"EVALUATION OF TRIPLE TEST SCORE IN PALPABLE BREAST LUMP"

By

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DISSERTATION SUBMITTED TO SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH CENTER, KOLAR, KARNATAKA

In partial fulfillment of the requirements for the degree of

MASTER OF SURGERY

IN

GENERAL SURGERY

Under the Guidance of

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MAY 2015

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I hereby declare that this dissertation entitled **"EVALUATION OF TRIPLE TEST SCORE IN PALPABLE BREAST LUMP"** is a bonafide and genuine research work carried out by me under the direct guidance of **Dr.P.N.SREERAMULU,** Professor, Department of General Surgery, Sri Devaraj Urs Medical College, Tamaka, Kolar.

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Dr. PAWAN KATTI

ABSTRACT

"EVALUATION OF TRIPLE TEST SCORE IN PALPABLE BREAST LUMP"

Breast lump is a very sensitive issue and cause of great worry and anxiety to the patient, so a reliable, preferably non-invasive and prompt diagnosis is required. Breast lump should be managed effectively and confidently with a proper protocol plan, ensuring early and best possible treatment for every patient.

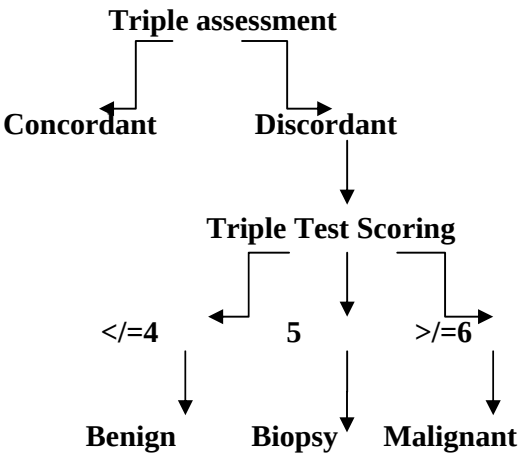
Triple test assessment was a major breakthrough in this direction, which streamlined the management of palpable breast lump. When all the components of triple test assessment which are Clinical Examination, FNAC, Mammography point to one possibility (are concordant) then the diagnosis is almost certain and management can be confidently planned in such a situation. But if there is discordancy among the components of triple test, then what should be the next step in the management plan is the question to be answered. This is where triple test score shows us the path.

By bringing in the scoring system for the triple test, management of palpable lump of breast will become more streamlined, providing a platform for managing discordant results, confidently and effectively. Scoring systems when introduced into management of any disease have always resulted in better management protocol, be it Alvarado score for acute appendicitis, Ransons scoring in pancreatits etc. Similarly implementation of triple test scoring in palpable breast lump is the next step in formulating a better protocol plan.

TTS provides diagnostic effectiveness at substantially lower cost than traditional management. Cost savings are mainly due to decreased open biopsy.

In TTS lumps with score 4 points or lower are benign and managed accordingly, lump with score 6 points or higher are malignant and should undergo definitive therapy. Only those lump that score 5 points require biopsy for confirmation of diagnosis. Thus large number of unnecessary biopsies can be avoided, saving the patient from undue anxiety, uncertainty, undue delay in receiving the treatment, financial burden, double surgeries.

PROTOCOL PLAN



Objective of the Study:

- To perform Triple Test Score in patients with breast lump.
- To perform HistopathologicalExamination(HPE) of the breast lump resected.
- To evaluate the efficacy of TTS in comparison with HPE.
- To develop a standard protocol for management of breast lump especially when discordant results are obtained from triple assessment.

Materials and Methods :

Study was conducted on 100 patients presenting with breast lump to the department of General Surgery at R.L.Jalappa Hospital & Research Centre, Kolar, during the period from JANUARY 2012 to AUGUST 2014.

It was a prospective study. Women presenting for evaluation of palpable breast lump underwent assessment by clinical examination, mammography and FNAC and got the Triple Test Scoring done.

All patients who underwent a complete TTS at our institution were entered into the study.

All patients were subjected to necessary surgery, post TTS and followed up with Histopathology of the specimen.

A structured proforma was used to collect relevant information from each patient selected.

Results:

In our study the mean age of the patients was found to be 46.12 ± 11.48 years, most of the patients were in the age group of 35-45 years (60%). Positive family history was found in 17%. Patients on an average took 6 months to seek medical help after recognition of the breast lump. Most common location of breast lump was upper outer quadrant.

Investigation	Sensitivity (%)	Specificity (%)	Positive Predictive Value (%)	Negative Predictive Value (%)	Accuracy (%)
Clinical examination	95	100	100	96.23	97.80
FNAC	97.56	100	100	98.18	98.94
Mammography	92.11	100	100	94.92	96.80
TTS	100	100	100	100	100

Conclusion:

The study clearly demonstrates the superiority of TTS over other components of triple assessment or all of them put together. A TTS of </=4 is consistent with a benign lesion; a TTS of >/=6 indicates malignancy. Only in patients in whom TTS score is 5, biopsy is recommended to obtain a definitive diagnosis. Thus a standard protocol can be developed, for the management of breast lump even with discordant results obtained via triple test assessment, which can be followed universally, thus empowering surgeon to go ahead in managing breast lump effectively and confidently.

Dedicated with

REVERENCE

To

My Parents

Dr.Sudhakar P.Katti

And

Dr.(Mrs) Ranjana S.Katti

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INTRODUCTION

"*He will manage to cure best who has foreseen what is to happen from the present state of matters*"

Hippocrates

The frequency of breast diseases, their recognition and the attempts at primeval cures by various cultures and societies historically antedate the therapy of diseases of other solid organs. Diseases of breast, with their uncertain causes and confusion of treatments, have intrigued physicians and medical historians throughout the ages. Despite centuries of theoretical meanderings and scientific enquiry, cancer of the breast remains one of the most dreaded of human ills. Although primarily thought of as a disease of women, it may occasionally afflict men with results just as lethal. The breast as a paired organ further increases its exposure to disease. As appendage of the skin it usually reveals its disorders to touch or sight.

A breast mass can be a difficulty at times. It may be difficult for the patient because of the anxiety associated with her underlying fear of a breast malignancy and it may be difficult for the physician to feel confident that what he or she is palpating is truly a mass rather than a variation of normal breast parenchyma.Breast symptoms and signs are common problems in clinical practice. Majority of breast symptoms or lesions will prove to be of a benign etiology. Physical, psychological and financial costs of investigating benign breast disease, primarily to exclude malignancy are substantial. Much concern is given to malignant lesions of the breast because breast cancer is the most common malignancy in women; however, benign lesions of the breast are far more frequent than malignant.

Because the majority of benign lesions are not associated with an increased risk for subsequent breast cancer, unnecessary surgical procedures should be avoided. It is important for pathologists, radiologists, and oncologists to recognize benign lesions, both to distinguish them from in-situ and invasive breast cancer and to assess patient's risk of developing breast cancer, so that the most appropriate treatment modality for each case can be established.

The first step in evaluation of breast lump is the clinical assessment. Although many a times clinician can confidently make the diagnosis of benign or malignant lesion, the possibility of mistake is always there even in experienced hand. This is where triple assessment has played a significant role in breast lump management.

The triple assessment for breast diseases involves,

1. Clinical assessment
2. Imaging modality – Mammography
3. Fine needle aspiration cytology

Clinical diagnosis of breast cancer is of higher sensitivity than specificity and has high diagnostic error. Mammography and FNAC respectively have lower sensitivity than specificity but have high positive predictive values.

When combined in the triple assessment, a definitive diagnosis can be made when the diagnoses concur, suggesting that the triple assessment has a high sensitivity, specificity, positive predictive value and negative predictive value with minimal error and excellent Kappa statistic. The output of the triple assessment is

reproducible, making it a valid and reliable diagnostic approach to diagnosis of breast cancer.

With increasing prominence and greater visibility in country specific health profiles around the world, breast cancer and its prevention, detection and treatment will continue to emerge as a major priority and challenge, for the health system in the near future.

NEED FOR THE STUDY

Breast lump is the clinical presentation of numerous breast diseases ranging from innocent benign cysts to malignant lesions. Distinction of benign from malignant is of paramount importance for patient care and proper management.[1]Breast cancer is the most common site specific cancer in women and is the leading cause of death from cancer for women of age 40 to 44 year.[2] It accounts for 33% of all female cancers and is responsible for 20% of the cancer related deaths in women.[3]

Presently a wide range of diagnostic modalities are available for the evaluation of breast lump. Conventional open biopsy, considered to be the gold standard for confirming diagnosis, has significant morbidity, is costly and time consuming. All of these cause significant trauma to the patient and are not patient friendly.

Mis-diagnosed breast cancer accounts for the greatest number of malpractice claims for errors in diagnosis. Litigation often involves younger women whose physical examination and mammography may be misleading.[3] Two techniques that are currently available with excellent patient tolerability are mammography and fine needle aspiration cytology. However if employed alone the reliability of mammography and FNAC is only around 82% and 78% respectively.[1]

There are numerous reports that if the results of clinical assessment, mammography and FNAC are all combined, the accuracy of diagnosis reaches 100%.[10] Furthermore these techniques provide information on tumor size, number, extent and grade pre-operatively.[11]

There is a dire need for evolving a method for establishing the diagnosis pre-operatively, which is cost effective, least invasive and least disturbing to the patient, with accuracy comparable to open biopsy. An efficient evaluation and prompt diagnosis is necessary to maximize cancer detection and minimize unnecessary testing and procedures. A thorough **Clinical Breast Examination (CBE), Imaging (Mammography), and Tissue sampling (FNAC)** are needed for definitive diagnosis.[3]

The **triple test assessment** is the combination of results from CBE, imaging, and tissue sampling. When the three assessments produce concordant results (point to the same possibility), the triple test diagnostic accuracy approaches 100 percent.[4-6] But, in discordant results, there is no clear cut protocol to follow and it is in such situations that triple test scoring will be the next step forward. Discordant results are seen in 40% patients, who are subjected for open biopsy for the confirmation of diagnosis.[7]

The **Triple Test Score (TTS)** was developed to help clinicians interpret discordant triple test results.[4,8] A three-point scale is used to score each component of the triple test (1 = benign, 2 = suspicious, 3 = malignant). A TTS of </=4 is consistent with a benign lesion; a TTS of >/=6 indicates malignancy. Only in patients in whom TTS score is 5, biopsy is recommended to obtain a definitive diagnosis. Thus a standard protocol can be developed, for the management of discordant results in triple test assessment, which can be followed universally.

The scope of improvement in arriving at correct and confident diagnosis of the breast lump is still enormous when we keep cent percent perfect diagnosis as our goal. This study is an attempt to travel part of that journey towards the goal.

AIM OF THE STUDY

- To perform Triple Test Score in patients with breast lump.
- To perform Histopathological Examination(HPE) of the breast lump resected.
- To evaluate the efficacy of TTS in comparison with HPE.
- To develop a standard protocol for management of breast lump especially when discordant results are obtained from triple assessment.

REVIEW OF LITERATURE

"*Nothing gives a better perspective of the subject than an appreciation of the steps by which it has reached its present state*"

- E.R. LANG

HISTORY

The cancer of breast with its uncertain cause has captured the attention of physicians through-out the ages. Despite centuries of theoretical meanderings and scientific enquiry, breast cancer remains one of the most dreaded of human diseases. However progress has been made in lessening the horrors that formerly devastated the body and psyche by the contribution of many doctors and scientists over many hundred years, although the milestones listed here are important ones, the list is by no means comprehensive.

A well documented case history of Hippocrates describes a woman with breast cancer associated with bloody discharge from nipple, also associated breast cancer with cessation of menstruation. Aurelius Celsus wrote "De Medicina" which contains an early clinical description of cancer, in it he mentions the breast of women as one of the sites of cancer and describes a fixed irregular swelling with dilated torturous veins and ulcerations. The great physician Leonides is credited with the first operative treatment of breast cancer in first century AD.

Galen described breast cancer as swelling with dilated veins resembling the shape of crabs leg. Rhazes one of the great Arabic physician condoned excision of breast cancer only if it could be completely removed and the underlying tissue cauterized. Anrdeas Vesalius was a Flemish physician, recommended mastectomy for breast cancer and the use of sutures rather than cautery.

Ambrose Pare condoned the excision of superficial breast cancer but attempted to treat other breast cancer through application of lead plates which were intended to arrest blood supply and arrest tumor growth, he made the important observation that breast cancer often caused the swelling of the axillary glands. Wilhelm Fabry is held in esteem as the "Father of German surgery", he devised an instrument that compressed and fixed the base of the breast so that a knife could amputate it more swiftly and less painfully.

Pieter Camper described and illustrated the internal mammary lymph nodes. Jean Petit advocated removal of the breast, the underlying pectoral muscle and the axillary lymph nodes. Henri Le Dran concluded that cancer was a local disease in its early stages and that it's spread to the lymphatic system signaled a worsened prognosis.

Large numbers of mastectomies were performed during the early 18^{th} century, but this number reduced during the second half of the century because of poor results. Breast surgery changed dramatically in 1800's William Morter introduced anesthesia in 1864, while Joseph Lister introduced the principles of antisepsis in England in 1867.

Samuel D Gross was designated as “The Greatest American surgeon of his time” his approach to carcinoma breast was more conservative, using a small elliptical incision he attempted to save enough skin for easy approximation of the edges of the wound. Paget described cancer of nipple accompanied by the eczematous change and cancer of lactiferous ducts.

Richard Von Volkmann removed the entire breast no matter how small the primary tumor, as well as the pectoral fascia with an occasional thick layer of the underlying muscle and the axillary nodes. Ernst Kuster of Berlin recommended that the axillary fat be removed along with axillary nodes.

William Welch a pathologist at Johns Hopkins was the first to use frozen section in the diagnosis of breast lesion. William Halstead recommended “The suspected tissue to be removed in one piece” he advocated such wide removal of skin that a graft would be required and recommended that pectoralis major be part of the enbloc specimen regardless of the size of the tumor. This procedure “Halstead’s radical mastectomy” was unchallenged for 70 years until the advent of breast conservation methods.

Wille Meyer described a similar technique only 10 days after Halstead’s published paper; he advocated removal of pectoralis minor in addition to pectoralis major. In 1937 Geoffry Keynes demonstrated that less radical surgery was needed in breast cancer with radiation giving good results. In 1948 two reports appeared that were destined to change the management of breast cancer. The first was the concept of modified radical mastectomy by D.Patey and W.Dyson. The second was treatment

with simple mastectomy and radiotheraphy by R We Whirter.

In 1977 William handley directed attention of the frequency of internal mammary node involvement he reported the removal of internal mammary nodes as an extension of radical mastectomy.In the late years of 20th century, Donold Morton at the John Wayne cancer centre in Santa Monica, CA developed the sentinel lymph node biopsy technique. Two months after the invention of X-ray, Emil Grubbe irradiated a patient with breast cancer. In 1889 Albert Schinzinger proposed opphorectomy before mastectomy to produce early aging in menstruating woman.In 1953 Charles Huggins advocated oophorectomy and adrenalectomy to remove the major source of oestrogen in the body.

Medical historians have traced needle biopsy to a report in 1847 by Kun.[1] FNAC was introduced in United States in 1920's by Hayes Martin, a Surgeon and Ellis, a technician at Memorial Hospital, USA. But they used needles of thicker caliber (18gauge) than those commonly used today.[12-16] It was in Europe, particularly Scandinavia that the application of fine needle aspiration cytology (FNAC), as the technique was usually called began to flourish in 1950's and 1960's.[16] The application of FNAC for the diagnosis of palpable breast masses was first introduced by Martin and Ellis in 1930 and since then has been established as an important tool in the evaluation of breast lesions.[17-19]

First attempts at mammary radiology in the early twentieth century were hampered by the difficulty in obtaining adequate contrast between normal and abnormal tissue of low density.[20] In 1913 Salomon in Germany studied 3,000

amputated breasts radiographically and noted the microcalcifications in intra ductal carcinomas. In 1927 Kleinschmidt wrote a book in which he described mammography as an aid indiagnosis.[21] By 1953 Leborgne had produced a text book on mammography and Egan's use of industrial films to improve contrast and detail established mammography as an important technique. In 1960 Egan reported an accuracy of 97% in the diagnosis of breast cancer, although he subsequently admitted accuracy below 90%.[22]

Triple test was described initially in 1975. It refers to evaluation of palpable breast masses by physical examination, mammography and fine needle aspiration in women.[23,24] John A Butler et al studied 113 women prospectively to evaluate the efficacy of a combined physical, mammography and FNAC examination. They found that mammography fails to detect approximately 10% to 15% of breast cancers. Physical examination proved to be highly sensitive in identifying patients with cancer, but not very specific. Thus clinical assessment is much more accurate in defining malignant than benign diseases. Aspiration cytology examination has the highest overall accuracy when compared to physical examination and mammography. However, with 10% incidence of false negative results, it emphasizes the fact that aspiration cytologic examination cannot be used as the sole criterion for evaluation of breast masses.[19]

J.M. Dixon et al assessed 1655 breast masses to evaluate the accuracy of clinical examination, mammogrphy and FNAC in identifying malignancy. They found that clinical examination and mammography either alone or in combination do not identify all malignant breast lesions. This appears to be a particular problem in

patients below 50 years of age. A major advantage of FNAC is that it can give a definitive diagnosis of malignancy in over 90% of affected patients. Further, the accuracy of aspiration cytology is not related to the age and appears to be of even greater value in younger patients where the other two techniques have an unacceptable false negative rate.[25] David P. Winchester et al found that mammography and aspiration cytologic studies are important evaluation adjuncts, but must not supplant clinical judgment. The lowest false negative rate in patients with malignant disease was based on clinical examination. Aspiration cytology findings have 15% false negative and mammography 24%.[26]

John Vetto et al studied 46 lesions in 43 patients and found that triple test was 100% accurate in diagnosis of palpable breast lesion when all three elements were concordant. However when they were non concordant and where at least one of the elements was considered benign FNAC was the most accurate with only two false negative results and mammography was the next most accurate. The false negative results are most frequently seen in small tumors with pauci-cellularity and "special type" histologic factors.[27-33]

Reshma Ariga et al found very high sensitivity, specificity and positive predictive value for FNA in all age groups. However, FNAC had a higher false negative rate in women over 41 years of age and hence it is a draw back and cannot be used as a sole diagnostic modality in assessing a palpable lesion in women over 41 years of age. Further, cases with a benign FNA diagnosis with a high index of suspicion for an underlying malignancy should be evaluated with additional diagnostic modalities.[17]

EMBRYOLOGY

At the fifth or sixth week of fetal development, two ventral bands of thickened ectoderm (mammary ridges, milk lines) are evident in the embryo. In most mammals, paired breasts develop along these ridges, which extend from the base of the forelimb (future axilla) to the region of the hind limb (inguinal area). These ridges are not prominent in the human embryo and disappear after a short time, except for small portions that may persist in the pectoral region. The primary bud, in turn, initiates the development of 15 to 20 secondary buds. Epithelial cords develop from the secondary buds and extend into the surrounding mesenchyme. Major (lactiferous) ducts develop, which open into a shallow mammary pit.[4]

During infancy, a proliferation of mesenchyme transforms the mammary pit into a nipple. At birth, the breasts are identical in males and females, demonstrating only the presence of major ducts. The breast remains undeveloped in the female until puberty, when it enlarges in response to ovarian estrogen and progesterone, which initiate proliferation of the epithelial and connective tissue elements.

