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A basic review of Oncology

Dr. Siva Rami Reddy E
Faculty of Homoeopathy, Tantia University, Sri Ganganagar, Rajasthan, India

Abstract
Oncology (basic review) are to understand very easily for graduate, post graduate and post-doctoral ayush, dental, medical etc., students. I am explaining main and important diseases in cancer in day to day practical life for medical students and professionals. Diseases are breast cancer, lung cancer, Gastro intestinal tract cancer and prostate cancer.

Keywords: cancers, causes, clinical features, investigation

Introduction
We have lot of diseases to explain in oncology. But only main/few diseases are reviewing for under graduate, post graduate and post-doctoral ayush, dental, medical, nursing etc., entrance and main examination purpose.

Breast cancer [1, 8]
It is a malignant proliferation of epithelial cells lining the duct or lobules of the breast. Breast cancer is one of the most common cancers in women worldwide, accounting for approximately 570,000 deaths in 2015. Over 1.5 million women (25% of all women with cancer) are diagnosed with breast cancer every year throughout the world. Breast cancer is a metastatic cancer and can commonly transfer to distant organs such as the bone, liver, lung and brain, which mainly accounts for its incurability. Early diagnosis of the disease can lead to a good prognosis and a high survival rate. In North American, the 5-year relative survival rate of breast cancer patients is above 80% due to the timely detection of this disease. There're numerous risk factors such as sex, aging, estrogen, family history, gene mutations and unhealthy lifestyle, which can increase the possibility of developing breast cancer. Most breast cancer occurs in women and the number of cases is 100 times higher in women than that in men.

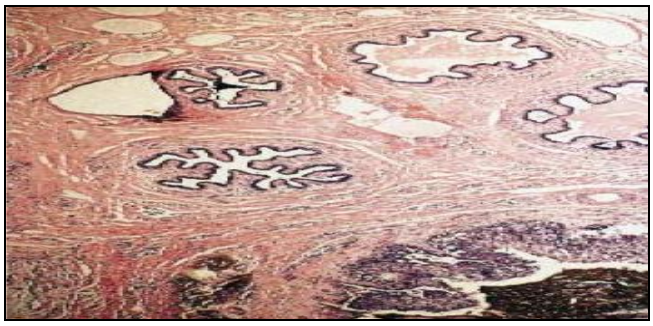

Fig 1: breast ductal endoscopy

The following are risk factors for breast cancer:
Age: the chances of breast cancer increase as one gets older.
Family history: The risk of breast cancer is higher among women who have relatives with the disease. Having a close relative with the disease (sister, mother, daughter) doubles w woman's risk.
Personal history: Having a breast cancer diagnosis in one breast increases the risk of cancer in the other breast or the chance of an additional cancer in the original breast. Women diagnosed with certain benign (non-cancerous) breast conditions have an increased risk of breast cancer. These include atypical hyperplasia, a condition in which there is abnormal proliferation of breast cells but no cancer has developed.
Menstruation: women who started their menstrual cycle at a younger age (before 12) or went through menopause later (after 55) have a slightly increased risk.
Breast tissue: Women with dense breast tissue (as documented by mammogram) have a higher risk of breast cancer.
Exposure to previous chest radiation or use of diethylstilbestrol increase the risk of breast cancer. Having no children or the first child after age 30 increases the risk of breast cancer. Breast feeding for one and a half to two years might slightly lower the risk of breast cancer. Being overweight or obese increases the risk of breast cancer. Both in pre and postmenopausal women but at different rates. Use of oral contraceptives in the last 10 years increases the risk of breast cancer slightly. Using combined hormone therapy after menopause increases the risk of breast cancer. Alcohol consumption increases the risk of breast cancer and this seems to be proportional to the amount of alcohol used. A recent meta-analysis reviewing the research on alcohol use and breast cancer concluded that all levels of alcohol use are associated with an increased risk for breast cancer. This includes even light drinking. Exercise seems to lower the risk of breast cancer. Breast tumors usually start from the ductal hyperproliferation, and then develop into benign tumors or even metastatic carcinomas after constantly stimulation by various carcinogenic factors.
Tumor microenvironments such as the stromal influences or macrophages play vital roles in breast cancer initiation and progression. The mammary gland of rats could be induced to neoplasms when only the stroma was exposed to carcinogens, not the extracellular matrix or the epithelium. Macrophages can generate a mutagenic inflammatory microenvironment, which can promote angiogenesis and enable cancer cells to escape immune rejection. Different DNA methylation patterns have been observed between the

