Recent advances in management of breast cancer

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Abstract

Sir,

In past decades, tremendous advances have been made in detection and management of breast cancer management.

Conventional mammography cannot detect 10 to 15% of palpable breast tumors. Moreover, there are difficulties in imaging of dense breast. Digital mammography is an advanced form of screening that offers electronic archiving of breast studies, with improved contrast resolution over a larger dynamic range. These advantages may obviate the need for many call-backs and eliminate the film storage problem.

Other methods like whole breast ultrasound, magnetic resonance imaging (MRI) and positron emission tomography are also investigated for screening of breast cancer.

Ductal lavage is a recently used minimally invasive method that can be used to collect cellular material for cytomorphology and biomarker studies. In ductal lavage, cellular material is retrieved by inserting a 1.5-cm flexible microcatheter through through the nipple surface orifices under local anesthesia and infusing the same with saline. Potential uses of ductal lavage include selection of women for risk-reduction therapy, monitoring response to a risk reduction intervention, diagnostic workup of a nipple discharge, and early diagnosis of an occult cancer. Ductal lavage can be used to study genetic alterations associated with breast cancer. In conjunction with the newly identified genetic markers, ductal lavage has the potential to identify early breast cancers before any mammography changes occur. It can be used to study breast epithelial cells at the molecular level. Limitations of ductal lavage are its time-consuming nature, inability to detect extra-ductal carcinoma, and uncertainty about its sensitivity and specificity.

Now genetic testing is available to detect mutations in the tumor suppressor genes BRCA1 and BRCA2. These mutations are responsible for 70-80% of hereditary breast cancer. The American Society of Clinical Oncology recommends that genetic testing be offered to individuals with a strong family history or early age at diagnosis of cancer. For adult women with a known BRCA mutation, risk of breast cancer can be minimized by various strategies like increased surveillance, prophylactic surgery, and chemoprevention. However, these strategies do no apply to adolescent women and hence, genetic testing is of limited benefit in them. Genetic testing in adolescents may cause adverse psychological impact also.

Traditional procedure for documenting axillary lymph node, level 1 and 2 axillary lymph node dissection is associated with a lifetime risk of ipsilateral upper extremity lymphedema. To prevent this, of radioactive label technetium sulfur colloid or a vital blue dye can be injected into the breast before surgery to identify sentinel nodes which are most likely to harbor metastatic disease. However, there is a learning curve associated with the technique.

National Surgical Adjunct Breast and Bowel Project (Breast Cancer Prevention Trial BCPT; P-1) showed that administration of tamoxifen reduced the risk for invasive and noninvasive breast cancer by almost 50% in all age groups and also in patients with a history of lobular carcinoma in situ (56%) or atypical hyperplasia (86%). However, tamoxifen was associated with significantly increased risk of pulmonary embolism and endometrial cancer, and stroke. Preliminary evidence from Study of Tamoxifen and Raloxifen trial indicates that raloxifene has similar breast cancer risk reduction activity compared with tamoxifen, but with a lower incidence of uterine neoplasia.

Long-term results from various phase 3 trials conducted in United States and Europe demonstrated that breast cancer

survival is equal in early stage breast cancer patients, regardless of whether they are treated with breast-sparing procedures or mastectomy. Despite this, only a minority of eligible patients have been treated with lumpectomy and breast radiation therapy in the United States. Most breast cancer treatment guidelines state that the expected cosmetic outcome and patient preferences should guide the decision to perform breast conservation surgery (BCS).

Brachytherapy, a method of radiation in which radioactive sources in form of interstitial catheters are placed in the tumor bed intra-or post-operatively offers several advantages over traditional external beam radiation. It reduces the treatment time from 5 to 7 weeks to 4 to 5 days. It allows restriction of the radiation dose to the tumor bed compared with conventional external radiation therapy, which encompasses the entire breast. Older brachytherapy catheters were bulky and cumbersome. Newer devices, such MammoSite involve a reasonably user-friendly inflatable balloon that is inserted into the lumpectomy cavity either in the operating room or postoperatively, under ultrasound guidance.

Angiogenesis, the process of new blood vessel formation, plays a central role in local tumor growth and distant metastasis in breast cancer. Existing agents like tamoxifen have antiangiogenic properties. There are various categories of antiangiogenic agents like protease inhibitors, recombinant antibody to vascular endothelial growth factor (VEGF), endothelial toxins and naturally occurring agents. However, further clinical trials are required before widespread use of these agents.

Aromatase inhibitors (AI) act by blocking aromatase, the enzyme that catalyzes the final and rate-limiting step in the synthesis of estrogens. They may offer advantages vs. tamoxifen in treatment of hormone positive advanced breast cancer in terms of reduced adverse effects and increased efficacy.

In radiofrequency ablation, high-frequency alternating current is delivered via an electrode inserted into the tumor under ultrasound guidance. Pilot studies have shown that this technique have confirmed its efficacy to kill tumor cells. Similarly cryosurgery and focused ultrasound are currently under investigation in breast cancer. Percutaneous tumor excision is another novel technique in which small breast tumors are extracted via plastic cannulas attached to a circular blade. The lesion in question is targeted and retrieved with the assistance of mammographic stereotactic localization. Above techniques are not proved and are largely investigational.

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