ANATOMY

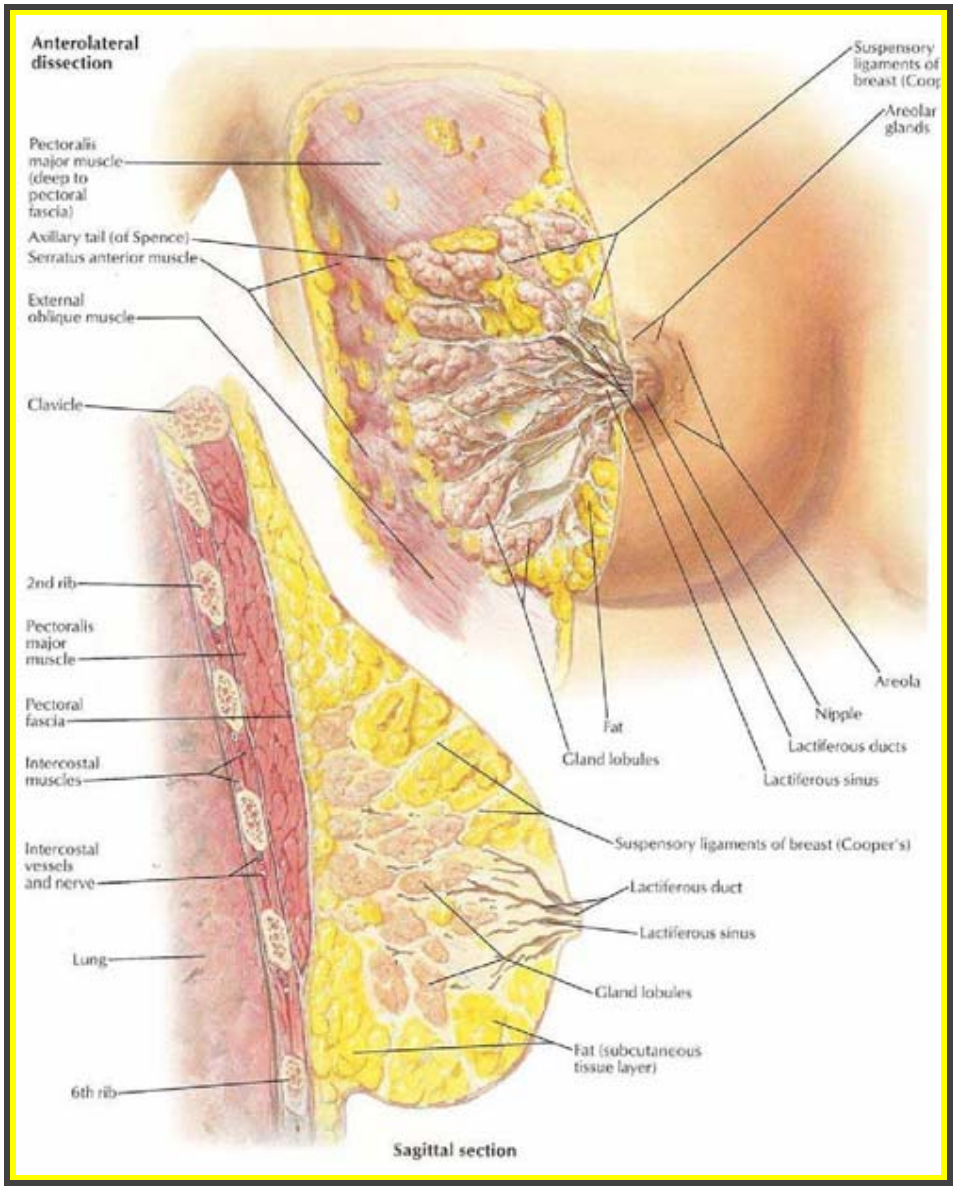

Figure 1: Anatomical architecture of mammary gland[34]

The adult female breast is located within the superficial of the anterior chest wall. The base the breast extends from the 2nd rib above to 6th or 7th rib below, and from the sternal border medially to the mid-axillary line laterally. Two-thirds of the of breast lies anterior to pectoralis muscle; the remainder lies anterior the serratus muscle. A small part may lie over the aponeurosis of external oblique muscle.

Extent:

The breasts are modified sweat glands, which extend from the level ofsecond to seventh rib. It extends transversely from the lateral border of the sternum to the anterior axillary line.[35]The deep surface of the breast rests on the fascia of the pectoralis major, serratus anterior and external oblique abdominal muscles. The axillary tail of Spence extends laterally across the anterior axillary fold.

Shape:

The breast has a protuberant conical form. The base of the cone is roughly circular, measuring 10 to 12 cm in diameter. The nulliparous breast has a hemispheric configuration with distinct flattening above the nipple. With pregnancy and lactation the breast becomes larger and increases in volume and density, while with senescence, it assumes a flattened, flaccid, and more pendulous configuration with decreased volume.[36]

Nipple-areola complex:

The epidermis of nipple-areola complex is pigmented and corrugated. During puberty, the pigment becomes darker and nipple assumes an elevated configuration. During pregnancy, the areola enlarges and pigmentation is further enhanced. The areola contains sebaceous glands, sweat glands and accessory glands, which produce small elevations on the surface of areola (Montgomery tubercles). Smooth muscle fibers lie circumferentially in the dense connective tissue and longitudinally along

major ducts; extend upward into nipples, which are responsible for nipple erection.[36]

Axillary Tail of Spence:

This is prolongation from the outer part of the gland which passes up to the level of the 3rd rib in the axilla, where it is in direct contact with the main lymph nodes of the breast (anterior axillary nodes). This process of breast tissue gets into the axilla through an opening in the axillary fascia, known as the foramen of Langer. 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 lipoma.[37]

Architecture of Gland:

The breast is composed of acini, which make up lobules, aggregations of which from the lobes of the gland. The lobes are arranged in a radiating fashion like the spokes of a wheel and converge on the nipple, where each lobe is drained by a duct. Ten to fifteen collecting ducts open onto the nipple, each duct draining a segmental system of smaller ducts and lobules. The ducts are surrounded by connective tissue which is characteristically loose and vascular in the distal ductules.

Different portions of the ducts system are associated with different diseases. The larger ducts are the sites of duct papilloma and duct ectasia; the distal smaller ducts are the sites of fibro-adenoma during development of thebreast, and cyst formation and sclerosing adenosis during the involution period. The majority of cancers of the breast arise from the intralobular portions of the terminal ducts. The roundness of the organ is due to fat, which fills the gaps between the portions of the parenchyma.

Ligaments Of Cooper:

The breast is anchored to the overlying skin and to the underlying pectoral fascia by bands of connective tissue called 'ligaments of cooper'.

BLOOD SUPPLY OF THE BREAST:

This is derived from:

1. The lateral thoracic artery, from the second part of the axillary artery.
2. The perforating cutaneous branches, of the internal mammary artery to the 2^{nd}, 3^{rd} and 4^{th} spaces.
3. The lateral branches of the 2^{nd}, 3^{rd} and 4^{th}intercostals arteries.[37]

VENOUS DRAINAGE:

The superficial veins radiate from the breast and characterized by their proximity to the skin. The axillary, the internal thoracic and the $3^{rd}$to 5^{th}intercostal drains the mammary gland. These veins follow the arteries.[38]

NERVE SUPPLY:

The secreting tissue is supplied by sympathetic nerves, which reach it via the 2^{nd} to the 6^{th} intercostal nerves, but the control of lactation is hormonal. The overlying skin supplied by cutaneous branches of intercostal nerves T4 to T6.

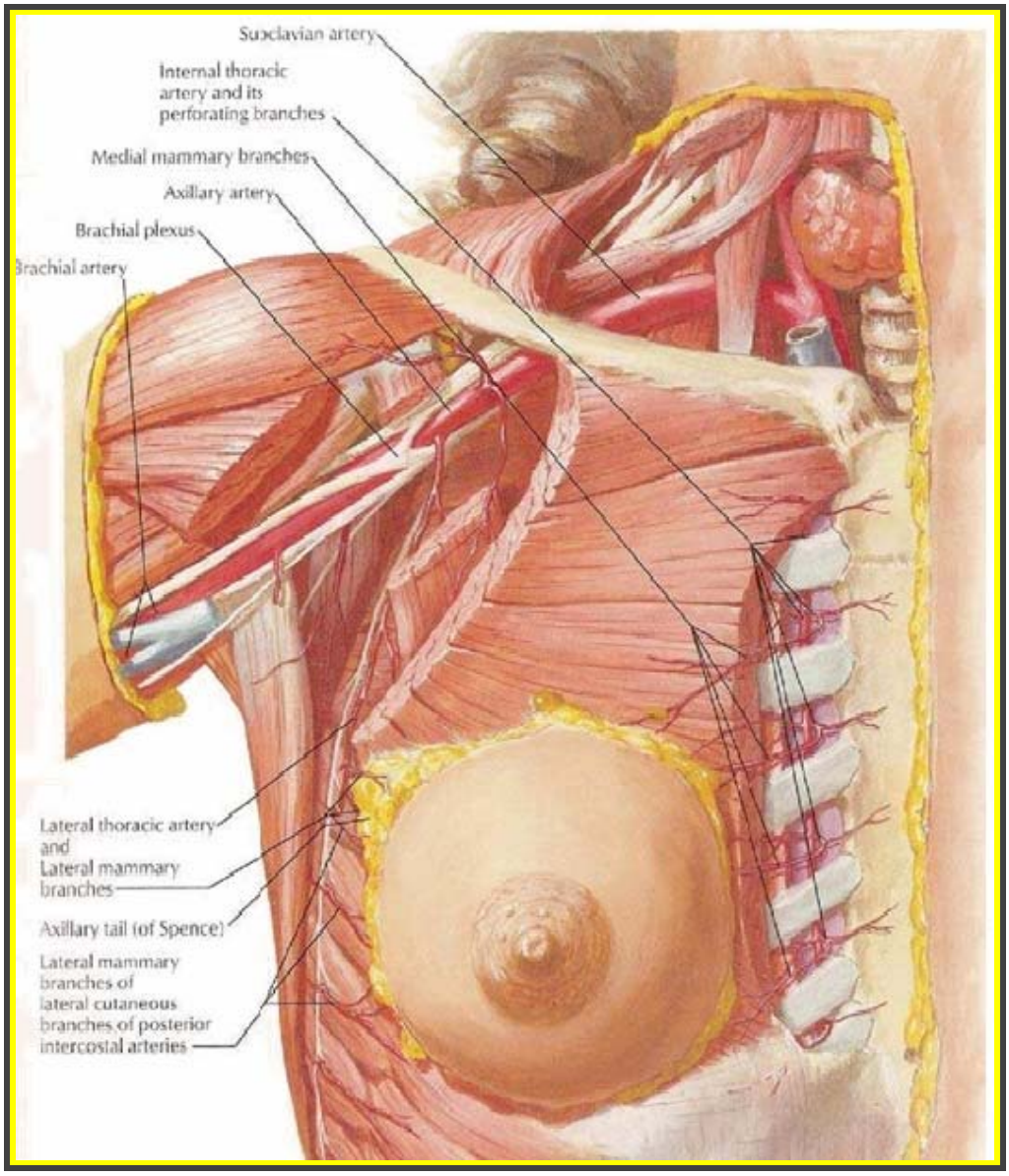

Figure 2: Arteries of the mammary gland

LYMPHATIC DRAINAGE

The breast is drained by two sets of lymphatics:

1. The lymphatics of the skin over the breast.
2. The lymphatics of the parenchyma of the breast.

LYMPHATIC OF THE OVERLYING SKIN:

These drain the integument over the breast, but not the skin of the areola and nipple. They pass in a radial direction and end in the surrounding nodes. Those from the outer side go to the axillary nodes. The skin of the upper part drains by vessels that go to the supraclavicular nodes (members of the lower deep cervical nodes). Certain of these vessels may end in the cephalic node, which lies in relation to the vein of the same name in the deltopectoral triangle. The vessels from the skin over the inner part of the breast drain to the internal mammary nodes, which lie in relation to the veins of that name. These nodes lie in the upper four or five intercostal spaces or behind the related costal cartilages.[37, 40]

The lymphatics of the skin over the breast communicate across the middle line, and a unilateral disease may become bilateral by this route. Mammary cancer may spread along these superficial lymphatic vessels to produce nodules in the skin.

LYMPHATIC OF THE PARENCHYMA OF THE BREAST:

The subareolar lymph plexus of Sappey is a collection of large lymph vessels situated under the areola. Though the subareolar plexus communicates with the lymphatics of the breast tissue, it is not a collecting zone for the breast lymph. The axillary nodes receive about 75 per cent of lymph draining the breast tissue.[40]

Lymphatics arising in the lobules pass directly outwards in the substance of the breast, receive tributaries on the way, and pass though the axillary tail to the axilla. Most to the anterior group of nodes a few pass to the posterior group, and from there they run to central and apical group.Lymphatics from the deep surface of the breast pass through the great pectoral muscle on their way to the axillary or internal mammary nodes. The lymphatic plexus of the deep fascia consists of five vessels, which do not act as a normal pathway for lymph from the breast to the regional nodes.

The internal mammary nodes receive lymph from both the medial and lateral portions of the breast. Lymph enters the thorax along the anterior perforating branches of the internal mammary artery and along the lateral perforating branches of the intercostals vessels. Most of this lymph goes to the internal mammary chain, but a small amount may pass to the posterior intercostal nodes lying near the head of the ribs.

At the level of the first interspace, fine lymphatics connect the right and left internal mammary chains behind the manubrium sterni, and nodes may be found there. Even in apparently early breast cancer, tumours of the outer half of the breast may metastasize to the internal mammary nodes without involvement of the axillary nodes.

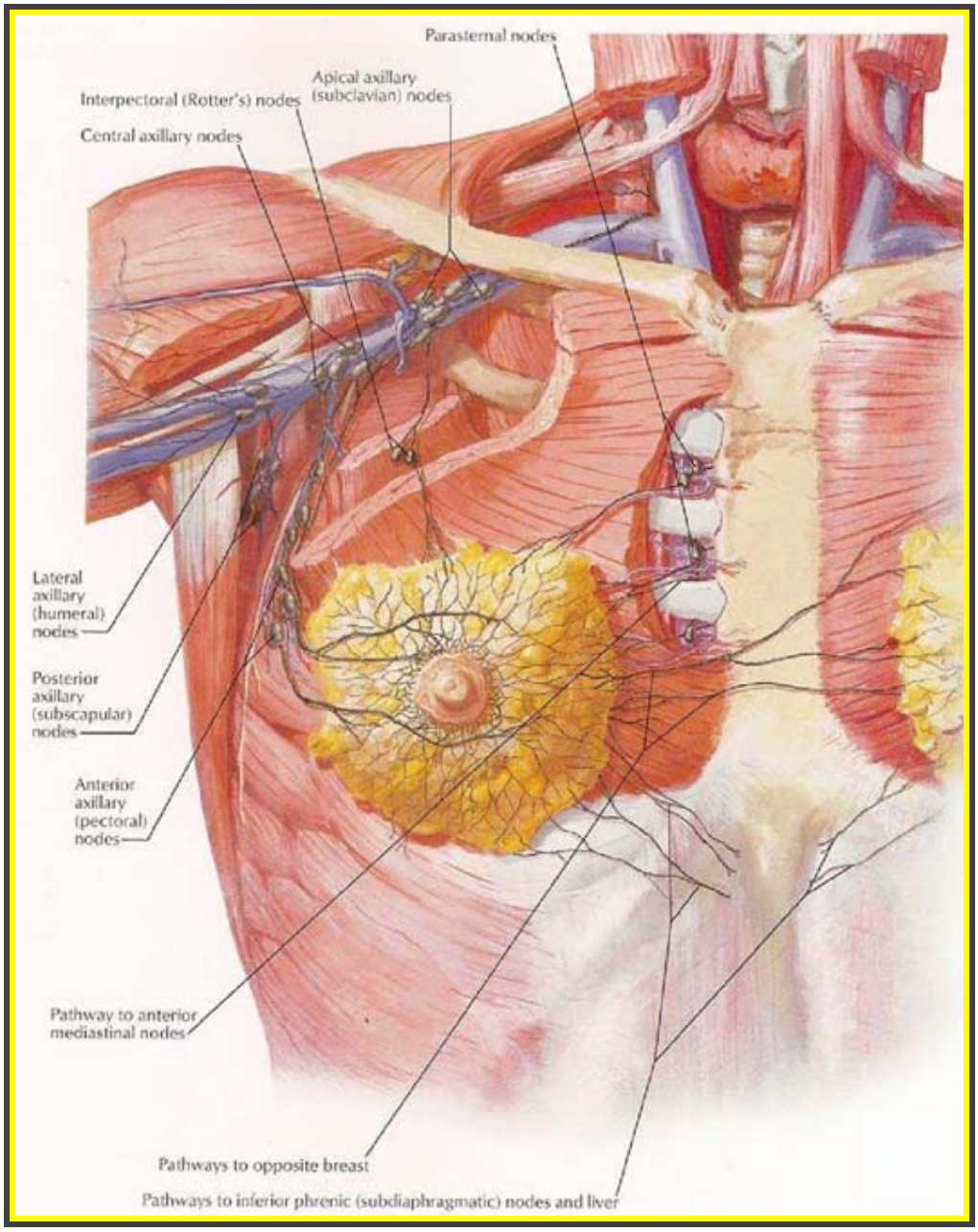

Figure 3: Lymph vessels and nodes of mammary gland

MICROSCOPIC ANATOMY:

A mature breast is composed of three principal tissue types:

1) Glandular epithelium,
2) Fibrous stroma and supporting structures, and
3) Fat.[41]

Infiltrating cells, including lymphocytes and macrophages, are also found within the breast. In youth, the predominant tissues are epithelium and stroma, which may be replaced by fat in postmenopausal women as they age. However, there is great variability among individual women of any age. Mammography in women younger than 30 years, whose breast tissue is dense with stroma and epithelium, may produce an image without much definition. Fat absorbs relatively little radiation and provides a contrasting background that favors detection of small lesions in older patients. Throughout the fat of the breast, coursing from the overlying skin to the underlying deep fascia, strands of dense connective tissue called Cooper's ligaments provide shape to the breast. Because they are anchored into the skin, tethering of these ligaments by a small scirrhous carcinoma commonly produces a dimple or subtle deformity on the otherwise smooth surface of the breast.

The glandular apparatus of the breast is composed of a branching system of ducts, roughly organized in a radial pattern spreading outward and downward from the nipple-areolar complex. It is possible to cannulate individual ducts and visualize the lactiferous ducts with contrast agents. This is useful in showing the arborizing tree of branching ducts, which end in terminal lobules. The contrast dye opacifies only a

single ductal system. At the summit of the arborizing ductal system, the subareolar ducts widen to form the lactiferous sinuses, which then exit through 10 to 15 orifices on the nipple. These large ducts close to the nipple are lined with a low columnar or cuboidal epithelium that abruptly meets the squamous epithelium of the nipple surface and the squamous invades the duct for a short distance. This relationship is important for the discussion of Paget's disease of the breast.

At the opposite end of the ductal system and after progressive generations of branching, the ducts end blindly in clusters of spaces called terminal ductules or acini. These are the milk-forming glands of the lactating breast and, together with their small efferent ducts or ductules, are known as lobular units or lobule. The terminal ductules are invested in a specialized loose connective tissue that contains capillaries, lymphocytes, and other migratory mononuclear cells. This intralobular stroma is clearly distinguished from the denser and less cellular interlobular stroma and from the fat within the breast.

PHYSIOLOGY OF THE BREAST

Breast development and function are initiated by a variety of hormonal stimuli, including estrogen, progesterone, prolactin, oxytocin, thyroid hormone, cortisol and growth hormone. Estrogen initiates ductal development, while progesterone is responsible for differentiation of epithelium and for lobular development. Prolactin is the primary hormonal stimulus for lactogenesis in late pregnancy and postpartum period.

The gonadotropins, leutenizing hormone (LH) and follicle-stimulating hormone (FSH) regulate the release of estrogen and progesterone. In turn, the release of LH and FSH from anterior pituitary is regulated by gonadotropin-releasing hormone GnRH from hypothalamus. Positive and negative feedback effects of circulating estrogen and progesterone regulate the secretion of LH, FSH and GnRH.

At ***birth*** the breast contains entirely of lactiferous ducts, no alveoli being present, this persists till puberty because of low circulating hormone levels. With onset of puberty there is increase in GnRH, LH and FSH levels and ultimately an increase in estrogen and progesterone from ovaries leading to establishment of menstrual cycle. The breast tissue growth is stimulated with ductal differentiation and formation of alveoli. Estrogen stimulates the growth of stroma and ductal system whereas progesterone causes the development of terminal ductal complex.[42]

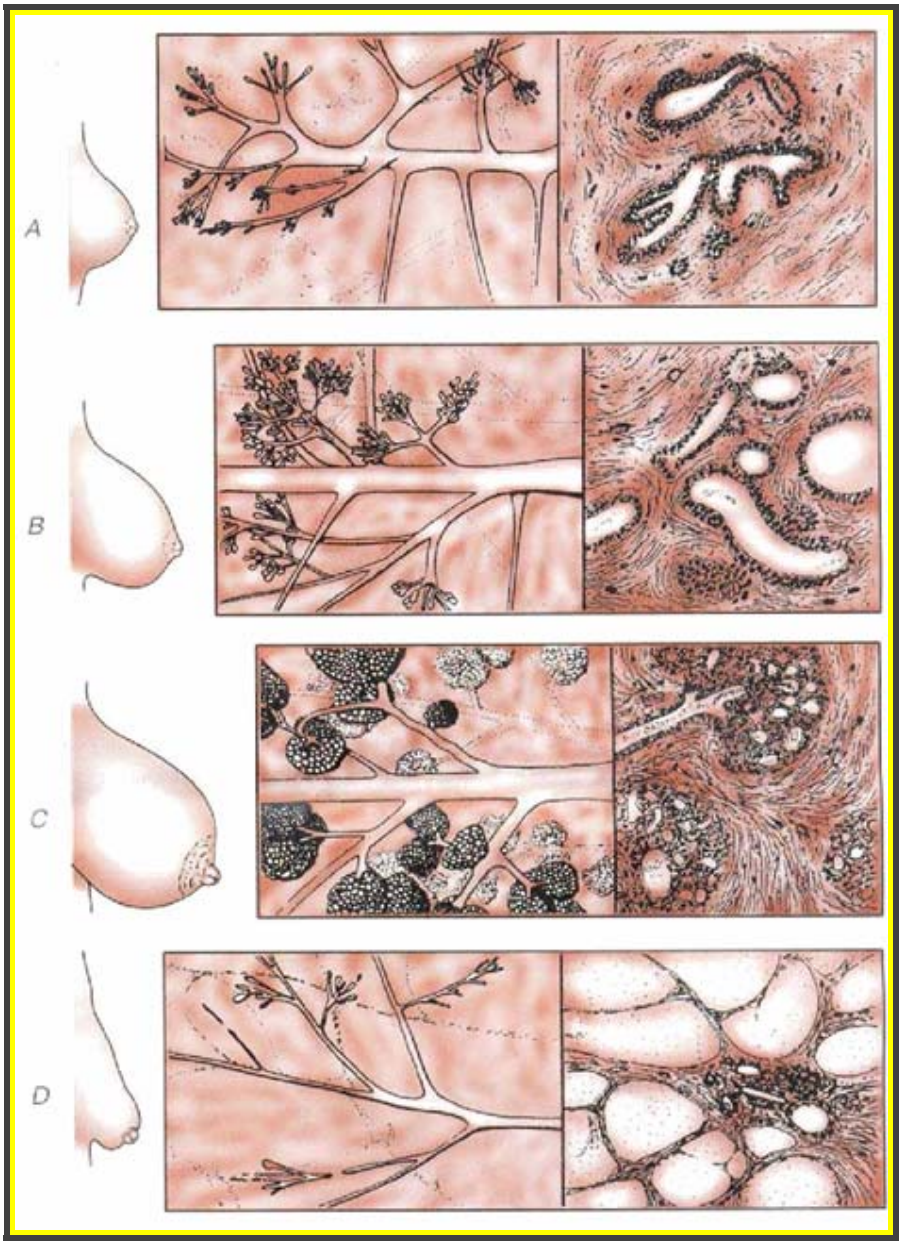

Figure 4: The breast at different physiological stages

The central column contains three dimensional depictions of microscopy structures.

