Update in early detection and management of breast cancer

Essay

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ACS	***American Cancer Society***
ALH	***Atypical Lobular Hyperplasia***
AJCCS	***American Joint Committee on Cancer Staging***
BSE	***Breast Self Examination***
CBE	***Clinical Breast Examination***
CCC	***Clinical Columbia Classification***
CIS	***Carcinoma Insitu***
DCIS	***Ductal Carcinoma Insitu***
LCIS	***Lobular Carcinoma Insitu***
FNAC	***Fine Needle Aspiration Cytology***
NAC	***Nipple areola complex***
PET	***Positron Emission Tomography***
PR	***Progesterone receptor***
RT-PCR	***Reverse Transcriptase Polymerase Chain Reaction***
SSM	***Skin Sparing Mastectomy***

List of Abbreviations

AIM OF THE WORK

The aim of the work is to discuss update details about early detection and proper management of breast cancer to achieve better prognosis.

INTRODUCTION

Breast cancer is the most commonly diagnosed malignancy amongst women, with an incidence rate more than twice that of colorectal cancer and cervical cancer, and about three times that of lung cancer. However breast cancer mortality worldwide is just 25% greater than that of lung cancer in women. In 2005, breast cancer caused 502,000 deaths worldwide (7% of cancer deaths; almost 1% of all deaths). *(1)*

Both incidence and death rates for breast cancer have been declining in the last few years. Nevertheless, In 2005 by the Society for Women's Health Research indicated that breast cancer remains the most feared disease, even though heart disease is a much more common cause of death among women. Incidence of breast cancer in men are approximately 100 times less common than in women, but men with breast cancer are considered to have the same statistical survival rate as women. *(2)*

Attention has been focused on early ways of diagnosis of breast cancer as early management of the tumors markedly affects outcomes. *(3)*

Early detection means using an approach that allows earlier diagnosis of breast cancer. Early detection improves the chances that breast cancer can be diagnosed at an early stage and treated successfully. Breast cancer that is detected because it is causing symptoms tends to be relatively larger and is more likely to have spread beyond the breast. In contrast, breast cancer found during screening examinations is more likely to be small and still confined to the breast. *(4)*

The goal of screening examinations for early breast cancer detection is to find cancer before it start symptoms. Screening refers to tests and exams used to find a cancer in people who do not have any symptoms. (5)

A small percentage of breast cancers do not show up on mammograms but can be felt by a woman or her doctors. For women at high risk of breast cancer, such as those with BRCA gene mutations or a strong family history, both MRI and mammogram exams of the breast are recommended. (6)

While mammography is an excellent way to find most breast cancers at their earliest and most curable stage, it does not detect all breast cancers.

Newer techniques may help to make mammography more accurate as (Digital Mammograms, Computer-aided Detection and Diagnosis (CAD).). Other imaging tests as (Breast Ultrasound and Ductogram (Galactogram)). (7)

Several newer imaging methods are now being studied for use in evaluating abnormalities that may be in breast cancers as (Tomosynthesis (3D mammography) and MRI-assisted Breast Biopsy). (8)

Nuclear medicine studies (nuclear scans) as (Technetium Sestamibi Scan (Scintimammography), Electrical Impedance Imaging (T-Scan) and Thermography (Thermal Imaging)). (9)

Surgical procedures for breast cancer include (modified radical mastectomy, simple mastectomy, skin sparing mastectomy and preventive mastectomy.) (10)

Medical therapy of breast cancer includes (radiation therapy and systemic therapy which includes biologic therapy, chemotherapy, and hormone therapy). (11)

Systemic treatment given before surgery called neoadjuvant therapy which is effective in disease progression, long term survival and distant recurrence. Systemic treatment given after surgery called adjuvant therapy used to kill any undetected tumor cells that migrate to other parts of the body. ***(12)***

Reconstruction of breast may be performed as immediate or delayed reconstruction. Reconstruction options include tissue expander or implant reconstructions and autologous tissue reconstruction most often with transversus rectus abdominis muscle (TRAM) flap. ***(13)***

Embryological origin:

