Breast Cancer : Features, Diagnosis and Management

Breast cancer is an abnormal, uncontrolled proliferation of cells within breast tissue. It is the second leading cause of cancer death among women, after lung cancer, accounting for about 6% of all female deaths.

Diagnosis of Breast Cancer: Triple Assessment

1. **Clinical Evaluation**
    - Detection of lump(s) and regional lymph nodes through physical exam.
2. **Imaging**
    - Ultrasound for women <35 years.
    - Mammography for women >35 years.
3. **Cytology or Histology**
    - Fine needle aspiration (FNA), core biopsy, or open biopsy for pathological confirmation.

Clinical Manifestations

Presenting Complaints

- **Painless breast lump** in over 70% of cases.
- **Painful breast lumps** may occur due to:
    - Ischemic changes and necrosis
    - Inflammatory carcinoma
    - Lymphedema
    - Local invasion of muscles/nerves
    - Superimposed infection
    - Rapid tumor growth
- **Nipple discharge** , often unilateral and possibly bloody.
- **Skin changes** : ulceration, irritation, eczema, nipple inversion, peau d'orange (orange peel appearance).
- **Rare metastatic symptoms without palpable mass** : back pain, hemoptysis, cough.

Advanced Disease Symptoms

- Chronic cough (lung metastasis)
- Weight loss, anorexia, fatigue
- Upper limb swelling (lymphedema from axillary node involvement)
- Back pain (bone metastasis)
- Jaundice (liver involvement)

Risk Factors and Predisposing History

- Prior breast cancer (contralateral breast)
- Benign breast diseases with hyperplasia or atypia
- Age >50 years (peak incidence 35-45 years)
- Family history of breast, ovarian, or gastrointestinal cancers
- Nulliparity or late first pregnancy (>30 years)
- Early menarche (<13 years), late menopause (>50 years)
- Use of oral contraceptives or hormone replacement therapy
- Lack or short duration of breastfeeding
- Chest irradiation
- Obesity, smoking, alcohol consumption
- High-fat diet

Physical Examination

General

- Assess overall condition, wasting, dehydration, anemia
- Check for lymphadenopathy

Breast Examination

- Explain procedure and obtain consent
- Inspect breasts for:
  - Size and symmetry
  - Nipple changes (inversion, discharge)
  - Visible masses or skin changes (ulcers, peau d’orange)
- Palpate breasts in quadrants + axillary tail + peri-areolar area:
  - Note size, shape, margins, mobility, tenderness, consistency, skin changes
- Examine nipple discharge if present
- Examine regional lymph nodes: axillary, supraclavicular, infraclavicular

Findings Suggestive of Malignancy

- Fixation to skin or chest wall
- Irregular, firm mass with irregular borders
- Skin dimpling, nipple inversion, peau d’orange
- Enlarged, hard, fixed lymph nodes
- Unilateral bloody nipple discharge with associated mass

Differential Diagnosis

- Giant fibroadenoma
- Fibrosarcoma
- Deep breast infections (e.g., tuberculosis)
- Secondary metastasis (e.g., melanoma, lung cancer)
- Cystosarcoma phyllodes

Diagnostic Investigations

Imaging

- **Mammography** : Best for detecting early breast cancer and microcalcifications. Less sensitive in dense breasts.
- **Ultrasound** : Useful adjunct in younger women and distinguishing cystic vs solid masses.
- **CT/MRI** : Used in metastatic workup.

Tissue Diagnosis

- **Fine needle aspiration (FNA)** : Useful for cystic lesions, initial evaluation.
- **Core (true-cut) biopsy** : Provides tissue architecture, determines invasiveness.
- **Histopathology** : Determines estrogen and progesterone receptor status, BRCA mutation testing.