A. Adolescence.

B. Pregnancy.

C. Lactation.

D. Senescence.

At the beginning of ***menstrual cycle*** there is an increase in size and density of breast, which is followed by engorgement of breast tissues and epithelial proliferation. With the onset of menstruation, the breast engorgement subsides and epithelial proliferation decreases.

Pregnancy causes further growth in size of the gland. During second trimester ofpregnancy, there is florid epithelial proliferation, with development of true functional acini from the terminal ductules. The areolar skin darkens, the Montgomery glands become prominent. During third trimester fat droplets accumulate and colostrum fills the alveolar and ductal spaces. In late pregnancy prolactin stimulates the synthesis of milk. Following delivery estrogen and progesterone levels decrease with full expression of lactogenic action of prolactin. Neural reflexes stimulate milk production by the action of prolactin and expulsion by the action of oxytocin, which acts on the myoepithelial cells of milk ducts[43].

Breast starts undergoing involution in ***preclimacteric*** phase. There is moderate loss of glandular tissues, replacement by fibrous tissue and round cell infiltration. Thus there is fibrosis, cyst formation and apocrine metaplasia. Changes at menopause have two clinical implications; firstly fat infiltration of breast produces the low-density appearance of the parenchyma seen on mammography, and thus makes this technique more successful in older women. Secondly, aberrations of this involutional change may explain some of the benign disorders that occur in this group. At the end after menopause, there is marked loss of glandular tissue, increase in adipose tissue with relative preponderance of connectivetissue.

RISK FACTORS

The cause of breast cancer is unknown. However, epidemiological data indicate well-defined factors that show an increased likelihood of developing the disease. Such risk factors for breast cancer fall into three main groups: genetic, endocrine and environmental; each may be of major, intermediate or minor importance.

Major risk factors

Gender: Breast cancer is 100 times more common in women than in men. Instrict epidemiological terms, therefore sex is a major risk factor for breast cancer.[44]

Age: As for other epithelial cancers the incidence of breast cancer increases withage. Breast cancer is only occasionally seen in the late teens but thereafter there is a rapid rise in age-specific rates. Upto the age of 40 years, the increase rate is very steep; the rate of increase then slows dramatically, although the overall cancer rate continues to rise until old age. The cumulative risk of developing breast cancer between ages of 20 to 40 is 0.5% whereas between 50 to 70 it is 5%.[45, 46]

Previous breast cancer: The development of breast cancer may be a clinicalmanifestation of multifocal origin of the first cancer or may be an entirely new cancer. Thus, the relative risk of developing a second, non-synchronous primary 20 years after initial diagnosis of breast cancer is 1.2 to 1.5. The risk appears greatest in young women if their initial breast cancer is diagnosed before the age of 40.

Family history and genetic predisposition: A family history of breast cancer isassociated with an increased risk of the disease. The risk is greatest in patients with first-degree relatives (mother or sister) affected, especially if under the age of 50 when the disease developed. The relative risk of developing breast cancer is 1.7 to 2.5 in women with a history of breast cancer in a first-degree relative, and 1.5 among those with an affected second-degree relative. Multiple family members with breast cancer, the existence of bilateral disease, or the identification of an affected male all indicateexcessive risk especially if in association with ovarian cancer among other relatives.[43]

5 to 10% of breast cancers are caused by inheritance of germline mutations such as BRCA-1 and BRCA-2, which are inherited in an autosomal dominant fashion. BRCA-1 is located on chromosome 17q, contains 22 coding exons. BRCA-2 is located on chromosome 13q and contains 26 coding exons. Both function as tumor suppressor genes, and for each gene, loss of both alleles is required for initiation of cancer.

It is now known that germline mutations in BRCA-1 represent a predisposing genetic factor in as many as 45% of hereditary breast cancers and in at least 80% of hereditary ovarian cancers. BRCA-1 associated cancers are mostly invasive ductal, poorly differentiated, hormone receptor negative and have higher prevalence of being bilateral.[47]

The breast cancer risk for BRCA-2 mutation carriers is close to 85%. BRCA-2 associated breast cancers are invasive ductal, well-differentiated and express hormone

receptors. Breast cancer is also associated with certain genetic disorders like Li-Fraumeni syndrome (p53 gene affected), Peutz-Jeghers syndrome (STK11/LKB1 gene affected),Cowden disease (PTEN), Muir-Torre syndrome (MSH2/MLH1) and Ataxia telangiectasia.

Benign breast disease: It is not usually recognized as major risk factor, although multiple papillomatosis may be regarded as such.

Intermediate risk factors

Diet and alcohol intake: Weight does correlate with breast cancer risk, high fatintake is said to increase serum estrogen levels. Evidence for an association between alcohol consumption and an increased likelihood of developing breast cancer is becoming stronger. The relative risk of one unit of alcohol per day is 1.1 and increases to 1.3 to 1.5 if intake increases to two glasses a day.[48]

Endocrine factors: Breast cancer is related to hormones and reproductive factors.Estrogen is the principal hormone and prolonged exposure of breast tissue to unopposed action of estrogen increases the incidence of breast cancer. Early Menarche increases duration of exposure of breast tissue to estrogen. There is 20% decrease in risk for each year delayed. Similarly increase number of menstrual cycles, nulliparity and late menopause are associated with increased risk. Longer lactational period, factors that decrease the number of menstrual cycles are protective.

The terminal differentiation of breast tissue associated with full-term pregnancy is also protective, so older age at first live birth is associated with increased

risk. Abortions offer no protection and may be responsible for increased risk. Oophorectomy before 50 years decreases the risk for breast cancer. Finally in postmenopausal women the major source of estrogen is conversion of androstenedione to estrone by adipose tissue; henceobesity is associated with a long-term increase in estrogen exposure.[46, 47]

Meta analysis has demonstrated the relative risk of developing breast cancer while taking Oral contraceptive pills is 1.24 and on stopping the risk diminishes to 1.1. Thus there is no lifetime risk from oral contraceptive use as had previously been feared. Hormone replacement therapy for more than 10 years is associated with relative risk of 1.3.

Irradiation: Young women who receive mantle radiation therapy for lymphoma, survivors of atomic bomb blasts and patients having multiple chest radiographs have increased risk.[49]

Benign breast disease: Severe atypia with hyperplasia is associated withmoderately increased risk of developing breast cancer.

Minor and controversial risk factors

Body size: There is minor relationship between body size and breast cancer butthis is dependent on age and whether height or body mass is considered.

Stress: There is no evidence that stress may lead to the development of breastcancer.

Benign breast disease: The patients with recurrent apocrine cysts, lesser degreeof atypia have slightly increased risk but convincing evidence is lacking.

Risk assessment models: Two risk assessment models are currently used topredict the risk of breast cancer. *Gail* and colleagues developed the most frequently used model, which incorporates age at menarche, number of breast biopsies, age at first live birth and number of first degree relatives with breast cancer. It predicts the cumulative risk of breast cancer according to decade of life. *Calus* and colleagues developed the other frequently used model, which is based on assumptions about the prevalence of high penetrance breast cancer susceptibility genes. Compared with Gail model the Calus model incorporates more information about family history.[50, 51]

ETIOLOGY OF CARCINOMA OF BREAST

For the surgeon to remain a manager of the care of patients with breast cancer, needs to co-ordinate the treatment planned among the medical oncologist, surgical oncologist and radiation oncologist. A broad knowledge of the biology of breast cancer and science of the other clinical modalities involved in essential.In spite of an immense amount of investigation, there is still no known cause and its natural history is obscure. The following are the risk factors for breast cancer.[52]

Major factors are:

- Gender
- Age
- Previous breast cancer
- Family history and genetic predisposition (BRCA 1 or 2 mutation)

Intermediate factors:

- Alcohol and Diet
- Endocrine Factors
- Early Menarche
- Late menopause
- Oral contraceptive and hormone replacement therapy
- Nulliparity
- Irradiation
- Benign proliferative breast disease (e.g. multiple papillomatosis)
- Benign breast disease (e.g. hyperplasia with moderate or severe atypia)

Minor or controversial factors:

- Body size
- Stress
- Benign breast disease (e.g. hyperplasia with moderate or mild atypia)

The following shows the relative risk for invasive breast carcinoma based on histologic examination of breast tissue without carcinoma.

1. No increased risk (no proliferate disease)
    - Apocrine change
    - Ductal Actasia
    - Mild epithelial hyperplasia of usual type
2. Slightly increased risk (1.5-2 times)
    - Hyperplasia of usual type, moderate or florid Sclerosing adenosis, papilloma
3. Moderately increased risk (4-5 times)
    - Atypical ductal hyperplasia Atypical lobular hyperplasia
4. High risk (8-10times)
    - Lobular carcinoma in situ
    - Ductal carcinoma in situ(non comedo)

With the exception of age, country of birth and history of breast cancer in both mother and sister, all of the relative risks reported to date are of modest magnitude. In consistency data suggest the protective effects of parity and lactation in various age groups.

EPIDEMIOLOGY

Breast cancer is the most common site-specific cancer in women and is the leading cause of death from cancer for women age 40 to 44 years. It accounts for 33% of all female cancers and is responsible for 20% of the cancer related deaths in women. Breast cancer was the leading cause of death until 1985, when it was surpassed by lung cancer. There is a tenfold variation in breast cancer incidence among different countries worldwide. England and Whales have highest age adjusted mortality for breast cancer while South Korea has the lowest. Women living in less industrialized countries have a lower incidence of breast cancer than women living in industrialized countries.[53]

NATURAL HISTORY OF BREAST CANCER

Bloom and colleagues described the natural history of breast cancer based on records of 250 women with untreated breast cancers who were cared for on charity wards in Middlesex Hospital, London.[54]

The Primary Breast Cancer:

More than 80% show productive fibrosis thatinvolves the epithelial and stromal tissues. With growth of cancer the Cooper's ligaments are shortened and a characteristic skin dimpling occurs. Localized edema (peau d orange) develops when drainage of lymph fluid from skin is disrupted. With continued growth cancer cells invade the skin and ulceration occurs (upto 75% of untreated cases). As new areas of skin are involved, small satellite nodules appear near primary ulceration. In general upto 20% of breast cancer recurrences are loco-regional, more than 60% are distant and 20% both loco-regional and distant.

Axillary lymph node metastases:

As cancer size increases some cells are shedinto cellular spaces, which are transported via lymphatics to regional axillary lymph nodes. Lymph nodes containing cancer are first ill defined and soft but become firm or hard with continued growth. Eventually the nodes adhere and form a conglomerate mass. Axillary nodes are sequentially involved from low (level I) to central (level II) and then to apical (level III). While more than 95% women who die have distant metastases, the most important prognostic correlate for disease free survival is axillary lymph node status. Node negative women have 30% risk of recurrence whereas node positive women have 70% risk.

Distant Metastases:

At approximately 20^{th}cell doubling breast cancers acquiretheir own blood supply. Thereafter cancer cells may shed into systemic venous blood to seed the pulmonary circulation via the axillary and intercostals veins or to vertebral column via Batson's plexus of veins. Successful implantation of metastatic foci from breast can occur after primary cancer exceeds 0.5cm in diameter. While 60% of women who develop distant metastases will do so within 24 months of treatment, metastases may become evident as late as 20 to 30 years after treatment of primary cancer. Common sites of involvement in order of frequency are bone, lung, pleura, soft tissues and liver.Skeletal metastases occur in order of frequency in lumbar vertebra, femur, thoracic vertebra, ribs and skull. Generally osteolytic metastasis occurs. Transcoelomic implantation into ovaries may occur.

HISTOPATHOLOGY OF BREAST CANCER

Breast cancer may arise from the epithelium of the duct system anywhere from the nipple end of major lactiferous ducts to the terminal duct unit, which is in the breast lobule. Previously, descriptive terms were used to classify breast cancer (scirrhous-means woody, medullary-means brain like). More recently, histological descriptions have been used.

Classification of Primary Breast Cancer

Non-invasive Epithelial Cancers

- Lobular carcinoma in situ (LCIS)
- Ductal carcinoma in situ (DCIS) or intraductal carcinoma

Invasive Epithelial Cancers

- Invasive lobular carcinoma
- Invasive ductal carcinoma
- Invasive ductal carcinoma
- Tubular carcinoma
- Mucinous or colloid carcinoma
- Medullary carcinoma
- Invasive cribriform
- Invasive papillary
- Adenoid cystic and metaplastic carcinoma

Mixed Connective and Epithelial Tumors:

- Phyllodes tumors
- Benign and malignant carcinosarcoma
- Angiosarcoma.

Non-Invasive Epithelial cancers:

Non-invasive neoplasms are broadly dividedinto two major types: LCIS and DCIS (or Intraductal carcinoma). Broder's original description of in situ breast cancer stressed the absence of invasion of cells into surrounding stroma and their confinement within natural ductal and alveolar boundaries. In 1941, Foote and Stewart published a landmark description of lobular carcinoma in situ (LCIS). In late 1960s, Gallangher and Martin published the term *minimal breast cancer* stressed the importance of early detection. It is now recognized that each type of minimal breast cancer has a distinct clinical and biological behaviour.

STAGING:

Staging systems of Carcinoma of Breast includes;

1) The Manchester system of staging (1940- UK).
2) Columbia clinical classification (Haagenson- 1943).
3) TNM- (Tumor, Node, Metastasis) staging system (Recommended by the International Union Against Cancer)
4) Modified TNM staging system (The American Joint committee on cancer staging and End Results Reporting; SEER, modification).

DIAGNOSING BREAST CANCER

CLINICAL PRESENTATION:

Although any portion of breast, includingaxillary tail, may be involved, breast cancer is found most frequently up to 60%, in the outer, upper quadrant (due to increased amount of breast tissue). 12% each are found in upper inner quadrant and beneath the nipple. Lower half of the breast accounts for the rest.

Symptoms caused locally by tumor

Lump: In 33% of breast cancer cases, the woman discovers a lump in her breastoften when washing or looking into a mirror.

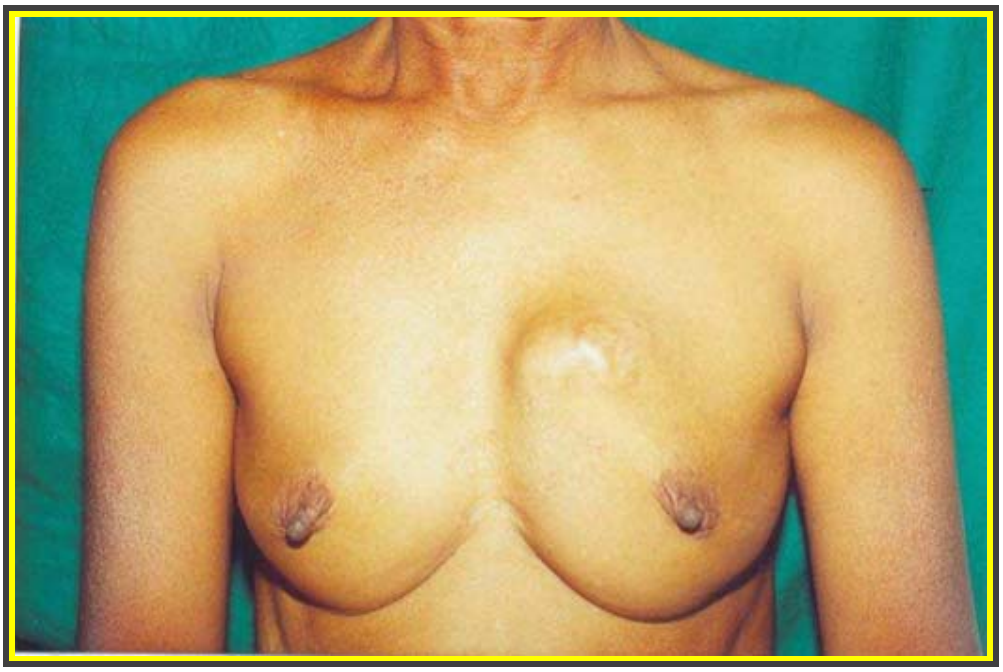

Figure 5: Lump in upper inner quadrant

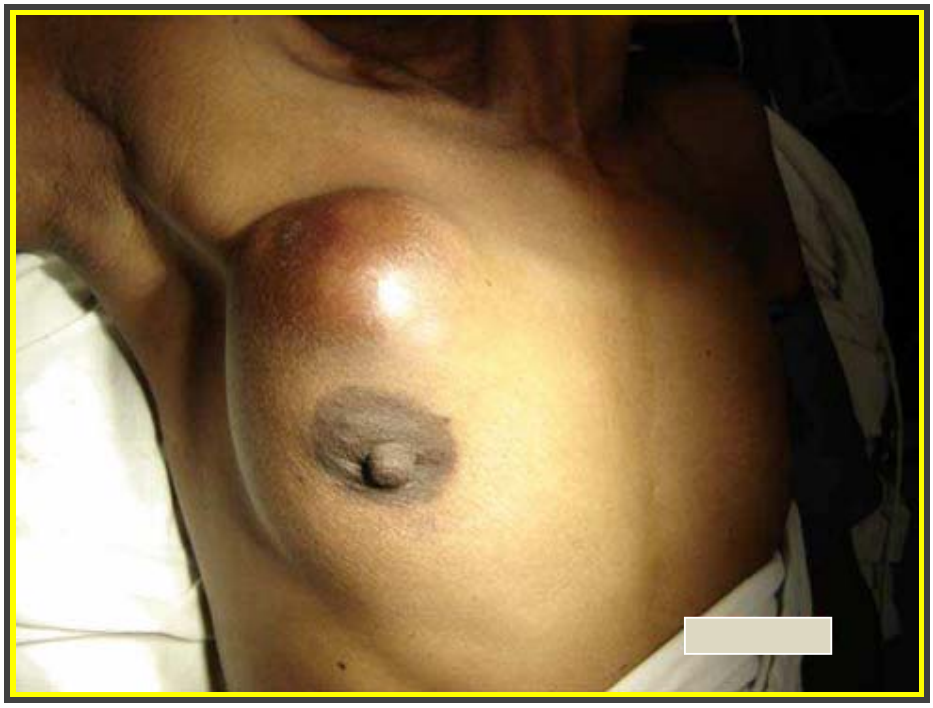

Figure 6: Lump in the upper outer quadrant with axillary lymph nodes

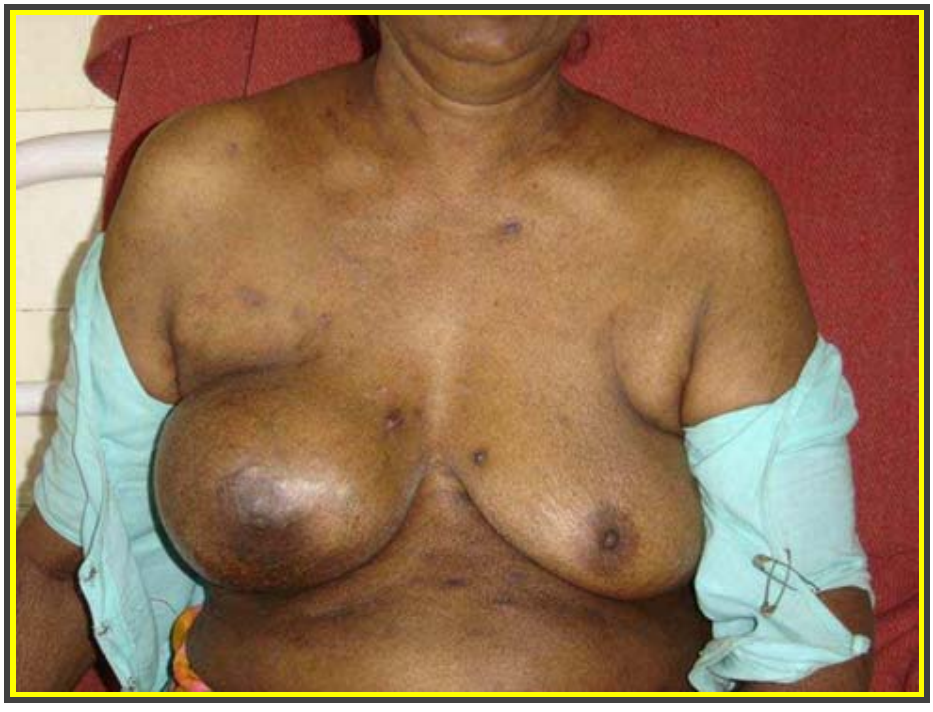

Figure 7: Diffuse involvement of breast carcinoma

Pain: Pain is an uncommon symptom, except for vague pricking sensation in thebreast pain is often suggestive of a benign condition. If present it suggests aggressive type of malignancy like mastitis carcinomata.

