also get adjuvant systemic medicines in addition to local therapy. Chemotherapy, biologic therapy, and endocrine therapy are examples of the types of adjuvant therapy that can be used depending on the patient's risk of recurrence. There is currently no place for routine cross-sectional imaging after adjuvant systemic therapy when there are no symptoms. New methods for early tumour identification are good, but they must first show that they are clinically useful in trials that are prospective.

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