Breast Cancer

Transcript

In this video, we will discuss breast cancer. For more information on the anatomy of the breast, the general approach to breast disease and investigation modalities specific to the breast, please refer to our video entitled “Approach to Breast Disease”.

(Person 1) A 48 year-old Caucasian woman comes into your family doctor’s office. You notice right away that she seems nervous and uneasy. You ask her what you can do to help her today.

(Person 2) “ Well, the other day I was taking a shower and I noticed a lump on my breast. Right here.”

(Person 1) She point at her left breast in the superolateral quadrant.

(Person 2) “ My mother had breast cancer and I’m really worried that I might have it too. I’ve had mammograms in the past, but they were all normal.”

(Person 1) How do you take a history for a woman with a breast mass and suspected breast cancer? What are the components of the focused physical exam? Which investigations do you order? In the next few minutes, we will address these questions as well as management concepts in breast cancer.

Breast cancer is the leading cause of cancer-related death in women aged 20 – 59. It can affect women of all ages but the majority of women affected by breast cancer are over 50 years of age. One in 9 women will be affected by breast cancer in their lifetime.

Risk factors for breast cancer can be categorized into non-hormonal or hormonal risk factors.

Non-hormonal risk factors include age, female sex, exposure to radiation, familial or personal history of breast or ovarian cancer, BRCA gene mutations, lifestyle factors such as alcohol consumption and lack of exercise, and history of proliferative breast disease.

Age is the biggest risk factor as the majority of women who develop breast cancer are over 50.

Given that estrogen has been implicated in the development of breast cancer, any factors that lead to increased estrogen exposure are considered a hormonal risk factor. These risk factors include nulliparity, women who have had their first child after 30 years of age, early menarche, late menopause, hormonal therapy (mainly estrogen related) and obesity.

BRCA1 and BRCA2 mutations are inherited in an autosomal dominant pattern with variable penetrance. They are both tumour suppressor genes.

BRCA1 mutations are more likely to be invasive ductal carcinomas and poorly differentiated. They are more likely to be triple receptor negative, which means estrogen receptor-negative, progesterone-receptor negative, and HER2 receptor-negative. Patients with BRCA1 mutations also present with breast cancer at an earlier age.

BRCA2 mutations are also more likely to be invasive ductal carcinomas. However, they are generally more differentiated and more likely to express hormone receptors compared to BRCA1 associated breast cancers.

Patients with a strong family history of breast cancer, especially with 1st-degree relatives affected and with relatives affected at an early age should rouse your suspicion for BRCA mutations. Patients with known BRCA mutations should undergo rigorous screening programs for early detection of resectable cancer.

Ask a resident. Is there a risk model that we can use to calculate a patient’s chances of developing breast cancer?

Yes! Breast cancer risk can be calculated using the “Gail model”. The Gail model takes into account several risk factors including age, age of menarche, parity, previous breast biopsies showing hyperplasia, and other risk factors.

Evidence has suggested that screening can reduce mortality from breast cancer by up to 25%. However, clinicians must also be wary of the fact that screening may lead to over-diagnosis and overtreatment. Currently, the Canadian guidelines recommend that women over 50 should be screened every 2 to 3 years until the age of 75. Controversy regarding regular screening with mammography still remains for women between the ages of 40 and 49. The difficulty with mammography in younger women is that the breast is denser, and abnormalities more difficult to detect.

Most breast cancers will either be found with a screening mammogram or women will present to their primary care physician with complaints of a lump in their breast. Other patients may complain about changes in their nipples, nipple discharge, or new asymmetry. A thorough history should be taken to assess the patient’s complaint and risk factors. Remember that most breast cancers are painless.

The clinical breast exam may be quite uncomfortable. Care must be taken to ensure the utmost privacy and comfort for your patient. Be sure to have a nurse or colleague with you to act as a chaperone.

The physical exam should begin with inspection of the breasts and chest wall.

Then, palpation of the breast should look for concerning characteristics of carcinoma such as firm masses, immobile masses, and masses with irregular borders. If nipple discharge is present, try to express the nipple for discharge and note the colour and consistency of discharge. Conclude the clinical breast exam with palpation of the axilla and supraclavicular region. This is for the detection of any suspicious lymph nodes that may be related to breast cancer.

Watch our video on the Approach to breast disease for more information on the clinical breast examination.

Ask a resident. What is the most common location for breast cancer?

Most breast cancers are present in the supero-lateral region of the breast.

The differential diagnoses include

* Fibrocystic disease of the breast
* Lipoma
* Fibroadenoma
* Cyst
* Intraductal papilloma
* Fat necrosis
* Mastitis
* Breast abscess and
* Gynecomastia in males.

A variety of imaging modalities are available for the detection of breast masses and breast cancer. Mammography is a reliable means of detecting breast cancer before it may even be detectable on clinical exam. This is why it is used as a screening tool, but it should also be ordered to investigate a new mass. It is most sensitive for the detection of calcifications.