Nipple retraction: Usually present in later part of the disease process. Recentonset of nipple retraction in an elderly female patient is highly suggestive of malignancy.

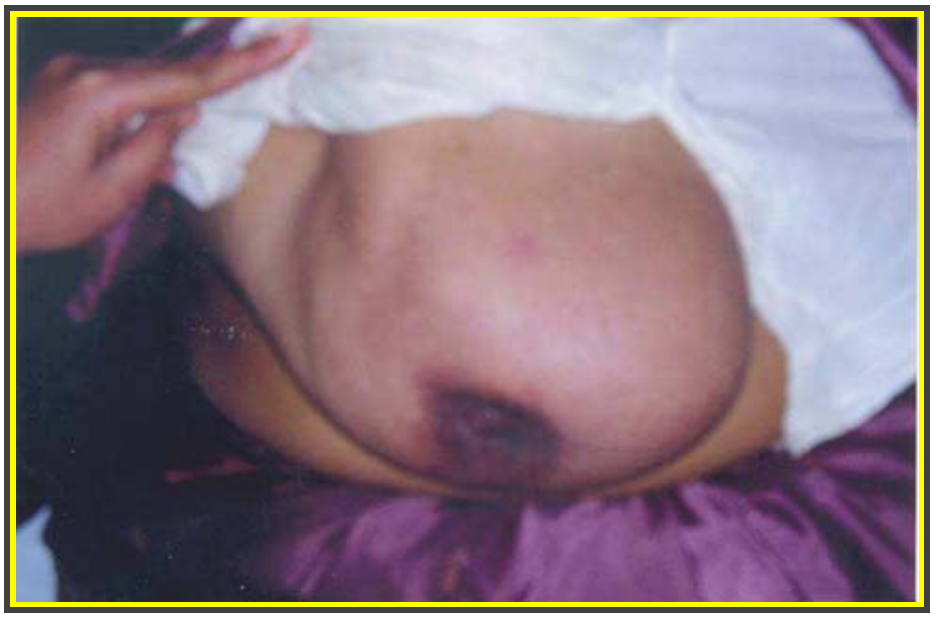

Figure 8: Nipple retraction

Nipple discharge: present in 3-11% of cases, blood stained discharge usually indicates an intraductal carcinoma, Paget's disease or the tumor has grown into a major duct.

Nipple erosion: It is the commonest mode of presentation in Paget's disease, also seen in advanced intraductal carcinomas.

As the disease advances locally there may be skin involvement with peau d orange or frank ulceration and fixation to the chest wall. This is described as cancer-en-cuirasse. About 20% of breast cancers in developing countries present in locally advanced stage.[43]

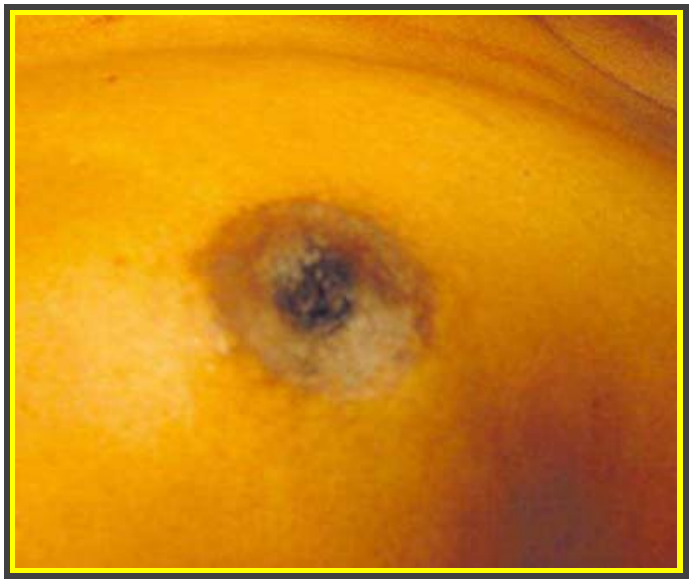

Figure 9: Nipple Erosion

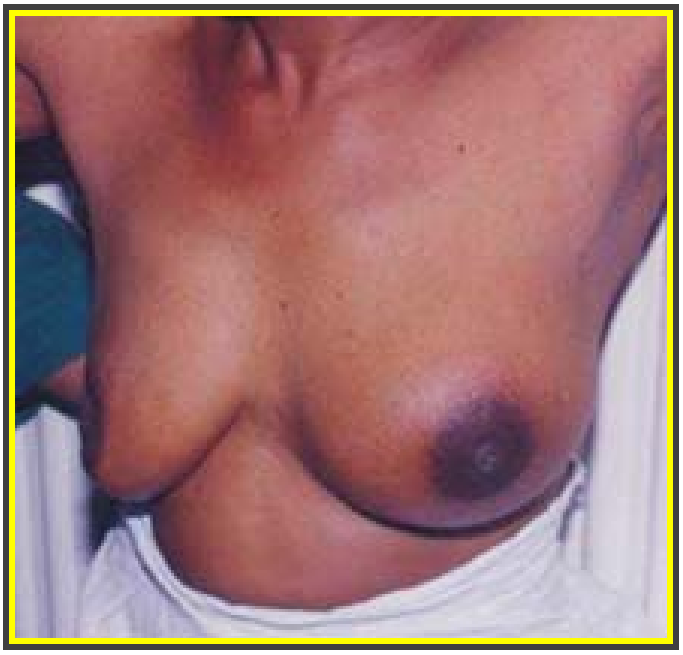

Figure 10: Peaud'orange appearance

Symptoms caused due to metastases

Lymphatic spread: Patients may present with swelling in the axilla orsupraclavicular region, which may be mobile or fixed. Swelling of arm due to lymphatic (or even venous obstruction) in the axilla, is an uncommon but significant presentation.

Hematogenous spread: Respiratory symptoms like cough, breathlessness due topulmonary metastases.Backache, caused by secondary infiltration and collapse of lumbar vertebrae, with nerve root pains radiating to both the legs, is a common symptom.A pathological fracture may be the first indication of the presence of the disease due bone metastases. Cerebral metastases may cause a fit or behavioral abnormality.Mass in the right upper abdomen, jaundice may be caused due to liver metastases.

Curiously, the general symptoms commonly associated with cancer, such as malaise, weight loss and cachexia, are rare in patients with breast cancer. Even those with disseminated fatal disease usually feel well in themselves until the final stages.

CLINICAL EXAMINATION

The patient must be fully undressed to the waist, resting comfortably on an examination couch with her upper body raised at 45 degree to the legs. This position is the best compromise between lying flat sideways, and sitting upright, which makes the breast pendulous. Patients sometimes say that their lump can only be felt when they adopt a certain posture and they should therefore be examined in this position as well.

Inspection: The surgeon inspects the women's breast in following positions:

1. Arms by the side.
2. Arms straight up in the air
3. Hands on her hips.

The following observations are made:

Breast: -Position: whether displaced in any direction.

Symmetry: Marked size difference of recent onset is likely to be caused bysignificant pathology.

Skin: The skin may be pulled in or puckered by an underlying cancer. There may be edema caused by obstruction of skin lymphatics by cancer cells, which is commonly referred to as peau d' orange. Other skin changes include nodules of tumor or a malignant ulcer due to direct invasion of skin by cancer.

Nipple and areola: The levels of nipples on both the sides are compared. In caseof carcinoma the affected side is drawn towards the lump. Look for flattening, retraction, cracks, fissures or eczema. Any discharge from nipple and nature of discharge is noted. Diminution in size of areola around a retracted nipple is a feature of malignancy. Skin changes may become prominent by making patient to raise her

hands above her head. By asking to press the hands against the hips previously invisible swelling may become prominent.Inspect the axillae, arms and supraclavicular fossa to look for enlarged glands, distended veins or arm lymphoedema.

Palpation:

The breast should be palpated with the flat of the fingers and not with the palm of the hand. Surgical mythology says that the breast should be felt with 'the flat of the hand'-this is wrong, use the fingers, which is more sensitive. With the patient sitting up at 45 degree, begin with the normal side first and then palpate the other. The commonest palpatory finding is a hard lump. It is felt most commonly in the outer upper quadrant, which may be irregular in shape and size.

There is difference between skin fixation and tethering, when a lesion is fixed to the skin it has spread into the skin and cannot be moved or separated from it. Tethered lesions is one more deeply situated and by distorting the fibrous septa which separate the lobules of breast tissue (the ligaments of Cooper), puckers and pulls the skin inwards, but remain separate from the skin and can be moved independently.

Ascertain the mobility of the lump within the breast tissue and with relationship to pectoralis major muscle, this may be done by asking the patient to press against her hips. Also look for fixity to chest wall.

If there is nipple inversion it may be possible to evert it by gently squeezing, if the nipple will not evert, there is likely to be underlying disease. Unilateral inversion is more significant than bilateral inversion. Discharge may be gently expressed out and the character of the fluid noted.[57, 58]

Lymph nodes palpation:

The axillary lymph glands form a three-sided pyramid whose apex is in the narrow gap between the first rib and axillary vessels. The examination is carried out in sitting position with muscles and fascia around the axilla well relaxed.[59]

If the patient's left axilla is to be examined, the left arm is taken and supported by the left hand of the examiner. Then the examiner's right hand palpates the anterior fold of axilla for pectoral lymph nodes. The hand is gently introduced gently into the apex of the axilla to palpate the apical lymph nodes, and passed down to palpate the central group over the medial wall of axilla.

The posterior and lateral groups can more easily be felt from behind. The posterior wall of axilla the scapular groups of nodes are felt around the serratus anterior and latissimus dorsi and lastly feel for the lateral group around the neck and shaft of humerus. The size, number, consistency and mobility must be fully documented. Obstruction of lymphatics may give rise to edema of the arm.

Other groups of nodes that must be examined are the supraclavicular and infraclavicular nodes. Note particularly the presence of scalene node behind the insertion of sternocleidomastoid.

Systemic examination:

This is important for the clinical assessment of distantmetastasis. Abdominal examination for liver metastasis, ovarian secondaries or presence of free fluid. Respiratory system examination for pulmonary metastasis should be done. Skeletal system examination particularly lumbar spine, pelvis, ribs, sternum, upper ends of femur and humerus should be done to look for tenderness or restricted mobility. Rectal and vaginal examinations are necessary to detect deposits and krukenberg's tumor respectively.

Triple assessment:

In UK, suspected cases receive triple assessment whichconsists of

1) History and examination
2) Diagnostic imaging by mammography or ultrasonography and
3) Cytology or histology.

Sensitivity ranges from 85% to 95%.[60]

BREAST CANCER STAGING

Staging of breast cancer is essential to plan the treatment and assess the prognosis of the disease. Staging relates to the classification of breast cancer according to the anatomical extent of disease, each stage serving to aggregate cases having an approximately similar prognosis. Many staging systems have been proposed, none has been shown to be significantly better than others. The clinical stage of breast cancer is determined primarily through physical examination of skin, breast and lymph nodes. Clinical determination of axillary lymph nodes is only 33%. Mammography, chest x-ray and intraoperative findings provide necessary information.[43, 61] Common staging systems are:

TNM STAGING: Proposed by International Union against Cancer (UICC) and the American Joint Committee on Cancer (AJCC). In 2002, the AJCC issued its revised TNM classification system. This system is based on the description of the primary tumor (T), status of regional lymph nodes (N) and distant metastases (M). The breast cancer staging is complex, reflecting the introduction of sentinel node biopsy, the scrutiny of axillary lymph nodes by immunohistochemistry and polymerase chain reaction.

American Joint committee on Cancer (AJCC) staging system, 2002[30]

TNM (Tumor, Node, Metastasis) staging system

Primary Tumor (T) definitions for classifying the primary tumor (T) are the same for clinical and for pathologic classification. If the measurement is made by physical examination, the examiner will use the major headings (T1, T2, orT3), if other measurements, such as mammographic or pathologic measurements, are used, the subsets of T1 can be used. Tumors should be measured to the nearest 0.1cm increment.

Primary tumor (P)

Tx: Primary tumor cannot be assessed

To: No evidence of primary tumor

Tis: Carcinoma in situ

T1: Tumor 2 cm or less in greatest dimension

T1mic: Micro invasion 0.1cm or less in greatest dimension

T1a: Tumor more than 0.1cm but not more than 0.5cm in greatest dimension

T1b: Tumor more than 0.5cm but not more than 1cm in greatest dimension

T1c: Tumor more than 1cm but not more than 2cm in greatest dimension

T2: Tumor more than 2 cm but not more than 5 cm in greatest dimension

T3: Tumor more than 5 cm in greatest dimension

T4: Tumor of any size with direct extension to (a) chest wall or (b) skin, only as described below

T4a: Extension to chest wall, not including pectoralis muscle

T4b: Edema (Including Peaud'orange), or ulceration of the skin of the breast, or satellite skin nodules confined to the same breast

T4c: Both T4a and T4b

T4d: Inflammatory Carcinoma

Regional lymph nodes-Clinical (N)

Nx: Regional lymph nodes cannot be assessed (e.g., previously removed)

No: No regional lymph node metastasis

N1: Metastasis to movable ipsilateral axillary lymph node(s)

N2: Metastasis in ipsilateral axillary lymph nodes, fixed or matted, or in clinically apparent ipsilateral internal mammary nodes in the absence of clinically evident axillary lymph node metastasis

N2a: Metastasis in ipsilateral axillary lymph nodes fixed to one another (matted) or to other structures

N2b: Metastasis only in clinically apparent ipsilateral internal mammary nodes and in the absence of clinically evident axillary lymph node metastasis

N3: Metastasis in ipsilateral infraclavicular lymph node(s) with or without axillary lymph node involvement, or in clinically apparent ipsilateral internal mammary lymph node(s) and in the presence of clinically evident axillary lymph node metastasis, or metastasis in ipsilateral supraclavicular lymph node(s) with or without axillary or internal mammary lymph node involvement

N3a: Metastasis in ipsilateral infra clavicular lymph node(s)

N3b: Metastasis in ipsilateral internal mammary lymph node(s) and axillary lymph node(s)

N3c: Metastasis in ipsilateral supraclavicular lymph node(s)

Distant metastasis (M)

Mx: Distant metastasis cannot be assessed

Mo: No distant metastasis

M1: Distant metastasis

a--Clinically apparent is defined as detected by imaging studies (excluding lymphoscintigraphy) or by clinical examination or grossly visible pathologically

The Manchester System (1940)[44]

Stage I: Tumor confined to breast. Any skin involvement covers an area less than the size of the tumor.

Stage II: Tumor confined to breast. Palpable, mobile axillary nodes.

Stage III: Tumor extends beyond the breast tissue because of skin fixation in an area greater than the size of the tumor or because of ulceration. Tumor fixed to underlying fascia.

Stage IV: Fixed axillary nodes, supraclavicular nodal involvement, satellite nodules or distant metastases.

The Columbia classification (Haagensen, Cooley and Stout 1943, 1969)[44]

Stage A: No skin edema, ulceration, or fixation to chest wall; axillary nodes not clinically involved.

Stage B: Clinically involved axillary nodes less than 2.5 cm in diameter and notfixed.

Stage C: Grave signs of comparatively advanced carcinoma: edema of skin, skinulceration, fixation to chest wall, massive axillary involvement with nodes greater than 2.5 cm in diameter, and axillary fixation.

The single most important predictor of 10 to 20 year survival rates in breast cancer is the number of axillary lymph nodes involved with metastatic disease.

INVESTIGATIONS

Breast biopsy

1. **Fine needle aspiration cytology**:

FNAC of a palpable breast mass is performed in an outpatient setting. A 1.5 inch, 22-guage needle attached to a 10 ml syringe is commonly used. A syringe holder enables the surgeon performing the procedure to control the syringe with one hand while positioning the breast mass with the opposite hand. After the needle is placed inside the mass, suction is applied while the needle is moved back and forth with the mass. The cellular material expressed is put onto microscope slide. Both air-dried and ethanol fixed microscopy sections are prepared for analysis. The sensitivity and specificity approaches 100% when breast mass is clinically and mammographically suspicious. The false negative rate is 5% and false positive rate is 2%.[53,62]

Disadvantages[63]

- Will not differentiate between in situ and invasive cancer.
- No histological detail.
- False negatives are high due to sampling errors.
- Requires expert and specialized pathological interpretation.

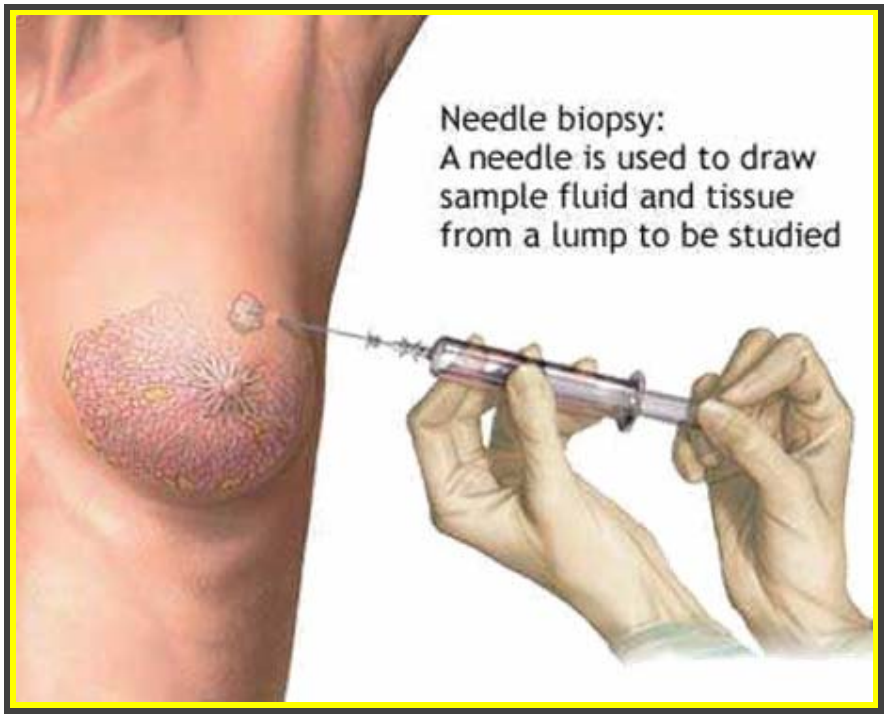

Figure 11: Fine needle aspiration cytology

2. **Core biopsy:**

Core biopsy can be performed on palpable breast masses with a 14 gauge needle, such as Tru cut needle. A variety of instruments can be used to provide a core or tissue such as automated biopsy guns which has replaced aspiration cytology in many departments. This technique has to be performed under local anesthetic. Tissue specimens are placed in formalin and then processed to paraffin blocks. The only disadvantage is because of sampling errors.

Advantages[63]

1. Produces excellent histological detail rather than cytological specimen.
2. In situ cancers can be differentiated from invasive cancers.
3. Grading of tumors is possible.
4. Identification of estrogen receptors is also possible.