normal and tumor-associated microenvironments, indicating that epigenetic modifications in the tumor microenvironment can promote the carcinogenesis. Recently, a new subclass of malignant cells within tumors called the cancer stem cells (CSCs) are observed and associated with tumor initiation, escape and recurrence. This small population of cells, which may develop from stem cells or progenitor cells in normal tissues, have self-renewal abilities and are resistant to conventional therapies such as chemotherapy and radiotherapy. Signaling pathways including Wnt, Notch, Hedgehog, p53, PI3K and HIF are involved in the self-renewal, proliferation and invasion of bCSCs.

Clinical features

- A lump in the breast or armpit.
- Bloody nipple discharge.
- Inverted nipple
- Orange peel texture or dimpling of the breast skin (peau d'orange).
- Breast pain or sore nipple.
- Swollen lymph nodes in the neck or armpit
- A change in the size or shape of the breast or nipple.

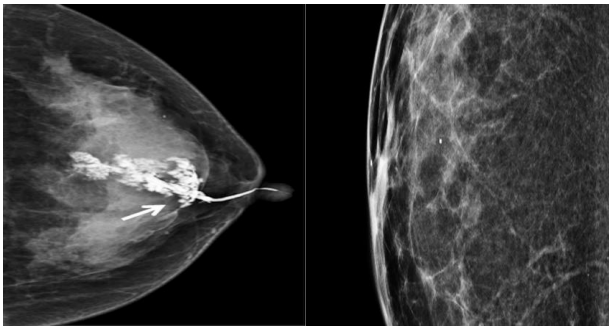

Fig 2: Breast cancer ductal ductography & mammography

Screening

Brest cancer is virtually unique among the epithelial tumors in adults in that screening (in the form of annual mammography) improves survival. Meta-analysis examining out comes from every randomized trial of mammography conclusively shows a more than 25% reduction in the chance of dying from breast cancer with annual screening after age 50 years. The data for women between ages 40 to 50 are almost as positive. Ductography should be performed precisely, and interpreted meticulously, so as not to miss important signs of breast cancer, and to avoid delayed diagnosis. Previous articles have extensively reviewed ductographic techniques, and reported on the nonspecific findings of benign and malignant diseases which can be responsible for nipple discharge. Complete ductal obstruction is not pathognomonic of breast cancer, and can be observed in both benign and malignant tumors. This finding was noted in 5-47% of benign diseases, and in 67-83% of cancers, by ductographyIn approximately 70% of obstructing papillomas, contrast material was observed to partially outline the leading edge of a lesion, resulting in a meniscus-like appearance. By way of contrast, the shape of the cut-off site in the carcinoma on ductography often assumes an irregular, moth eaten appearance (Figure 2). Multiple irregular filling defects in non-dilated peripheral ducts are highly suggestive of malignancy. Shen *et al*. reported on their results with ductoscopy in 415 patients with nipple discharge. They found an intraductal lesion in 166 patients (40%). They found the majority of benign lesions to be present in the main segmental ducts and the first branch while DCIS lesions were situated more peripherally in the first and second branches. The average distance for a DCIS lesion was 3.3 cm, and the most distant lesion was situated 5 cm from the nipple. In contrast benign papillomas were situated at an average distance of 2.7 cm and the nearest at 0.5 cm. DCIS lesions were associated with bleeding, circumferential ductal obstruction, and gross fungating projections. The positive predictive value with ductoscopy in detecting DCIS was 80% which increased to 100% when combined with ductal lavage cytology. Dooley evaluated the role of ductoscopy in patients undergoing definite surgery for atypical ductal hyperplasia (ADH), ductal carcinoma in situ (DCIS), and breast cancer to assess intra ductal extent of disease and in achieving disease free surgical margins.