Lab Investigations

- Full blood count (FBC)
- Liver function tests (LFTs)
- Renal function (U/E/C)
- Tumor markers (CEA, CA 15-3, CA 27.29)
- Chest X-ray

Histological Types (WHO Classification)

- **Non-invasive (in situ)**
  - Ductal carcinoma in situ (DCIS)
  - Lobular carcinoma in situ (LCIS)
- **Invasive**
  - Invasive ductal carcinoma (85%)
  - Invasive lobular carcinoma (1%)
  - Mucinous carcinoma (5%)
  - Papillary carcinoma (<5%)
  - Medullary carcinoma (<5%)
- **Mixed epithelial and connective tissue tumors**
- **Miscellaneous types**

Staging of Breast Cancer

TNM Classification

- **T (Tumor size/extent):**
  - Tx: Not assessed
  - T0: No tumor
  - Tis: Carcinoma in situ
  - T1: ? 2 cm

    - T2: > 2 cm ? 5 cm
    - T3: > 5 cm
    - T4: Extension to chest wall/skin (including inflammatory carcinoma)
- **N (Node involvement):**
    - Nx: Cannot assess
    - N0: No lymph nodes involved
    - N1: Ipsilateral axillary nodes, no fixation
    - N2: Ipsilateral axillary nodes, with fixation
    - N3: Ipsilateral supraclavicular or internal mammary nodes
- **M (Metastasis):**
    - Mx: Cannot assess
    - M0: No metastasis
    - M1: Distant metastasis (including supraclavicular nodes)

Manchester Staging System of Breast Cancer

- **Stage I:**
  Tumor confined to the breast. Any skin involvement covers an area smaller than the tumor size. No lymph node involvement.
- **Stage II:**
  Tumor is confined to the breast but involves regional lymph nodes (axillary) or skin involvement covers a larger area than the tumor size.
- **Stage III:**
  Tumor involves the breast with fixation to skin or chest wall or extensive skin ulceration. Significant lymph node involvement including fixation or matted nodes.
- **Stage IV:**
  Distant metastasis present (lung, liver, bone, brain, etc.).

Treatment of Breast Cancer

Treatment depends on stage, tumor biology (hormone receptor status, HER2), patient factors, and preferences.

1. Surgical Management

- **Breast-Conserving Surgery (Lumpectomy/Wide Local Excision):**
  Removal of tumor with a margin of normal tissue, usually followed by radiotherapy. Suitable for early-stage cancers.
- **Mastectomy:**
  Removal of entire breast tissue. Can be simple, modified radical, or radical mastectomy depending on lymph node dissection extent.
- **Axillary Lymph Node Dissection or Sentinel Lymph Node Biopsy:**
  To assess and manage regional lymph node involvement.

2. Radiotherapy

- Used post breast-conserving surgery to reduce local recurrence.
- Also used for palliation in advanced or metastatic disease.

3. Systemic Therapy

- **Chemotherapy:**
  Used in locally advanced and metastatic disease, or high-risk early disease.
- **Hormonal Therapy:**
  For hormone receptor-positive cancers (Estrogen and/or Progesterone receptor positive).
  - Tamoxifen (Selective Estrogen Receptor Modulator)
  - Aromatase inhibitors (postmenopausal women)
- **Targeted Therapy:**
  For HER2-positive tumors, e.g., Trastuzumab (Herceptin).

4. Supportive and Palliative Care

- Symptom control for metastatic disease (pain, lymphedema).
- Psychosocial support.

Prognosis

- Early-stage breast cancer generally has a good prognosis with 5-year survival rates >90%.
- Prognosis worsens with larger tumor size, lymph node involvement, distant metastasis, and unfavorable tumor biology (triple-negative, HER2-positive without therapy).
- Hormone receptor positivity generally indicates better prognosis due to available targeted therapies.

Molecular and Genetic Considerations

- **Estrogen Receptor (ER) and Progesterone Receptor (PR) status:**
  Guide hormonal therapy.
- **HER2 (Human Epidermal growth factor Receptor 2):**
  Overexpression/amplification seen in ~20% breast cancers. Targetable with monoclonal antibodies.
- **BRCA1 and BRCA2 mutations:**
  Genetic mutations increasing risk of breast and ovarian cancers. Implications for screening and preventive strategies.