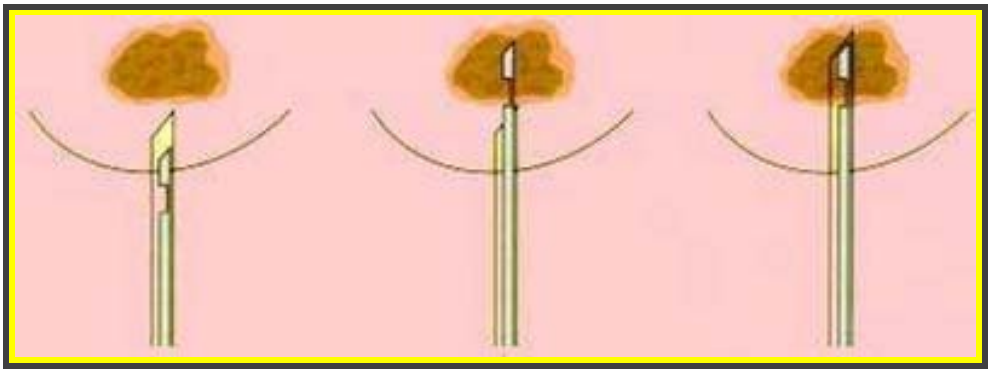

Figure 12: Core biopsy

3. **Open surgical biopsy:**

Biopsy is required when FNAC or core biopsies havefailed to demonstrate malignant disease. It has the *disadvantage* of requiring hospital admission, although majority of patients can be treated and discharged the same day. Its *advantage* is that it provides a definitive method of proving or excluding malignant disease. Open biopsy can occasionally be performed under local anesthesia but more easily under general anesthesia.

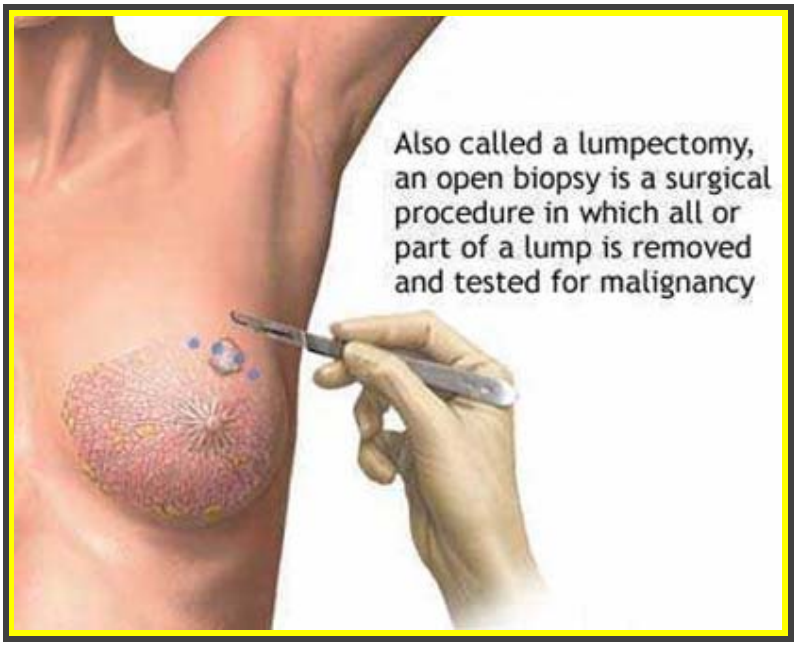

Figure 13: Open biopsy

Open surgical biopsy and frozen section:

This procedure of excising thespecimen at the time of definitive surgery has become less common with more wide spread use of FNAC. Modern surgical practice should avoid the outmoded approach of performing mastectomy on the basis of frozen section.[43]

4. **Incisional biopsy:**

For cases presenting with an ulcer this method was used. Notused routinely and has been replaced by FNAC.

MAMMOGRAPHY

Mammography has been used in North America since 1960's. Conventional mammography delivers a radiation dose of 0.1 centigray (cGy) per study. By comparison a chest x-ray delivers 25% of this dose. However there is no increased breast cancer risk associated with the radiation dose.

Screening Mammography:

It is used to detect unexpected breast cancer inasymptomatic women. Two views of the breast are obtained, the craniocaudal (CC) and mediolateral oblique (MLO) view. The MLO view images the greatest volume of the breast, including the upper outer quadrant and the axillary tail. The CC view provides better visualization of the medial aspect of the breast and permits greater breast compression.

At present screening mammography should be offered:

- Annually to women aged 50 and older.
- At least biennially in women aged 40 to 49.
- Annually in younger women with significant family history, histological risk or a history of prior breast cancer.

Figure 14: Malignant micro-calcifications in mammograms

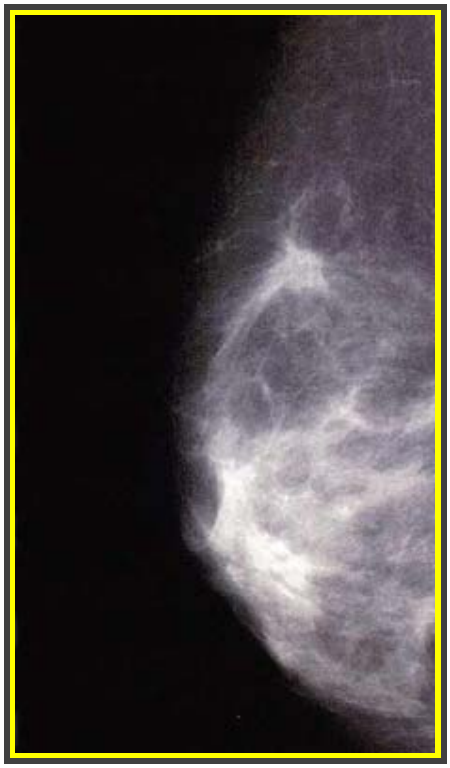

Figure 15: Malignant breast mass

Diagnostic Mammography

It is used to evaluate women with abnormal findings such as a breast mass, nipple discharge, or an abnormality on screening mammography. It includes magnification and compression imaging in addition to MLO and CC views. The additional views are 90 degree lateral and spot compression views. Compression device minimizes motion artifact, improves definition, separates overlying tissues and decreases radiation dose. Magnification (x1.5) improves better visualization of margins. Diagnostic mammography may be offered to:

1. Evaluate opposite breast.
2. To evaluate questionable or ill-defined mass or other suspicious changes in breast.
3. To search for occult cancer in patients with axillary nodes.
4. When women is undergoing conservative breast surgery to detect concomitant lesion in the same breast.

Mammographic abnormalities suggestive of malignancy can be divided into:

- *Density abnormalities* - masses, architectural distortion and asymmetries.
- *Micro calcifications* - The presence of fine, stippled, clustered calcium in andaround a suspicious lesion is highly suggestive of malignancy, especially in younger women.[64, 65]

Mammography assisted biopsy techniques

1. **Needle Localization Breast Biopsy**: Until 1990, this was the only method to evaluate non-palpable mammographic abnormality, which included surgical excision of breast masses marked with preoperative wire localization.
2. **Large core needle biopsy (LCNB)**: Can be either performed under ultrasound or mammographic guidance. Mammographic calcifications are sampled using stereotactic capabilities. Histological detail can be obtained. Stereotactic LCNB involves the patient lying prone on core biopsy table with breast in compression. A robotic arm and biopsy gun is positioned by computed analysis of triangulated mammographic images.[53]

Ductography:

The primary indication is nipple discharge, particularly when thefluid contains blood. Contrast media is injected into one or more major ducts and CC and MLO mammography views are obtained. Intraductal papillomas appear as small filling defects, whereas cancers appear as irregular masses or as multiple filling defects. **Ductal-lavage** and cytology using micro-catheters is used in women with increased breast cancer risk.

Thermography:

Malignant lesions are hotter than normal and benign lesions dueto increased vascularity and increased metabolism. It has 85% diagnostic accuracy.

Magnetic Resonance Imaging:

There is current interest in using MRI to screen the breasts of high-risk women and of women with a newly diagnosed cancer.[70]

1. It can be useful to distinguish scar from recurrence in women who have had previous breast conservation therapy.
2. It is the gold standard for imaging breasts of women with implants.

Investigations to assess the metastases

Liver function tests: Enzyme levels may be elevated in hepatic metastases.

Chest X-ray: Features suggestive of secondaries include coin lesions, interstitial infiltration, mediastinal widening, pleural effusion and rib secondaries.

Bone X-rays: Usually present osteolytic lesions and rarely osteogenic.

Bone Scan: Technetium Tc99 labeled bone scans are more sensitive than X-rays.They are most helpful when strong suspicion of skeletal metastases is present.

Ultrasound scan of abdomen: is used to assess liver metastases, lymph nodes, free fluid in abdomen, ovarian secondaries or any pelvic deposits.

MATERIALS AND METHODS

SOURCE OF DATA

Study conducted on 100 patients presenting with breast lump to the department of surgery in R.L.Jalappa Hospital & Research Centre, Kolar, during the period from January 2012 to August 2014.

Inclusion Criteria: Patient aged ≥ 35 years, presenting with palpable breast lump.

Exclusion Criteria: Obvious malignant lesions (fungation, ulceration).

METHOD OF COLLECTION OF DATA:

It being prospective study, women presenting for evaluation of palpable breast lump to the department of surgery at R.L.Jalappa hospital and Research centre underwent assessment by clinical examination, mammography and FNAC and Triple Test Scoring was done.

- All patients who underwent a complete TTS at our institution were entered into the study.
- All patients were subjected to necessary surgery, post TTS and followed up with histopathology of the specimen.
- A structured proforma was used to collect relevant information from each patient selected.
- Each component of the triple assessment was compared with the gold standard histopathology, so also TTS was compared with histopathology and findings were analyzed.
- All of patient details and relevant information was entered into the proforma.

ANALYSIS

All the three components of triple test i.e., physical examination, mammography and FNAC findings were categorized as benign, suspicious and malignant. The Triple test (TT) was considered concordant if all the elements indicated a malignant condition or all indicated a benign condition, otherwise TT was considered non-concordant.

- Sensitivity is defined as percentage of cases in which biopsy proven cancer was correctly diagnosed by the test.
- Specificity is defined as percentage of cases in which biopsy proven benign lesion was correctly diagnosed by the test.

The values were determined by the following formula:

$$\text{Sensitivity} = \frac{TP}{TP + FN} \qquad \text{Specificity} = \frac{TN}{TN + FP}$$

TP – true positive,

TN – true negative,

FP – false positive

FN – false negative

Further, triple test score (TTS) was given; physical examination, mammogram and FNA were each assigned a score of 1, 2 or 3 for benign, suspicious or malignant results; TTS is the sum of these scores. TTS has a minimum score of 3 (concordant benign) and a maximum score of 9 (concordant malignant).

RESULTS

A total of 100 patients who satisfied the inclusion criteria were enrolled into the study, all the patients were subjected to clinical examination followed by mammography and FNAC, individual scores were given and the triple test score was calculated. All the patients were subjected to the appropriate surgery and the specimen sent for histopathology.

In our study the mean age of the patients was found to be 46.12 ± 11.48 years, most of the patients were in the age group of 35-45 years (60%). Positive family history was found in 17%. Patients on an average took 6 months to seek medical help after recognition of the breast lump.

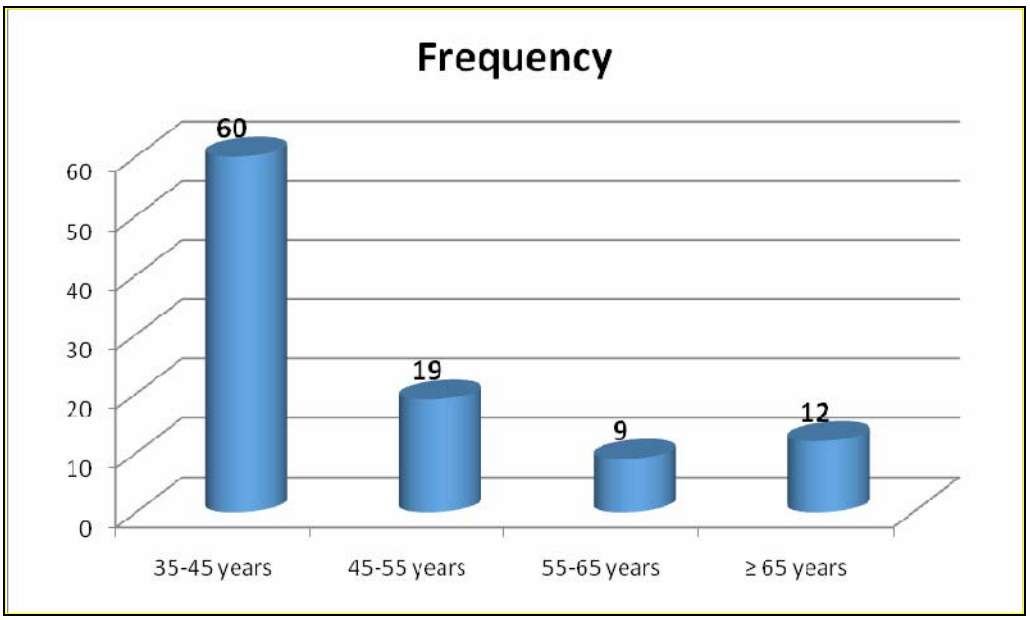

Figure 16: Age-wise distribution of patient

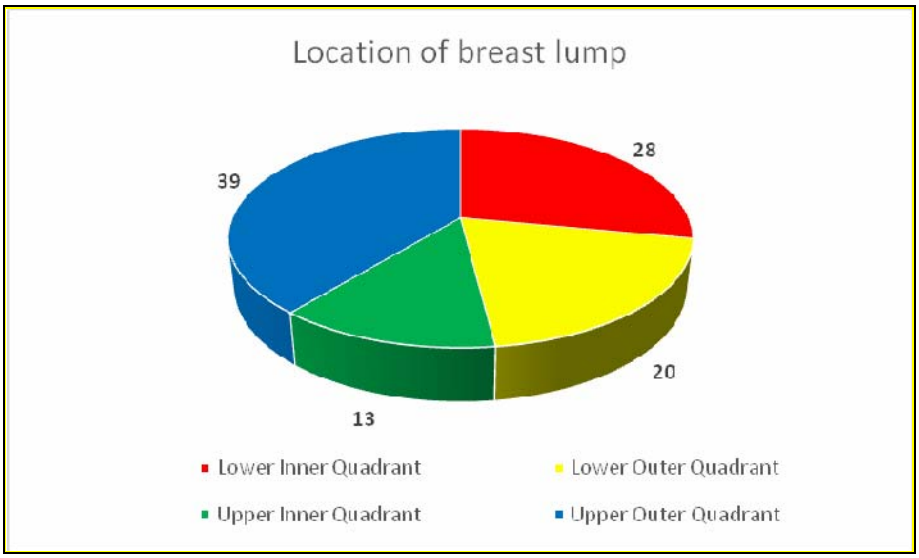

Figure 17: Location of breast lump

Most common location of breast lump was upper outer quadrant (Figure 17).

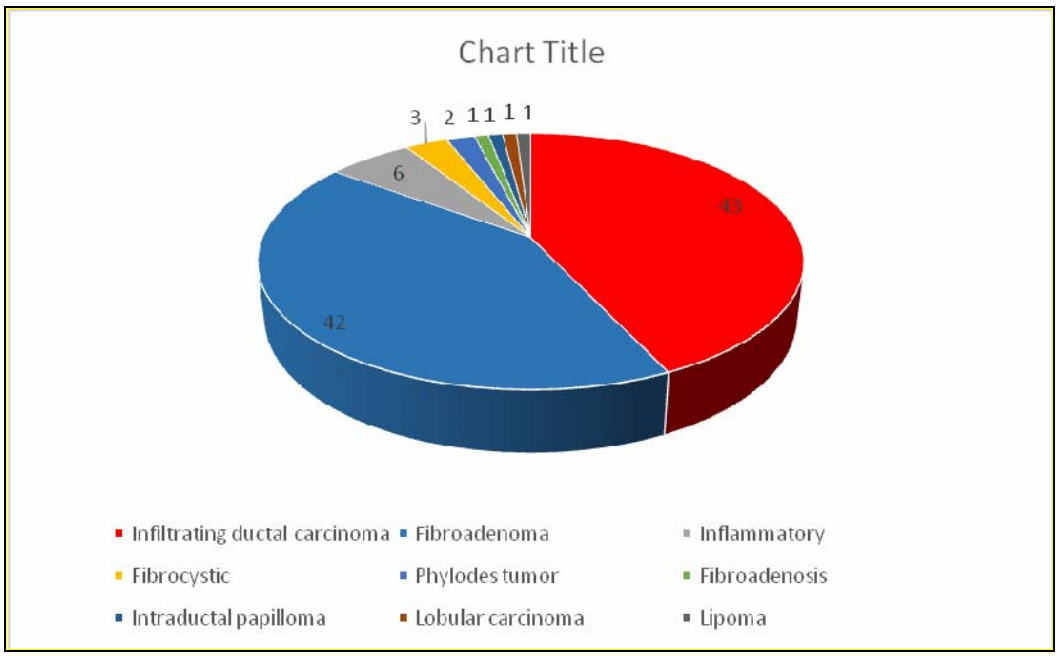

Figure 18: The different histo-pathological diagnosis of breast lump

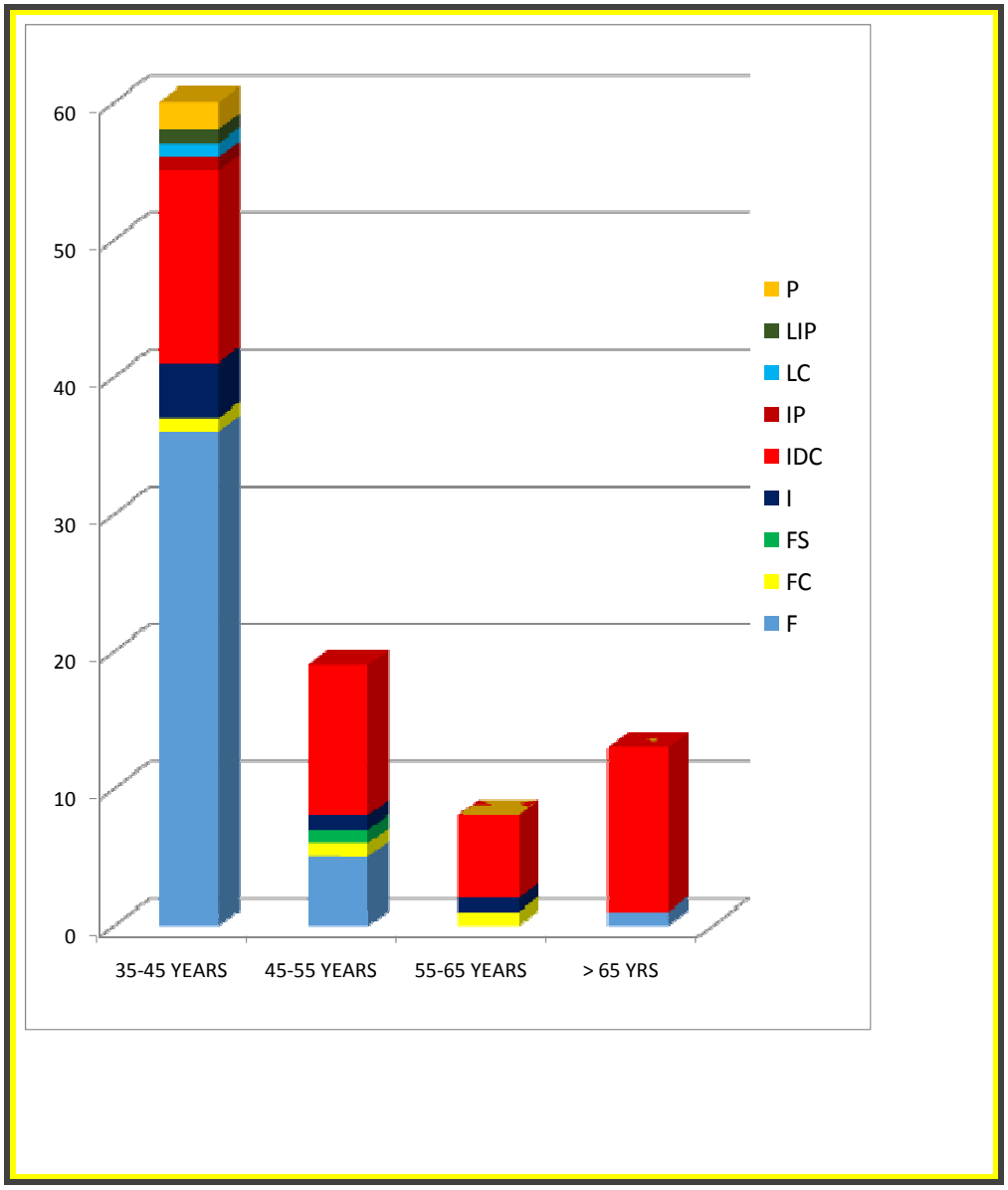

Figure 19: The different histo-pathological diagnosis of breast lump age-wise

Among the 100 cases which had histo-pathologic correlation 56 were benign disease and 44 malignant.