Management

Breast conserving treatments, consisting of the removal of the primary tumor by some form of lumpectomy with or without irradiating the breast, result in a survival that is as good as for slightly superior to that after extensive surgical procedures, such as mastectomy or modified radical mastectomy with or without further irradiation. The use of systemic therapy after local management of breast cancer substantially improves survival. More than one third of the women who would otherwise die of metastatic breast cancer remain disease free when treated with the appropriate systemic regimen. One approach so called neo adjuvant chemotherapy- involves the administration of adjuvant therapy before definitive surgery and radiation therapy. Because the objective response rates of patients with breast cancer to systemic therapy in this setting exceed 75% many patients will be down staged and may become candidates for beast conserving therapy.

Lung cancer [9, 15]

The term lung cancer is used for tumors arising from the respiratory epithelium (bronchi, bronchioles and alveoli). Mesotheliomas, lymphomas and stromal tumors are distinct from epithelial lung cancer. Lung cancer is the third most frequently diagnosed cancer in Germany in both men and women. The annual incidence in Germany is 65 per 100 000 for men and 21 per 100 000 for women. The peak incidence is between the ages of 75 and 80 years. At the same time, both in Germany and worldwide, lung cancer is the most frequent cause of death from cancer among men, and in Germany it is the third most frequent cause of death from cancer among women. In men the figures are steady or slightly reducing, but in women the rate is going up. Both incidence and mortality rates reflect cigarette consumption in a given population about 20 years ago. Lung cancer is by far the most common malignant tumor originating in the lung. The four major histological types of lung cancer are:

- Squamous cell carcinoma (30% to 40% of lung cancers)
- Adenocarcinoma (25% to 30%)
- Non-small cell lung carcinoma (less than 10%), and
- Small cell lung carcinoma (15% to 20%).

These four types are subdivided into numerous subtypes. A notable subtype is broncho alveolar carcinoma (synonym: alveolar cell carcinoma), a rare subtype of adenocarcinoma,

that lines the alveoli as it grows. Lung cancers can be classified according to a variety of criteria. Histological a distinction is made between small cell lung carcinoma (15% to 20%) and non-small cell lung carcinoma, because of differences in their biological behavior and the implications of these differences for treatment and prognosis.

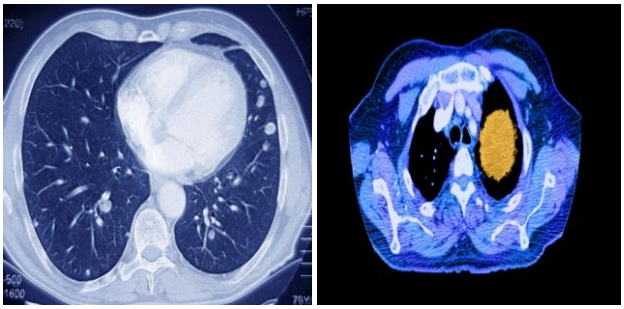

Fig 3: CT scan of Breast cancer of lung & PET

Clinical features

Cough (8% to 75%), hemoptysis (6% to 35%), pain, wheezing (0% to 2%), poststenotic pneumonia, dyspnea (3% to 60%), stridor (0% to 2%), Chest pain (20% to 49%), hoarseness, upper airway inflow obstruction, Horner's triad, pleural effusion, pericardial effusion, dysphagia, raised diaphragm, Weight loss (0% to 68%), night sweats, fatigue, fever (0% to 20%), Bone pain (6% to 25%), headache, neurological or psychiatric abnormalities, paraplegia, hepatomegaly, pathological fractures, Cushing syndrome, syndrome of inappropriate ADH secretion, Lambert Eaton syndrome, Perre-Marie-Bamberger syndrome, etc.

Diagnosis

PET/PET-CT imaging is of central importance in tumor staging. Ruling out distant metastases by a negative finding saves further diagnostic procedures, while the detection of structures suggestive of metastasis can guide the next step and move the diagnostic process rapidly forward. In patients in clinical stages IB to IIIB, in whom curative therapy should be attempted, PET/PET-CT scanning (if available) should be carried out for mediastinal N-staging and for M-staging; in stage IA this examination should be considered. In addition to history, clinical exam, and routine laboratory tests, the diagnostic workup of small cell lung cancer should include CT of the chest and abdomen (at least liver and adrenals), bone scintigraphy, and contrast-enhanced cranial CT or cranial MRI. PET is not recommended for regular staging.