*The epithelial lining of the ducts and acini of the breast is developed from ectoderm and the supporting tissue is derived from the mesenchyme. On each side of the ventral surface of young embryo, a thickened band of ectoderm develops (**the milk ridge**).1t extends from the axilla to the inguinal region. In the human, the whole of this ridge atrophies, except only a small portion in each pectoral region from which the breast arises. Accessory breast tissue will form along the course of the milk ridge, if it does not disappear outside the area where the breast normally develops.*

Normally, a tiny portion of the ridge which is going to form the breast enlarges projecting slightly on the skin and extending deeply in the shape of buds which form long slender tubes from which the ducts and secreting tissue of the breast are formed. The nipple is either flat or depressed at birth, but later it projects beyond the surrounding skin. ***(14)***

Anatomical features of the breast:

Understanding the anatomy of the breast and its relation to underlying chest structures is important for the successful management of breast diseases. The mature breast lies cushioned in adipose tissue between the subcutaneous fat layer and the superficial pectoral fascia. ***(15)***

*Although the adult breast varies greatly in size, its base is fairly constant anatomically, extending from the second to the sixth rib in the midclavicular line and overlying the pectoralis major, serratus anterior and external oblique muscles. Laterally, the breast reaches midaxillary line.**(16)***

Axillary tail of Spence: *This is elongation of the outer part of the gland which passes up to the level of the third rib in the axilla, where it is in direct contact with the lymph nodes of the breast. This process of the breast tissue gets into the axilla through an opening in the axillary fascia, known as the foramen of Lange. It follows that the axillary tail is under the deep fascia, and not, like the rest of the breast, superficial to this layer. When it enlarges it may be mistaken for a lipoma.*

*The main bulk of the tissue of the breast is concentrated in its upper quadrant, which is thus the most common site for the breast cancer and most benign breast pathologies. The nipple is usually situated at the level of the fourth intercostal space in men and nulliparous females but its position is inconstant when the breasts are pendulous.(**17**)*

The adult female breast has two components. These are the epithelial elements responsible for milk formation and transport, namely the acini and ducts, and the supporting tissue, muscles, fascia and fat. The epithelial component consists of twenty or more lobes. Each lobe drains into a mammary duct, each of which ends separately at the nipple. The lobe consists of lobules, the number of which is very variable. Each lobule is a collection of between ten and a hundred acini group around, and converging on a collecting duct. Each acinus is a sphere of cells capable of milk secretion, draining into terminal duct. It is the confluence of the terminal ducts which gives rise to collecting ducts. Looking at the breast from the front, the major mammary ducts lie behind the areola. The lobules occupy the most peripheral part of the breast. The areola contains involuntary muscles arranged in concentric rings as well as radially in the subcutaneous tissue. The areolar epithelium contains numerous sweat glands and sebaceous glands, the latter of which enlarge during pregnancy and

*serve to lubricate the nipple during lactation (**Montgomery's tubercles**).The nipple is covered by thick skin with corrugations near its apex lies the orifices of the lactiferous ducts. The nipple contains smooth muscle fibers arranged concentrically and longitudinally; this is an erectile structure which points outwards.* ***(18)***

The fascial covering of the breast is of importance with respect to surgical techniques. As it develops from the skin, the breast is contained within a packet of superficial fascia of the anterior thoracic wall, where its superficial layer lies immediately deep to the dermis. It is relatively avascular. ***(16)***

*Fibrous processes and irregular strands (**the retinacula cutis**), extend deeply from the dermis into the underlying tissue of the breast. Such connective tissue bands (**the suspensory ligaments of Cooper**) attach the skin of the breast, the areola and the nipple to the underlying elements, including the breast parenchyma. Contraction of this fascia due to fibrosis either inflammatory or neoplastic produces the characteristic dimpling of the skin. The deep layer or membranous layer of the superficial fascia covers the deep aspect of the breast and is separated by a layer of filmy areolar tissue from the underlying fascial coverings of the pectoralis major and serratus anterior.* ***(18)***

The areolar layer forms the retromammary or submammary space and enables the normal breast to move freely over underlying muscles. Deep infiltration of carcinoma through this space into the underlying pectoralis fascia or muscle produces deep tethering of the tumor. The retromammary space enables rapid and relatively avascular dissection of the deep aspect of the breast in simple mastectomy. ***(19)***