Table 1: COMPARISON OF CLINICAL ASSESSMENT WITH HISTOPATHOLOGY

CLINICAL ASSESSMENT	HISTOPATHOLOGY		Total
	Benign	Malignant	
Benign	51	2	53
(%)	91.1%	4.5%	53.0%
Suspicious	5	4	9
(%)	8.9%	9.1%	9.0%
Malignant	0	38	38
(%)	0.0%	86.4%	38.0%
Total	56	44	100
(%)	100.0%	100.0%	100.0%

Sensitivity: 95 %

Specificity: 100 %

Positive Predictive value: 100 %

Negative Predictive Value: 96.23 %

Accuracy: 97.80%

The scoring for clinical examination revealed a score of 1, 2 and 3 in 53%, 9% and 38% respectively. The clinical diagnosis of benign and malignant was comparable with HPE.

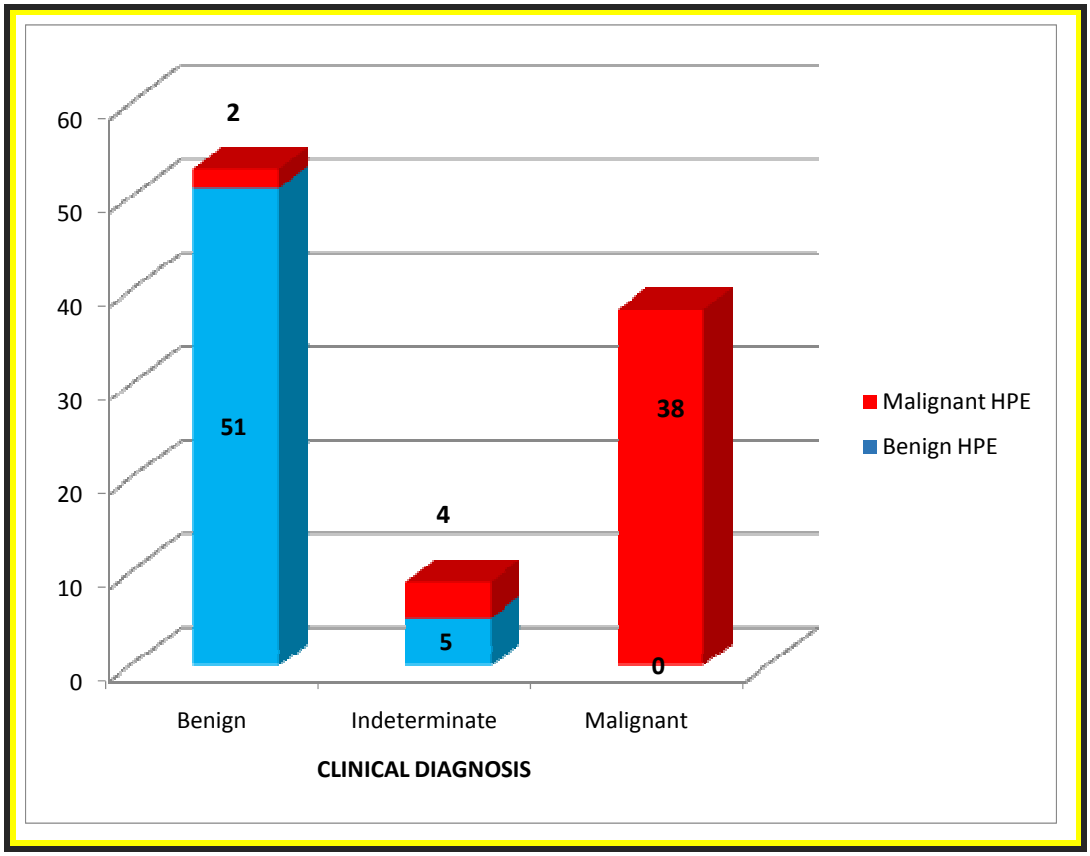

Figure 19: Comparison of clinical assessment with histopathology

Out of 9 cases with suspicious interpretation in clinical diagnosis: 5 were diagnosed to be benign and 4 were diagnosed as malignant. Two cases which were diagnosed clinically as benign turned out to be malignant on HPE.

TABLE 2: COMPARISION OF FNAC WITH HISTOPATHOLOGY

FNAC SCORE	HISTOPATHOLOGY		Total
	Benign	Malignant	
Benign	54	1	55
(%)	96.4%	2.3%	55.0%
Suspicious	2	3	5
(%)	3.6%	6.8%	5.0%
Malignant	0	40	40
(%)	0.0%	90.9%	40.0%
Total	56	44	100
(%)	100.0%	100.0%	100.0%

The scoring for FNAC revealed a score of 1, 2 and 3 in 55%, 5% and 40% respectively. The clinical diagnosis of benign and malignant was comparable with HPE.

Sensitivity: 97.56 %

Specificity: 100 %

Positive Predictive value: 100 %

Negative Predictive Value: 98.18 %

Accuracy: 98.94%

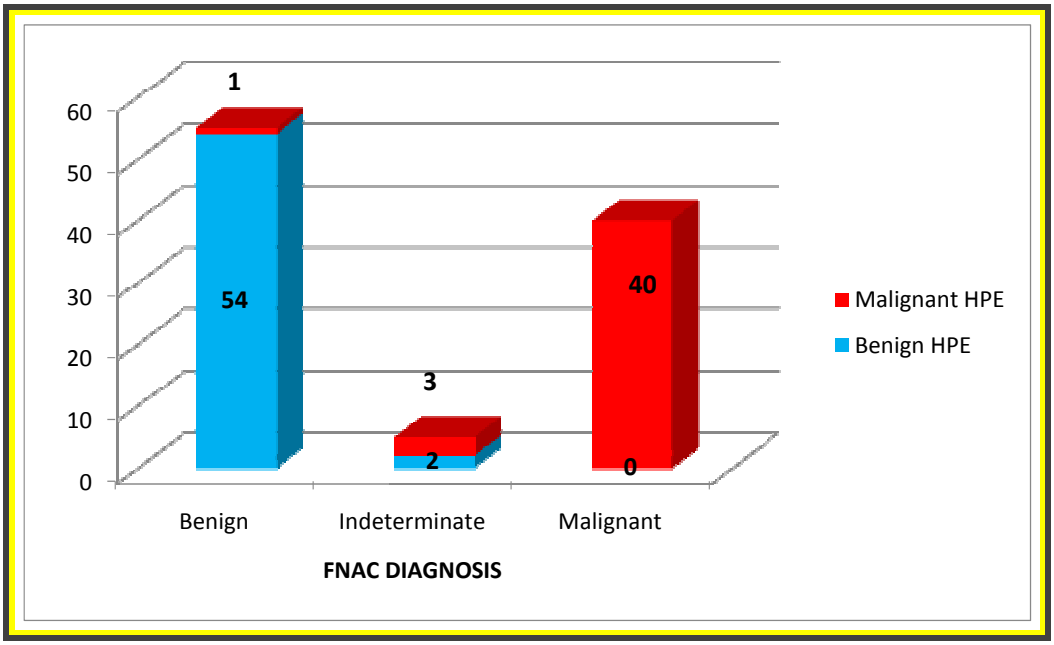

Figure 19: Comparison of FNAC with histopathology

Out of 5 cases with suspicious interpretation in FNAC: 2 were diagnosed to be benign and 3 were diagnosed as malignant. One case which was diagnosed as benign turned out to be malignant on HPE.

TABLE 3: COMPARISION OF MAMMOGRAPHY WITH HISTOPATHOLOGY

MAMMOGRAPHY	HISTOPATHOLOGY		Total
	Benign	Malignant	
Benign(1)	56	3	59
%	100.0%	6.8%	59.0%
Suspicious(2)	0	6	6
%	0.0%	13.6%	6.0%
Malignant(3)	0	35	35
%	0.0%	79.5%	35.0%
Total	56	44	100
%	100.0%	100.0%	100.0%

The scoring for mammography revealed a score of 1, 2 and 3 in 59%, 6% and 35% respectively. The mammography diagnosis of benign and malignant was comparable with HPE.

Sensitivity: 92.11 %

Specificity: 100 %

Positive Predictive value: 100 %

Negative Predictive Value: 94.92 %

Accuracy: 96.80%

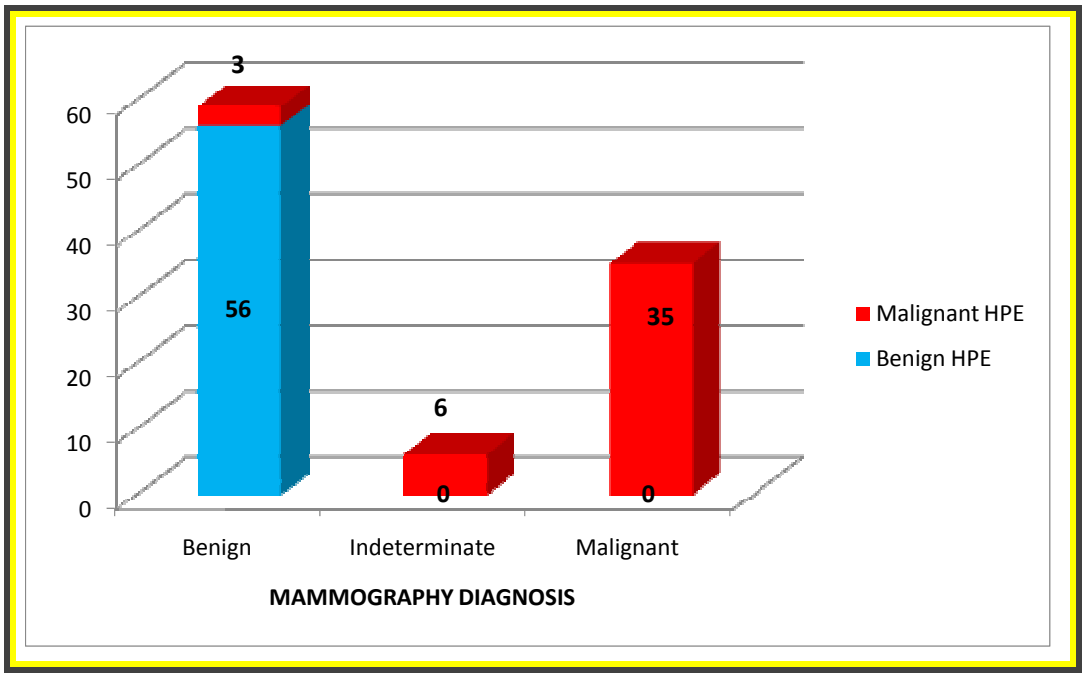

Figure 19: Comparison of Mammography with histopathology

Out of 6 cases with suspicious interpretation in mammography all were diagnosed as malignant. Three cases which were diagnosed as benign turned out to be malignant on HPE.

TABLE 4: COMPARISION OF TRIPLE TEST SCORE WITH HISTOPATHOLOGY

TRIPLE TEST SCORE	HISTOPATHOLOGY		Total
	Benign	Malignant	
Benign(1)	55	0	55
(%)	100%	0.0%	52.0%
Indeterminate(2)	1	0	1
(%)	0.0%	2.3%	4.0%
Malignant(3)	0	44	44
(%)	1.8%	97.7%	44.0%
Total	56	44	100
(%)	100.0%	100.0%	100.0%

All the cases diagnosed as malignant with TTS were proved malignant by HPE, all cases diagnosed as benign were proved benign on HPE, one case with TTS of 5 required a further test in form of biopsy for confirmation, it turned out to be benign.

Sensitivity: 100 %

Specificity: 100 %

Positive Predictive value: 100%

Negative Predictive Value: 100 %

Accuracy: 100 %

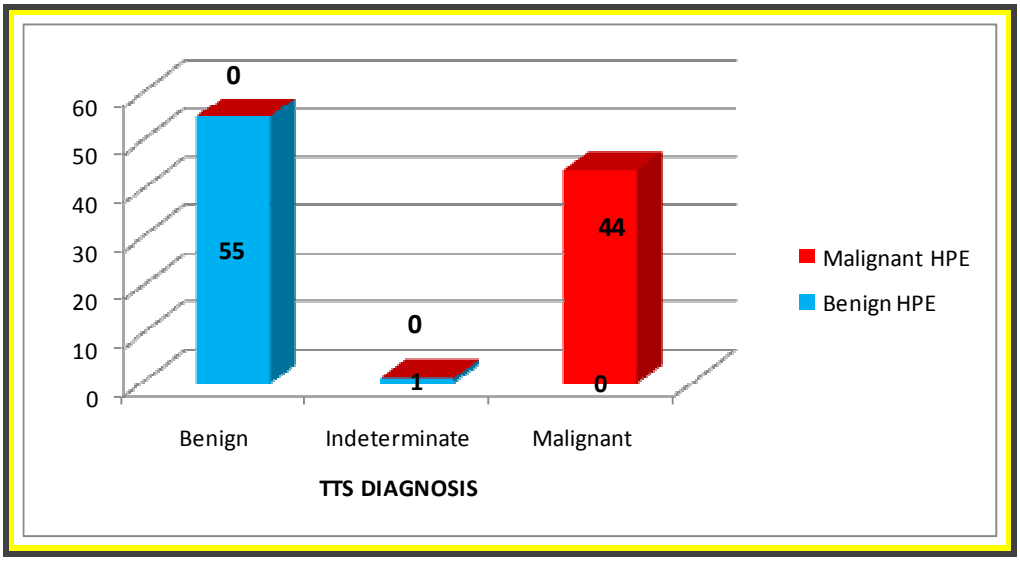

Figure 19: Comparison of TTS with histopathology

TABLE 5: CONCORDANT V/S DISCORDANT RESULTS IN TRIPLE ASSESSMENT.

CONCORDANT	DISCORDANT
89	11

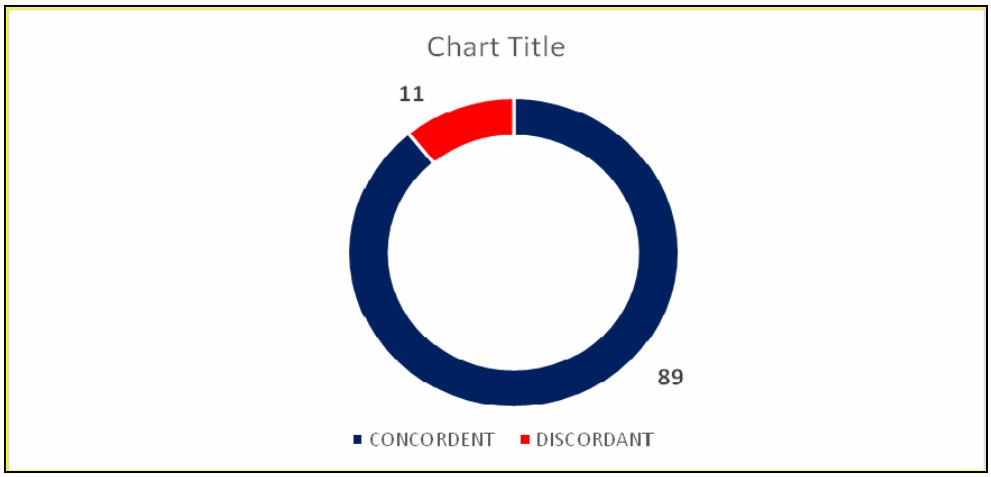

Figure 19: Depicting the ratio between concordant and discordant results

Among the 11 discordant results, score of 7,6 and 5 were seen in 7,3 and 1 patients respectively.

TABLE 6: RESULTS DERIVED FROM VARIOUS MODALITIES USED IN BREAST LUMP ANALYSIS

Diagnosis	Clinical	FNAC	Mammography	Triple test	HPE
Benign	53	55	59	55	56
Indeterminate	9	5	6	1	0
Malignant	38	40	35	44	44
Total	100	100	100	100	100

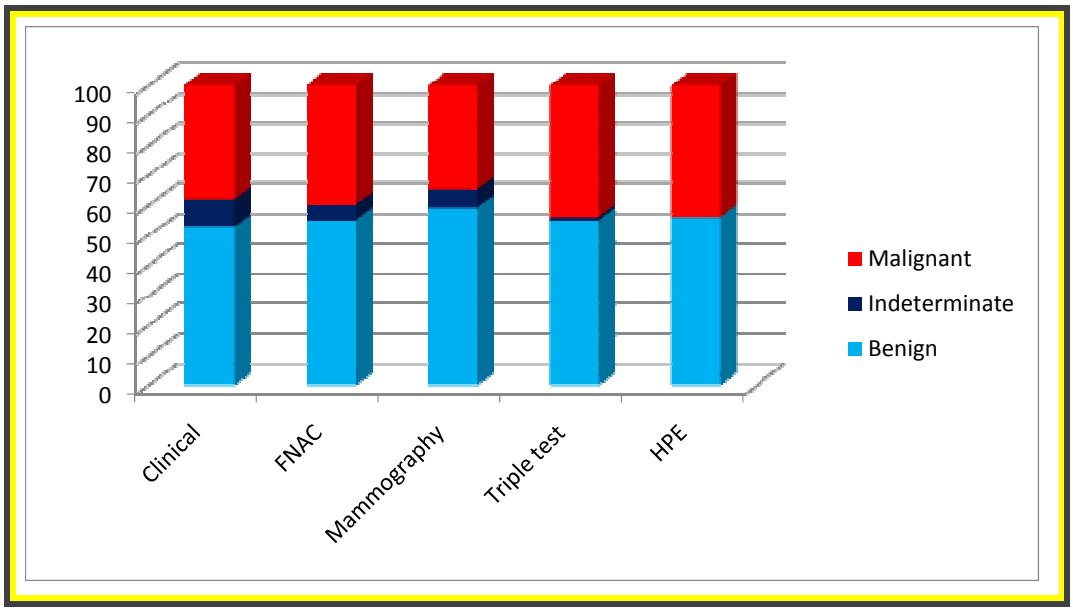

Figure 20: Results Derived From Various Modalities Used In Breast Lump Analysis

TABLE 7: COMPARISON OF ALL THE COMPONENTS USED IN BREAST LUMP ANALYSIS.

Investigation	Sensitivity (%)	Specificity (%)	Positive Predictive Value (%)	Negative Predictive Value (%)	Accuracy(%) (%)
Clinical examination	95	100	100	96.23	97.80
FNAC	97.56	100	100	98.18	98.94
Mammography	92.11	100	100	94.92	96.80
TTS	100	100	100	100	100

TABLE 8: KAPPA AGREEMENT BETWEEN BIOPSY AND OTHER DIAGNOSTIC MODALITIES

Diagnostic modality	Kappa value	p value
Clinical examination	0.795	<0.01
FNAC	0.884	<0.01
Mammography	0.758	<0.01
Triple test	0.903	<0.01

DISCUSSION

Prospective analysis of TTS on 100 patients and confirming the results with histopathological finding showed TTS to be highly sensitive and specific. In the present study 100 patients with age ranging from 35 years to 90 years with a mean age of 46.12 ± 11.48 years who presented with complaint of breast lump were evaluated.The mean age here was considerably less than that seen in the western population (57 years)[7] and comparable to study done at Nepal (48 years).60% of the patients belonged to age group between 35-45yrs. Benign diseases (56%) were more common than malignant (44%). Fibrodenoma (42%) being the most common benign lesion and Infiltrating ductal carcinoma (43%) being the most common malignant lesion. Most of the patients aged above 55 years with breast lump were diagnosed with a malignant lesion reinforcing the fact that age is an important risk factor in carcinoma breast. The lesion was found to be present commonly in upper outer quadrant (39%). Women on an average sought medical help with a delay of 6 months after realizing the presence of breast lump, thus delaying the treatment which in cases of malignancy carry bad prognosis, thus emphasizing the need of better education of the mass at large.

In our study, clinical diagnosis (physical examination) showed a sensitivity of 95%, a specificity of 100% and positive predictive value of 100%, negative predictive value of 96.23 with an overall accuracy of 97.80% (Table 7). Other studies showed that clinical examination could diagnose accurately only 70% of cases of carcinoma. Egan recorded an accuracy of 65% detection by physical examination.[22] Our study showed an accuracy of 97.80% by clinical examination. This relatively high accuracy

in detecting malignancy by clinical examination is due to the fact that our patients rarely present early in the course of the disease. Breast lump in our patients on an average was about 4x3centimeters on presentation. Out of 9 cases with suspicious interpretation in clinical diagnosis: 5 were diagnosed to be benign and 4 were diagnosed as malignant. Two cases which were diagnosed clinically as benign turned out to be malignant on HPE (Table 1).

In examining the triple test elements individually, we noted that FNAC is typically more accurate than physical examination or mammography (Table 7). This agrees with the study of Morris et.al. and Vetto et. al.[27-33] In our study, the sensitivity of FNAC was 97.56%, the positive predictive value was 100%, specificity was 100%, and the negative predictive value was 98.18% with no false positives, but 1 false negative (Table 2). These results are in accordance with those of Morris et.al. Vetto et al. reported a sensitivity of 96% for FNAC, with a specificity of 100%, and a positive predictive value of 100%.[27-33] Rubin and Joy concluded that FNAC is the first reliable diagnostic step in detection of breast carcinoma. They reported a positive predictive value of 100%, a specificity of 100%, a sensitivity of 87%, and a negative predictive value of 89%.