Ultrasound is mainly used to differentiate cystic masses from solid masses. It is your first choice of investigation for women who are pregnant. It can also be used to look for suspicious nodes in the axilla that can then be biopsied.

MRI is seldom used and is reserved for special cases. It is occasionally used to screen high-risk patients, like those with BRCA mutations.

Fine needle aspiration is a quick and cheap method of investigating the cytology of potential breast cancers. Unfortunately, they are prone to sampling errors and do not conserve the tissue architecture. Today, they are infrequently used for breast masses.

Large-needle core biopsies remove a larger piece of tissue and leave the tissue architecture intact. This allows for a more reliable histological analysis. Core biopsies are the gold standard for further investigation of abnormalities on clinical exam or imaging. In contrast to fine needle aspiration, core biopsies preserve the tissue architecture and may be used to detect surface hormonal markers and the HER2 gene.

Ask a resident. What are the most common types of breast cancer?

The most common types of breast cancer or invasive carcinoma are ductal carcinoma, followed by lobular carcinoma.

Before continuing our discussion on invasive breast carcinomas, other subtypes of breast cancer include ductal carcinoma in-situ, also known as DCIS or intraductal carcinoma, lobular carcinoma in-situ or LCIS, Paget’s disease or Paget’s carcinoma and inflammatory breast cancer.

Although less than 1% of all breast cancers are diagnosed in males, it is still a reason for concern. Similar to breast cancer found in women, males exposed to estrogen have a higher risk of developing breast cancer. BRCA2 carriers have an even greater risk. An overwhelming majority of cases are ductal carcinoma.

Ask a resident. What is tamoxifen?

Tamoxifen is an estrogen receptor modulator that is used to prevent breast cancer in susceptible women according to Gail model risk assessment scores. It is also given as adjuvant treatment after surgery for women with a tumor that is estrogen-receptor positive.

However, like with all treatments, tamoxifen comes with its risks. These risks include an increased risk of endometrial cancer, thromboembolic events such as deep vein thrombosis and pulmonary embolism, and cataracts. These should always be discussed with the patient and the risks and benefits should be thoroughly evaluated before commencing treatment.

Let us discuss invasive cancer in more detail. The most common site of metastasis for breast cancer is the adjacent lymphatic structures, most commonly the axillary lymph nodes. Breast cancer also commonly metastasizes to lung, pleura, bone, liver, and brain. The rest of the video will focus on the pre-operative work-up, management, and follow-up of these cancers.

Once a diagnosis of breast cancer is made via biopsy, a preoperative workup is done to determine prognosis and guide management. The preoperative workup consists of a series of imaging studies and laboratory investigations to determine the extent of the primary lesion and possible metastasis. This will provide the staging of the cancer. If not yet done, the preoperative workup should also determine tumour marker expression for the diagnosed cancer, as this is vital to guiding adjuvant therapy.

The investigations include a bilateral mammogram to check both breasts for malignancy; a chest x-ray or CT scan to detect lung or pleural metastasis; liver function tests and/or abdominal ultrasound for possible liver metastasis; serum calcium and alkaline phosphatase to screen for bone involvement, if these are positive then a bone scan is warranted to investigate for bone metastasis. Bone pain, especially in the back region would also warrant a bone scan. Finally a CT scan of the head should be done if there are focal neurological signs.

Management of breast cancer requires a multidisciplinary team approach, consisting of oncologists, surgeons, radiation oncologists, radiation therapists, physiotherapists, occupational therapists, family physicians, nurses, and many more.

Management is guided by staging of disease. Breast cancer staging follows the tumour, node, metastasis (TNM) scale. TNM staging also correlates with stage I-IV.

Stage I and II of invasive breast carcinomas make up the majority of diagnosed invasive breast cancers. They are typically treated either by mastectomy with sentinel node biopsy or lumpectomy with sentinel node biopsy plus radiation therapy. Adjuvant therapy with chemotherapy, hormone receptor modulators, or targeted biologic therapy is initiated depending on the final pathology report including the receptor status of the tumour.

Stage III or locally advanced invasive breast carcinomas follow a different pathway of treatment. These patients receive neoadjuvant therapy and depending on the tumour response, will receive surgical therapy with adjuvant therapy or alternative systemic therapy with some local and regional therapy.

Stage IV cancers are rarely curable and are treated with the goal of increasing quality of life and prolonging survival where appropriate. These therapies are individualized and also based on symptom management.

Women with known BRCA mutations may consider prophylactic surgical resection to prevent the development of breast cancer. In some cases, the ovaries may also be removed as BRCA mutations also increase the risk of ovarian cancer.

Fortunately, screening practices and improvement in treatment has made breast cancer a relatively treatable and curable disease. The 5-year survival for patients with localized disease is 98%. Metastatic disease has a poorer prognosis with a 5-year survival of about 24%.