The widespread use of mammography has helped in better management of breast lump. In our study, the accuracy of mammography was 96.80%, the sensitivity 92.11%, the specificity 100%. The positive predictive value was found to be 100%. There were 3 false positives and 6 cases were inconclusive (Table 3). In a Dutch study of breast cancer screening, Romback found that if mammography alone has been used the sensitivity of breast cancer diagnosis would have been 95%. Rodes et.al. reported that mammography was the sole detection modality in 56% of cases. When combined with physical examination, an additional 30% were detected, while physical

examination alone detected 14% of cases.

In our study, the best results was got by TTS, it showed sensitivity of 100%, the positive predictive value was 100%, specificity was 100%, and the negative predictive value was 100% almost in perfect alignment with that of histopathology(Table 7). In one case where the TTS was 5 an additional test in the form of biopsy was required .

In our study, when all three components showed malignancy, the sensitivity and specificity were 100%. Kaufman et al described a sensitivity of 100% and a specificity of 57% for the triple test and a negative predictive value of 100% in concordant cases. Clinical examination remains indispensable for detection of different breast lesions. Mammography remains the method of choice in radiology of the breast. FNAC has proved to be a very effective diagnostic aid. It is an easy technique, safe and very acceptable to patients. TTS outweighs all of these components and also helps us proceed further even in difficult scenarios of discordant results with triple assessment, thus reducing the fall back on the option of open biopsy which carries with it a number of disadvantages.

The use of the triple test score has proved itself to be a reliable tool for the accurate diagnosis of palpable breast lump. Triple test score when implemented streamlines the management of breast lump, more so when triple assessment can't come to a definitive diagnosis and thus biopsy which usually is resorted to in such a scenario can be avoided, saving the patient from anxiety, repeated operative procedure, financial burden, undue delay in treatment and also providing the surgeon a platform to base his further management.

SUMMARY

This prospective study was done to evaluate the efficacy of triple test score in the management of palpable breast lump and to develop a standard protocol for management of breast lump especially when discordant results are obtained from triple assessment.

A total of 100 women with complain of breast lump presenting to the department of surgery at R.L. Jalappa hospital and Research centre underwent assessment by physical examination, followed by mammography and FNAC. Triple Test Scoring was done for each component and the total score calculated. Patient were subjected to appropriate surgery and the specimen sent for histopathology. Each component was analyzed and compared with histopathology, the parameters sensitivity, specificity, positive predictive value, negative predictive value, accuracy were calculated and it was found that triple test score was best in predicting the nature of the breast lesion compared with any of the individual components of triple assessment or all of them put together.

The real value of triple test scoring was better appreciated when there was discordant results among the components of triple assessment. As no proper guidelines exist in managing such cases, it was here that triple test score can provide us with something concrete on which we can base our definitive management effectively and confidently. Along with being a non-invasive, cost effective method it gives us the result without any undue delay and helps to manage patient in a better way rather than managing such cases as per individual surgeon's choice.

Triple test score when implemented streamlines the management of breast lump, more so when triple assessment can't come to a definitive diagnosis and thus biopsy which usually is resorted to in such a scenario can be avoided, saving the patient from anxiety, double operative procedure, financial burden, undue delay in treatment and also providing the surgeon a platform to base his further management.

CONCLUSION

Triple test score can be safely used as an accurate and least invasive diagnostic test and based on its interpretation, definitive treatment can be initiated which would reduce the need for unnecessary biopsies. The strength of TTS seems to lie in its ability to reliably predict benign lumps and thus avoid major surgeries. Given the increased incidence of malignant lumps in elderly females and the tendency to hide asymptomatic lumps, we need more awareness programs targeting this age group.

When patient presents to us with breast lump, it has been the usual practice to do a thorough clinical assessment, reaching a provisional diagnosis, which is then confirmed by using FNAC. With triple assessment gaining popularity mammography too was included into the scheme of breast lump evaluation for more apt diagnosis thus leading to better management of the patient.

When all the components of triple assessment are concordant, that is agree on common grounds the diagnosis is easily reached and patient is managed accordingly. When the components are discordant, that is differ in their interpretation of the breast lump, what would be the next step forward is the area which needs more light to be shed upon. It is precisely in this area where triple test score can be the answer to this dilemma. TTS being non-invasive and economical, with certain diagnosis in most of the cases (except in score of 5) can be relied upon as an effective test for further management of the patient.

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ANNEXURES

PROFORMA

Name: IP No:

Age: Address:

Complaints : 1) Lump in breast : Right / Left : Since -

2)

3)

Details of history

1) Lump :

Mode of onset - Insidious / Acute

Progress - Gradual / Rapid / Static

Size of lump (Approx.) – Initial: Marble / Lemon / Orange /

Present: Marble / Lemon / Orange /

2) Pain: Present / Absent , if present :

Duration:

Type:

3) Discharge from the nipple: Yes / No

If yes, nature of discharge : Blood stained /serous /dark green / Purulent /Milk /Black.

4) Nipple retraction : Recent / Congenital / Absent

Axillary, supraclavicular swellings: Yes / No ,Since –

Symptoms of – Cough / Haemoptysis / Dyspnoea / Chest pain - Present / Absent

Bony pain: Present / Absent – Spine / Ribs / Pelvis / Femur

Loss of weight: Yes / No .If yes - percentage: in months

History of taking, OCP: Yes / No . If yes - Duration

Hormone Replacement therapy : Yes / No . If yes - Duration

Any other complaints:

Past History

Previous breast disease : Yes / No

If yes, Fibroadenoma /Fibroadenosis /Breast abscess /Duct papilloma /Not known

Personal History

Marital status: Married / Unmarried

Age at marriage: years

Age at first pregnancy: years

Number of pregnancy:

Menstrual history

Age at menarche: years

Frequency: days

Duration of flow: days

Regular / Irregular

Menopause: Attained / Not attained, if attained age at onset:

Lactation history

Whether children breast fed / Not breast fed

Duration of lactation : months

Whether fed with – One / both breasts

Family history

Any family history of breast cancer: Present / Absent.

Relationship to patient:

GENERAL PHYSICAL EXAMINATION

Built: Thin / Moderate / Heavy Nourishment : Poor / Moderate / Well

Pallor: Present / Absent Edema: Present / Absent

Cyanosis : Present / Absent Jaundice: Present / Absent

Pulse: bpm R.R: Cycles / minute

B.P: mm hg Temperature :

LOCAL EXAMINATION

Affected breast (Right / Left)

Inspection:

Position: Displaced in any direction: Yes / No

Size and shape: Smaller / Larger than its fellow

Nipple: Position – Elevated / Same

Size and shape: Normal / Retracted

Surface: Cracks / fissure / Eczema / ulceration / Normal

Discharge: Present / Absent

Nature of discharge: Blood stained /serous /dark green / Purulent /Milk /Black

Areola:

Size : Normal / Increased / Diminished/

Any cracks / fissure / Ulcer / Eczema / Discharge / Swelling / Absent

Skin over the breast: Puckering / Dimpling / Inflammed / Veins / Peau-de-orange / Nodular

Localized swelling: Present / Absent , if present;

Position (relation to quadrants): UI / UO / LI / LO / C

Size:

Shape :

Surface : Smooth / Irregular /

Margin : Defined / ill - defined

Oedematous arm: Present / Absent

Any swelling in the Supraclavical / Infraclavical / Axilla : Present / Absent

If present-

Number:

Size:

Shape:

Other breast tissue: Normal /

Contralateral breast : Normal /

Contralateral Axilla : Normal /

Palpation:

Affected side breast: Right / Left

Local temperature : Raised / Normal

Tenderness : Present / Absent

Any lump felt – Yes / No . If yes,

Situation of Lump (in which quadrant): UI / UO / LI / LO / C

Size and shape:

Surface : Smooth / Uneven

Margin : Well defined and regular / iII defined and irregular

Consistency : Cystic / Soft / Firm / Hard / Variable

Fluctuation : Present / Absent

Fixity to skin : Present / Absent

Independent mobility: Present / Absent

Fixity to underlying Fascia and muscles : Fixed / Not fixed

Fixity to chest wall: Fixed / Not fixed

Examination of regional lymphnodes– Right / left / both

Axillary group of lymphnodes: Palpable / Not Palpable

If palpable- Group: level 1 / 2 / 3

Number of lymphnodes :

Size:

Tenderness: Present / Absent

Consistency: Soft / Firm / Hard Mobility : Fixed / Mobile

Supraclavicularlymphnodes : Palpable / Not Palpable ; Fixed / Mobile

Opposite breast examination: Normal / Abnormal : If abnormal , details :

Opposite axilla examination:

Any lymph node enlarge: Yes / No If yes, details:

SYSTEMIC EXAMINATION

Abdominal examination :

Respiratory system examination :

Cardiovascular examination :

Per-rectal examination :

Per-vaginal examination:

Bone tenderness: Spine/Sternum/Humerous/Femur/Ribs – Present / Absent

Clinical diagnosis :

If carcinoma , TNM Stage: I / II / III / IV

INVESTIGATIONS

Hb: gm% TC: cells/cu.mm

RBS: mg/dl

BU: mg/dl

LFT:

Chest X-ray:

ECG:

USG Abdomen & Pelvis :

FNAC of Lump :

MAMMOGRAPHY:

TRIPLE TEST SCORE:

Clinical :

FNAC:

Mammography :

TOTAL:

INFERENCE:

HISTOPATHOLOGICAL EXAMINATION OF SURGICAL SPECIMEN:

INFORMED CONSENT FORM

I,_____have been told about the study in my own vernacular language(_____).I have been told that this is for dissertation procedure, that my participation is voluntary and I reserve the full right to withdraw from the study at my own initiative at any time, without having to give any reason, and that decision to participate or withdraw from the study at any stage will not prejudice my rights and welfare. Confidentiality will be maintained and only be shared for academic purposes.

I hereby give consent to participate in the above study. I am also aware that I can withdraw this consent at any later date, if I wish to. This consent form being signed voluntarily indicates agreement to participate in the study and the procedures involved, until I decide otherwise.

Signature of the subject:

Date:

Place:

Contact address:

I, Dr. PawanKatti, Post graduate student in the Department of General Surgery conducting Dissertation work for award of MS Degree in General Surgery.

The study Topic is "**EVALUATION OF TRIPLE TEST SCORE IN PALPABLE BREAST LUMPS"**

I hereby state that the study and procedures involved were explained in detail and all questions were fully and clearly answered to the above mentioned participant/her relative.

KEY TO MASTER CHART

L	**-**	**LEMON**
M	**-**	**MARBLE**
O	**-**	**ORANGE**
A	**-**	**ABSENT**
P	**-**	**PRESENT**
N	**-**	**NO**
Y	**-**	**YES**
MM	**-**	**MOTHER**
SS	**-**	**SISTER**
R	**-**	**RIGHT**
L	**-**	**LEFT**
E	**-**	**ELEVATED**
S	**-**	**SAME**
n	**-**	**NORMAL**
UO	**-**	**UPPER-OUTER**
UI	**-**	**UPPER-INNER**
LO	**-**	**LOWER-OUTER**
LI	**-**	**LOWER-INNER**
O	**-**	**OVAL**
s	**-**	**SPHERICAL**

i	**-**	**IRREGULAR**
R	**-**	**REGULAR**
d	**-**	**DISTINCT**
I	**-**	**INDISTINCT**
H	**-**	**HARD**
F	**-**	**FIRM**
m	**-**	**MOBILE**
C	**-**	**CARCINOMA**
f	**-**	**FIBROEDENOMA**
B	**-**	**BENIGN**
idc	**-**	**INFILTRATING DUCTAL CARCINOMA**
lc	**-**	**LOBULAR CARCINOMA**
fs	**-**	**FIBROADENOSIS**
i	**-**	**INFLAMATORY**
fc	**-**	**FIBROCYSTIC**
p	**-**	**PHYLLODES**
ip	**-**	**INTRADUCTAL PAPILLOMA**

MASTER CHART

SL NO	IP NO.	AGE (YEARS)	DURATION (MONTHS)	LUMP SIZE INITIAL	LUMP SIZE PRESENT	PAIN	NIPPLE DISCHARGE Y/N	NIPPLE RETRACTION	AXILLARY/SC SWELLING	BONY PAIN P/A	BONY PAIN LOCATION	WEIGHT LOSS Y/N	OCP USE Y/N	HRT USE Y/N	PREVIOUS BREAST DS Y/N	AGE AT MARRIAGE (IN YEARS)	AGE 1ST PREG (IN YEARS)	NO. OF PREG	AGE OF MENARCHE (IN YEARS)	FREQUENCY (DAYS)	DURATION (DAYS)	BREASTFED Y/N	LACTATION DURATION	FAMILY H/O CA BREAST	RELATIONSHIP TO PT	AFFECTED BREAST R/L	INSPECTION POSITION-DISPLACED	INSPECTION SIZE/SHAPE	NIPPLE POSITION	DISCHARGE Y/N	AREOLA SIZE	SKIN OVER BREAST	LOCALISED SWELLING	POSITION (QUADRANTS)	SIZE LENGTH (CMS)	SIZE BREADTH (CMS)	OTHER BREAST TISSUE	CONTRALATERAL BREAST	CONTRALATERAL AXILLA	LOCAL TEMP	TENDERNESS	ANY LUMP	LUMP SITUATION	LUMP SIZE LENGTH (CMS)	LUMP SIZE BREADTH (CMS)	LUMP SHAPE	LUMP SURFACE	LUMP MARGIN	LUMP CONSISTENCY	LUMP FIXITY TO SKIN	LUMP INDEPENDENT MOBILITY	LUMP FIXITY TO FASCIA/MUSCLE	LUMP FIXITY TO CHEST WALL	AX LN PALPABLE Y/N	AX LN TENDERNESS	AX LN CONSISTENCY	AX LN MOBILITY	CLINICAL DIANOSIS	TNM STAGING	FNAC	MAMMORAPHY	TRIPLE TEST SCORE CLINICAL	TRIPLE TEST SCORE FNAC	TRIPLE TEST SCORE MAMMOGRAPHY	TRIPLE TEST SCORE TOTAL	CONCORDENT/DISCORDENT	INFERENCE	HPE IMPRESSION	BENIGN/ MALIGNANT
1	356185	45	24	L	O	A	N	N	N	A	A	N	N	N	N	22	23	2	14	28	3	Y	6	A		R	Y	L	E	N	n	N	P	UO	6	5	N	N	N	N	A	Y	UO	6	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	s	s	3	2	2	7	D	M	idc	m
2	401242	42	9	M	L	A	N	N	N	A	A	N	N	N	N	18	20	1	15	30	3	Y	8	A		L	N	L	E	N	n	N	P	UI	4	4	N	N	N	N	A	Y	UI	4	4	s	i	d	H	A	A	A	A	N	A			C	2	dc	m	3	3	3	9	C	M	idc	m
3	399279	38	11	L	O	A	N	N	N	A	A	N	N	N	N	19	21	2	14	30	3	Y	12	P	MM	R	Y	L	E	N	n	N	P	UO	7	5	N	N	N	N	A	Y	UO	6	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
4	399966	38	6	M	M	A	N	N	N	A	A	N	Y	N	Y	22	24	2	15	30	4	Y	15	A		R	N	S	S	N	n	N	A	LO	2	2	N	N	N	N	A	Y	LO	2	2	s	R	d	F	A	A	A	A	N	A			f		f	b	1	1	1	3	C	B	f	b
5	1007672	71	7	L	L	A	N	N	N	A	A	N	N	N	N	15	17	2	14	28	3	Y	8	A		R	Y	L	E	N	n	N	P	LO	4	4	N	N	N	N	A	Y	LO	4	4	s	i	d	H	A	A	A	A	N	A			C	2	dc	m	3	3	3	9	C	M	idc	m
6	1011292	35	24	L	O	A	Y	Y	N	A	A	Y	N	N	N	19	24	1	14	27	3	Y	12	A		L	Y	L	E	N	n	P	P	UO	6	6	N	N	N	N	A	Y	UO	6	6	s	i	d	H	Y	A	A	A	Y	A	H	m	C	3	s	s	2	2	3	7	D	M	lc	m
7	30992	42	3	L	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	10	A		R	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	O	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	f	b
8	403761	62	9	L	M	A	N	N	N	A	A	N	N	N	N	17	25	1	16	30	3	Y	15	A		L	Y	L	E	N	n	N	P	UO	4	3	N	N	N	N	A	Y	UO	4	3	O	i	d	H	A	A	A	A	Y	A	H	m	C	2	dc	m	3	3	3	9	C	M	idc	m
9	3464	38	1	M	M	A	N	N	N	A	A	N	N	N	N	22	24	2	15	30	4	Y	19	A		R	N	L	S	N	n	N	A	LO	2	2	N	N	N	N	A	Y	LO	2	2	s	R	d	F	A	A	A	A	N	A			f		f	b	1	1	1	3	C	B	f	b
10	990766	35	2	L	L	A	N	N	N	A	A	N	N	N	N	23	25	2	16	27	3	Y	15	A		L	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	f	b
11	368913	45	2	M	M	A	N	N	N	A	A	N	N	N	N	23	25	1	16	30	3	Y	18	A		R	N	N	S	N	n	N	A	UI	3	2	N	N	N	N	A	Y	UI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	fs	b
12	329447	42	24	L	O	A	N	N	N	A	A	N	N	N	N	21	22	3	14	28	3	Y	10	A		L	Y	L	E	N	n	N	P	UO	6	4	N	N	N	N	A	Y	UO	6	4	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	b	3	3	1	7	D	M	idc	m
13	1009754	41	3	L	L	A	N	N	N	A	A	N	N	N	N	22	24	3	15	30	3	Y	15	A		R	N	L	S	N	n	N	P	LO	3	2	N	N	N	N	A	Y	LO	3	2	O	R	d	F	A	A	A	A	N	A			f		f	b	1	1	1	3	C	B	f	b
14	400297	40	2	M	M	A	N	N	N	A	A	N	N	N	N	26	28	1	15	29	3	Y	18	A		R	N	L	S	N	n	N	P	UO	2	2	N	N	N	N	A	Y	UO	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	f	b
15	1013728	38	7	L	L	A	N	N	N	A	A	N	N	N	N	23	25	2	16	27	3	Y	15	A		R	N	L	S	N	n	N	P	UI	2	2	N	N	N	N	A	Y	UI	2	2	s	R	d	H	A	P	A	A	N	A	H	m	f		f	b	1	1	1	3	C	B	f	b
16	2230	42	6	M	L	A	N	N	N	A	A	N	N	N	N	28	30	2	15	30	3	Y	18	A		R	N	L	S	N	n	N	A	LO	2	1	N	N	N	N	A	Y	LO	2	2	s	R	d	F	A	A	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
17	28621	48	3	L	L	A	N	N	N	A	A	N	N	N	N	22	24	3	15	30	3	Y	15	A		R	N	L	S	N	n	N	P	LO	3	2	N	N	N	N	A	Y	LO	3	2	O	R	I	F	A	A	A	A	N	A			f		i	b	1	1	1	3	C	B	I	b
18	873422	38	2	M	M	A	N	N	N	A	A	N	N	N	N	26	28	1	15	29	3	Y	18	A		R	N	L	S	N	n	N	P	UO	2	2	N	N	N	N	A	Y	UO	3	2	s	R	d	F	A	P	A	A	N	A			f		l	b	1	1	1	3	C	B	F	b
19	986420	40	3	L	L	A	N	N	N	A	A	N	N	N	N	23	25	2	16	27	3	Y	15	A		R	N	L	S	N	n	N	P	UI	2	2	N	N	N	N	A	Y	UI	2	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
20	994180	40	1	M	L	A	N	N	N	A	A	N	N	N	N	28	30	2	15	30	3	Y	18	A		R	N	L	S	N	n	N	A	LO	2	1	N	N	N	N	A	Y	LO	2	2	s	R	d	F	A	A	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
21	36123	40	2	L	L	A	N	N	N	A	A	N	N	N	N	23	25	2	16	27	3	Y	15	A		L	N	L	S	N	n	N	P	LI	2	2	N	N	N	N	A	Y	LI	2	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
22	1005031	42	2	M	M	A	N	N	N	A	A	N	N	N	N	23	25	1	16	30	3	Y	18	A		R	N	L	S	N	n	N	A	UI	3	2	N	N	N	N	A	Y	UI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
23	357431	45	36	L	O	A	N	N	N	A	A	N	N	N	N	22		0	14	30	3			P	SS	R	Y	L	E	N	n	N	P	UO	6	5	N	N	N	R	P	Y	UO	6	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	Idc	m
24	339775	40	7	M	M	A	N	N	N	A	A	N	N	N	N	22	24	2	15	30	4	Y	15	A		R	N	L	S	N	n	N	A	LO	2	2	N	N	N	N	A	Y	LO	2	2	s	R	d	F	A	A	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
25	351756	68	3	M	L	A	N	N	N	A	A	N	N	N	N	24	26	1	15	28	3	Y	24	A		L	Y	L	E	N	n	N	P	UO	4	3	N	N	N	N	P	Y	UO	4	3	O	i	d	H	A	A	A	A	Y	A	H	m	C	2	dc	m	3	3	3	9	C	M	Idc	m
26	1015178	36	1	M	M	A	N	N	N	A	A	N	N	N	N	22	24	2	15	30	4	Y	19	A		R	N	L	S	N	n	N	A	LO	2	2	N	N	N	N	A	Y	LO	2	2	s	R	d	F	A	P	A	A	N	A			B		lipoma	b	1	1	1	3	C	B	lipoma	b
27	7116	58	2	L	L	A	N	N	N	A	A	N	N	N	N	24	25	2	15	28	3	Y	12	A		L	Y	L	E	N	n	N	P	UI	4	2	N	N	N	N	A	Y	UI	4	2	O	i	d	H	A	A	A	A	N	A			C	2	dc	m	3	3	3	9	C	M	Idc	m
28	971892	39	1	M	L	A	N	N	N	A	A	N	N	N	N	28	30	2	15	30	3	Y	18	A		R	N	L	S	N	n	N	A	LO	2	1	N	N	N	N	A	Y	LO	2	2	s	R	d	F	A	A	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
29	5951	38	2	L	L	A	N	N	N	A	A	N	N	N	N	23	25	2	16	27	3	Y	15	A		L	N	L	S	N	n	N	P	LI	2	2	N	N	N	N	A	Y	LI	2	2	s	R	d	H	A	P	A	A	N	A	H	m	f		f	b	1	1	1	3	C	B	F	b
30	990370	37	2	M	M	A	N	N	N	A	A	N	N	N	N	23	25	1	16	30	3	Y	18	A		R	N	L	S	N	n	N	A	UI	3	2	N	N	N	N	A	Y	UI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
31	322444	35	6	L	O	A	N	Y	N	A	A	N	N	N	N	22	24	2	14	28	2	Y	15	A		L	Y	L	E	N	n	N	P	UI	6	4	N	N	N	N	A	Y	UI	6	4	O	i	d	H	Y	A	A	A	Y	A	H	m	C	3	dc	s	2	3	2	7	D	M	Idc	m
32	8364	60	5	L	O	A	N	Y	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	12	A		L	Y	L	E	N	n	N	P	UO	6	6	N	N	N	N	A	Y	UO	6	6	s	i	d	H	Y	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	Idc	m
33	28680	51	9	M	L	A	N	N	N	A	A	N	N	N	N	24	25	3	14	28	3	Y	18	A		R	N	L	S	N	n	N	A	LO	2	1	N	N	N	N	A	Y	LO	2	2	s	R	d	F	A	A	A	A	N	A			B		f	b	1	1	1	3	C	B	F	b
34	990639	40	8	L	L	A	N	N	N	A	A	N	N	N	N	23	25	2	16	27	3	Y	15	A		L	N	L	S	N	n	N	P	LI	2	2	N	N	N	N	A	Y	LI	2	2	s	R	d	H	A	P	A	A	N	A	H	m	B		f	b	1	1	1	3	C	B	F	b
35	362325	45	2	L	L	A	N	N	N	A	A	N	N	N	N	24	25	1	16	28	3	Y	13	A		L	Y	L	E	N	n	N	P	UI	4	2	N	N	N	N	P	Y	UI	4	2	O	i	d	H	A	A	A	A	N	A			C	2	dc	m	3	3	3	9	C	M	Idc	m
36	342968	65	3	L	O	A	N	N	N	A	A	N	N	N	N	21	22	3	14	28	3	Y	12	A		L	Y	L	E	N	n	N	P	LO	6	4	N	N	N	R	P	Y	LO	6	4	O	i	d	H	A	A	A	A	Y	P	H	m	C	3	dc	m	3	3	3	9	C	M	Idc	m
37	1001157	50	3	L	L	A	N	N	N	A	A	N	N	N	N	22	24	3	15	28	3	Y	15	A		R	N	L	S	N	n	N	P	LO	3	2	N	N	N	N	A	Y	LO	3	2	O	R	d	F	A	P	A	A	N	A			B		fc	b	1	1	1	3	C	B	Fc	b
38	10149	43	5	L	O	A	N	Y	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	14	A		L	Y	L	E	N	n	N	P	UO	6	6	N	N	N	N	P	Y	UO	6	6	s	i	d	H	Y	A	A	A	Y	P	H	m	C	3	dc	s	1	3	2	6	D	M	Idc	m
39	4207	40	3	L	L	A	N	N	N	A	A	N	N	N	N	22	24	3	15	30	3	Y	15	A		R	N	L	S	N	n	N	P	LO	3	2	N	N	N	N	A	Y	LO	3	2	O	R	d	F	A	P	A	A	N	A			B		fc	b	1	1	1	3	C	B	Fc	b
40	2533	45	1	M	M	A	N	N	N	A	A	N	N	N	N	26	28	1	15	29	3	Y	18	A		R	N	L	S	N	n	N	P	UO	2	2	N	N	N	N	A	Y	UO	3	2	s	R	d	F	A	P	A	A	N	A			B		f	b	1	1	1	3	C	B	F	b
41	933350	36	2	L	L	A	N	N	N	A	A	N	N	N	N	23	25	2	16	27	3	Y	15	A		R	N	L	S	N	n	N	P	UI	2	2	N	N	N	N	A	Y	UI	2	2	s	R	d	H	A	P	A	A	N	A	H	m	B		f	b	1	1	1	3	C	B	F	b
42	1009495	48	4	M	L	A	N	N	N	A	A	N	N	N	N	28	30	2	15	30	3	Y	18	A		R	N	L	S	N	n	N	A	LO	2	1	N	N	N	N	A	Y	LO	2	2	s	R	d	F	A	A	A	A	N	A			B		f	b	1	1	1	3	C	B	F	b
43	874930	65	3	L	O	A	N	N	N	A	A	N	N	N	N	21	22	3	14	28	3	Y	12	A		L	Y	L	E	N	n	N	P	LO	6	4	N	N	N	R	P	Y	LO	6	4	O	i	d	H	A	A	A	A	Y	P	H	m	C	3	dc	m	3	3	3	9	C	M	Idc	m
44	887275	55	2	L	L	A	N	N	N	A	A	N	N	N	N	23	25	2	16	28	3	Y	15	A		L	Y	L	E	N	n	N	P	UI	4	2	N	N	N	N	P	Y	UI	4	2	O	i	d	H	A	A	A	A	N	A			C	2	dc	m	3	3	3	9	C	M	Idc	m
45	892839	50	2	L	L	A	N	N	N	A	A	N	N	N	N	22	24	3	15	28	3	Y	15	A		R	N	L	S	N	n	N	P	LO	3	2	N	N	N	N	A	Y	LO	3	2	O	R	d	F	A	P	A	A	N	A			B		f	b	1	1	1	3	C	B	F	b
46	331860	37	5	L	O	A	N	Y	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	14	A		L	Y	L	E	N	n	N	P	UO	6	6	N	N	N	N	A	Y	UO	6	6	s	i	d	H	Y	A	A	A	Y	P	H	m	C	3	fc	s	3	1	2	6	D	M	Idc	m
47	371177	57	4	M	L	A	N	N	N	A	A	N	N	N	N	25	26	1	16	30	3	Y	15	A		L	Y	L	E	N	n	N	P	UO	4	3	N	N	N	N	A	Y	UO	4	3	O	i	d	H	A	A	A	A	Y	P	H	m	C	2	dc	m	3	3	3	9	C	M	Idc	m
48	326830	38	2	L	L	A	N	N	N	A	A	N	N	N	N	23	25	2	16	27	3	Y	15	A		R	N	L	S	N	n	N	P	UI	2	2	N	N	N	N	A	Y	UI	2	2	s	R	d	H	A	P	A	A	N	A	H	m	B		f	b	1	1	1	3	C	B	F	b
49	296053	62	5	L	O	A	N	Y	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	12	A		L	Y	L	E	N	n	N	P	UO	6	6	N	N	N	N	P	Y	UO	6	6	s	i	d	H	Y	A	A	A	Y	P	H	m	C	3	dc	m	3	3	3	9	C	M	Idc	m
50	373522	40	3	M	O	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	10	A		R	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		p	b	1	1	1	3	C	B	P	b
51	1885	35	7	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	10	A		R	N	L	S	N	n	N	P	LI	4	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
52	4415	38	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	10	A		R	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	P	Y	LI	3	2	s	R	d	F	A	A	A	A	N	A			f		f	b	1	1	1	3	C	B	I	i
53	401035	38	6	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	13	29	5	Y	10	A		L	N	L	S	N	n	N	P	UO	2	2	N	N	N	N	A	Y	UO	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
54	18044	35	11	L	O	A	N	N	N	A	A	N	N	N	N	19	21	2	14	30	3	Y	12	P	MM	R	Y	L	E	N	n	N	P	UO	7	5	N	N	N	N	A	Y	UO	6	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	Idc	m
55	18991	35	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	4	Y	10	A		L	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
56	362390	36	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	10	A		R	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
57	369203	35	36	L	O	A	N	N	N	A	A	N	N	N	N	19	21	2	14	30	5	Y	6	P	MM	L	Y	L	E	N	n	N	P	UO	5	4	N	N	N	N	A	Y	UO	5	4	O	i	d	H	A	A	P	P	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	Idc	m

MASTER CHART

SL NO	IP NO.	AGE (YEARS)	DURATION (MONTHS)	LUMP SIZE INITIAL	LUMP SIZE PRESENT	PAIN	NIPPLE DISCARGE Y/N	NIPPLE RETRACTION	AXILLARY/SC SWELLING	BONY PAIN P/A	BONY PAIN LOCATION	WEIGHT LOSS Y/N	OCP USE Y/N	HRT USE Y/N	PREVIOUS BREAST DS Y/N	AGE AT MARRIAGE (IN YEARS)	AGE 1ST PREG (IN YEARS)	NO. OF PREG	AGE OF MENARCHE (IN YEARS)	FREQUENCY (DAYS)	DURATION (DAYS)	BREASTFED Y/N	LACTATION DURATION	FAMILY H/O CA BREAST	RELATIONSHIP TO PT	AFFECTED BREAST R/L	INSPECTION POSITION-DISPLACED	INSPECTION SIZE/SHAPE	NIPPLE POSITION	DISCHARGE Y/N	AREOLA SIZE	SKIN OVER BREAST	LOCALISED SWELLING	POSITION (QUADRANTS)	SIZE LENGTH (CMS)	SIZE BREADTH (CMS)	OTHER BREAST TISSUE	CONTRALATERAL BREAST	CONTRALATERAL AXILLA	LOCAL TEMP	TENDERNESS	ANY LUMP	LUMP SITUATION	LUMP SIZE LENGTH (CMS)	LUMP SIZE BREADTH (CMS)	LUMP SHAPE	LUMP SURFACE	LUMP MARGIN	LUMP CONSISTENCY	LUMP FIXITY TO SKIN	LUMP INDEPENDENT MOBILITY	LUMP FIXITY TO FASCIA/MUSCLE	LUMP FIXITY TO CHEST WALL	AX LN PALPABLE Y/N	AX LN TENDERNESS	AX LN CONSISTENCY	AX LN MOBILITY	CLINICAL DIANOSIS	TNM STAGING	FNAC	MAMMORAPHY	TRIPLE TEST SCORE CLINICAL	TRIPLE TEST SCORE FNAC	TRIPLE TEST SCORE MAMMOGRAPHY	TRIPLE TEST SCORE TOTAL	CONCORDENT/DISCORDENT	INFERENCE	HPE IMPRESSION	BENIGN/ MALIGNANT
58	391274	42	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	10	A		R	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	I	b
59	560	44	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	14	29	4	Y	10	A		R	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
60	397816	37	8	M	L	A	N	N	N	A	A	N	N	N	N	24	26	2	13	29	3	Y	5	A		R	N	L	S	N	n	N	P	UI	4	3	N	N	N	N	A	Y	UI	4	3	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
61	403015	40	2	M	M	A	N	N	N	A	A	N	N	N	N	17	19	2	13	26	5	Y	7	A		L	N	L	S	N	n	N	P	LI	2	1	N	N	N	N	A	Y	LI	2	1	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
62	75	35	6	M	L	A	N	N	N	A	A	N	N	N	N	25	26	2	14	27	3	Y	8	A		L	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
63	3454	40	6	M	M	A	N	N	N	A	A	N	N	N	N	18	22	2	15	28	4	Y	9	A		L	N	L	S	N	n	N	P	LI	2	1	N	N	N	N	A	Y	LI	2	1	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
64	18058	36	8	M	L	A	N	N	N	A	A	N	N	N	N	23	24	2	13	29	3	Y	6	A		R	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
65	901673	42	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	14	29	3	Y	8	A		L	N	L	S	N	n	N	P	LI	2	1	N	N	N	N	A	Y	LI	2	1	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
66	1826	53	11	L	O	A	N	N	N	A	A	N	N	N	N	19	21	2	14	30	5	Y	9	P	MM	R	Y	L	E	N	n	N	P	UO	7	5	N	N	N	N	A	Y	UO	6	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
67	892555	39	6	M	M	A	N	N	N	A	A	N	N	N	N	23	26	2	15	29	4	Y	10	A		R	N	L	S	N	n	N	P	LI	2	1	N	N	N	N	P	Y	LI	2	1	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	I	b
68	899296	43	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	16	29	3	Y	6	A		L	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
69	362586	47	36	L	O	A	N	N	N	A	A	N	N	N	N	19	21	2	14	30	5	Y	7	P	MM	R	Y	L	E	N	n	N	P	UO	5	4	N	N	N	N	A	Y	UO	5	4	O	i	d	H	P	A	P	P	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
70	14843	65	9	M	L	A	P	N	N	A	A	N	N	N	N	21	22	2	14	30	4	Y	8	A		R	Y	L	E	P	n	N	P	UO	4	3	N	N	N	N	A	Y	UO	4	3	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
71	264	36	8	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	9	A		L	N	L	S	N	n	N	P	LO	2	1	N	N	N	N	A	Y	LO	2	1	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
72	1951	35	36	L	O	A	P	N	N	A	A	N	N	N	N	20	21	2	14	30	4	Y	6	A		R	Y	L	E	N	n	P	P	UO	7	5	N	N	N	N	A	Y	UO	7	5	O	i	d	H	P	A	P	P	Y	A	H	m	C	3	s	s	3	2	2	7	D	M	idc	m
73	13966	65	8	L	O	A	N	N	N	A	A	N	N	N	N	21	23	2	14	30	5	Y	3	P	MM	L	Y	L	E	Y	n	N	P	UO	7	5	N	N	N	N	A	Y	UO	7	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
74	11288	48	9	M	L	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	4	Y	4	A		R	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
75	13966	65	6	L	O	A	N	N	N	A	A	N	N	N	N	23	24	2	14	30	3	Y	6	A		R	Y	L	E	N	n	N	P	UO	4	3	N	N	N	N	A	Y	UO	4	3	O	i	d	H	A	A	A	A	Y	A	H	m	C	2	dc	m	3	3	3	9	C	M	idc	m
76	14843	56	11	L	O	A	N	N	N	A	A	N	N	N	N	21	25	2	13	30	5	Y	6	A		L	Y	L	E	N	n	N	P	UO	6	4	N	N	N	N	A	Y	UO	6	4	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
77	23382	75	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	4	Y	7	A		R	N	L	S	N	n	N	P	LI	2	2	N	N	N	N	A	Y	LI	2	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
78	395934	35	24	L	O	A	N	N	N	A	A	N	N	N	N	23	25	2	14	30	3	Y	12	P	MM	R	Y	L	E	N	n	N	P	UO	7	5	N	N	N	N	A	Y	UO	7	5	O	i	d	H	P	A	P	P	Y	A	H	m	C	3	dc	m	2	3	1	6	D	M	idc	m
79	976101	50	15	L	O	A	N	N	N	A	A	N	N	N	N	22	25	2	14	30	5	Y	12	P	MM	L	Y	L	E	N	n	N	P	UO	6	5	N	N	N	N	A	Y	UO	6	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
80	1014617	45	9	M	L	A	N	N	N	A	A	N	N	N	N	24	26	2	14	30	4	Y	6	P	MM	R	Y	L	E	N	n	N	P	LO	4	3	N	N	N	N	A	Y	LO	4	3	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
81	308	43	6	M	M	A	N	N	N	A	A	N	N	N	N	19	21	2	13	29	3	Y	4	A		R	N	L	S	N	n	N	P	LI	2	1	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
82	7705	40	7	M	L	A	N	N	N	A	A	N	N	N	N	20	23	2	15	29	5	Y	8	A		L	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	I	b
83	976429	40	8	M	L	A	N	N	N	A	A	N	N	N	N	23	26	2	15	29	4	Y	6	A		L	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
84	101139	44	15	L	O	A	N	N	N	A	A	N	N	N	N	21	23	2	14	30	3	Y	8	P	MM	L	Y	L	E	N	n	N	P	UO	7	5	N	N	N	N	A	Y	UO	7	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
85	6488	35	3	M	M	A	N	N	N	A	A	N	N	N	N	20	23	2	15	29	5	Y	5	A		R	N	L	S	N	n	N	P	LI	2	1	N	N	N	N	A	Y	LI	2	1	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	F	b
86	397787	49	11	L	O	A	N	N	N	A	A	N	N	N	N	21	23	2	14	30	4	Y	5	P	MM	R	Y	L	E	N	n	N	P	UO	7	5	N	N	N	N	A	Y	UO	6	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
87	394399	65	11	L	O	A	N	N	N	A	A	N	N	N	N	22	23	2	14	30	3	Y	4	P	MM	L	Y	L	E	N	n	N	P	UO	7	5	N	N	N	N	A	Y	UO	6	5	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
88	19293	42	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	5	Y	6	A		R	N	L	S	N	n	N	P	LI	2	2	N	N	N	N	A	Y	LI	2	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	ip	b
89	370457	60	3	M	M	A	N	N	N	A	A	N	N	N	N	20	21	2	15	29	4	Y	7	A		R	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	fc	b
90	334344	75	9	M	L	A	N	N	N	A	A	N	N	N	N	18	19	2	14	30	3	Y	10	A		L	Y	L	E	N	n	N	P	UO	4	3	N	N	N	N	A	Y	UO	4	3	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
91	333352	48	36	L	O	A	N	N	N	A	A	N	N	N	N	18	21	2	14	30	5	Y	5	P	MM	R	Y	L	E	N	n	N	P	UO	4	3	N	N	N	N	A	Y	UO	4	3	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
92	371409	43	24	L	O	A	N	N	N	A	A	N	N	N	N	17	18	2	14	30	4	Y	9	A		R	Y	L	E	N	n	N	P	UO	6	6	N	N	N	N	A	Y	UO	6	6	O	i	d	H	P	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
93	995047	36	10	L	O	A	N	N	N	A	A	N	N	N	N	18	21	2	13	30	3	Y	7	P	MM	L	Y	L	E	N	n	N	P	UO	6	4	N	N	N	N	A	Y	UO	6	4	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	s	2	3	2	7	D	M	idc	m
94	396886	45	6	M	L	A	N	N	N	A	A	N	N	N	N	17	20	2	14	30	5	Y	6	P	MM	R	Y	L	E	N	n	N	P	UO	3	3	N	N	N	N	A	Y	UO	3	3	s	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	b	3	3	1	7	D	M	idc	m
95	393872	50	9	L	O	A	N	N	N	A	A	N	N	N	N	20	21	2	14	30	4	Y	5	A		R	Y	L	E	N	n	N	P	UO	4	3	N	N	N	N	A	Y	UO	4	3	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
96	27	90	36	L	O	A	N	N	N	A	A	N	N	N	N	16	18	2	14	30	3	Y	7	A		L	Y	L	E	N	n	N	P	UO	7	5	N	N	N	N	A	Y	UO	7	5	O	i	d	H	P	A	P	P	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
97	1019698	40	9	L	O	A	N	N	N	A	A	N	N	N	N	17	19	2	15	30	5	Y	7	A		R	Y	L	E	N	n	N	P	UO	8	6	N	N	N	N	A	Y	UO	8	6	O	i	d	H	A	A	A	A	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
98	997391	62	3	M	M	A	N	N	N	A	A	N	N	N	N	24	26	2	15	29	3	Y	8	A		L	N	L	S	N	n	N	P	LI	3	2	N	N	N	N	A	Y	LI	3	2	s	R	d	F	A	P	A	A	N	A			f		f	b	1	1	1	3	C	B	I	b
99	328624	75	11	L	O	A	N	N	N	A	A	N	N	N	N	20	22	2	14	30	4	Y	9	P	MM	R	Y	L	E	N	n	N	P	UO	8	5	N	N	N	N	A	Y	UO	8	5	O	i	d	H	A	A	P	P	Y	A	H	m	C	3	dc	m	3	3	3	9	C	M	idc	m
100	5981	40	7	M	L	A	N	N	N	A	A	N		N	N	18	19	2	15	27	3	Y	7	A		R	N	L	S	N	n	N	P	LO	4	3	N	N	N	N	A	Y	LO	4	3	O	R	d	F	A	A	A	A	N	A			B		p	b	2	1	1	4	D	B	p	b