Management

Local therapy modalities are surgery and radiotherapy. For systemic therapy, conventional chemotherapy and increasingly also targeted therapies (i.e. interventions that affect tumor-specific structures at the molecular level) are employed. Chemotherapy is polychemotherapy—so long as the patient's condition permits. Treatment for lung cancer is often multimodal. Radiotherapy and chemotherapy can be administered simultaneously as radiochemotherapy. Chemotherapy, radiotherapy, and radiochemotherapy may precede surgery (neoadjuvant therapy) or may follow it (adjuvant therapy). If a lung tumor with mixed histology contains a combination of small cell lung cancer and non-small cell lung cancer, it should be treated as small cell lung cancer.

Gastrointestinal tract cancer [16, 25]

About 85% of stomach cancers are adenocarcinomas with 15% due to lymphomas and gastrointestinal stromal tumors (GIST) and leiomyosarcomas. Gastric adeno carcinomas may be sub divided in to two categories; *a diffuse* type in which cell cohesion is absent, so that individual cells infiltrate and thicken the stomach, wall without forming a discrete mass and an intestinal type is characterized by cohesive *neoplastic cells* that form gland like tubular structures. Cancer is the leading cause of mortality in both developed and developing countries. Annually, it causes around seven million deaths (about 13% of all causes of death) in the world and is the second most common cause of death in developed countries and among the top three causes of adult death in developing countries. Malignancies of the upper gastrointestinal (UGI) tract form a heterogeneous group of cancers characterized by unique epidemiology and biology. Also, esophageal cancer (EC) is among the 10 most common tumors and is the 6th leading cause of malignancy deaths worldwide. Smoking, alcohol consumption, Helicobacter pylori infection, dietary habits and obesity may be risk factors of gastric cancer. Most epidemiologic studies reported a risk of gastric cancer between 1.5 and 3.5 for subjects with relatives with gastric cancer.

Clinical features

Gastric cancers, when superficial and surgically curable, usually produce no symptoms. As the tumor become more extensive, patients may complain of an insidious upper abdominal discomfort varying in intensity from a vague, post prandial fullness to a severe, steady pain, anorexia often with slight nausea is very common but is not the usual presenting complaint. Weight loss, vomiting with nausea, dysphasia and early satiety may be the major symptoms caused by diffuse lesions originating in the cardia.

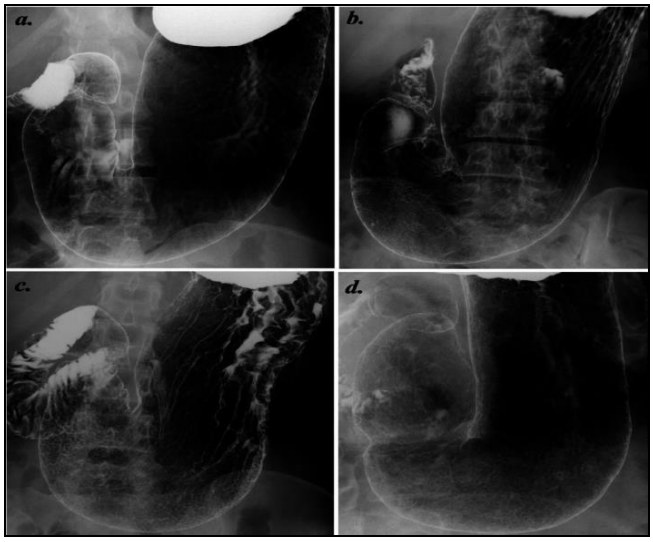

Fig 4: Contrast radiographic of GIT

Gastric carcinomas spread by direct extension through the gastric wall to the perigastric tissues, occasionally adhering to adjacent organs such as the pancreas, colon or liver. The disease also spreads via lymphatics or by seeding of peritoneal surfaces. Metastases to intra-abdominal and supra clavicular lymph nodes occur frequently as do metastic nodules to the ovary (krukenbergs tumor), perio umbilical region or peritoneal cul de sac (blumers shelf palpable on

rectal or vaginal examination). Malignant ascities may also develop. The liver is the most common site for hematogenous spread of tumor.
The presence of iron deficiency anaemia in men and of occult blood in the stool in both sexes mandates a search for an occult gastro intestinal tract lesion.

Diagnosis
Double contrast radiographic examination is the simplest diagnostic procedure for the evaluation of a patient with epigastric complaints. Gastric ulcer that appear benign by radiography present special problems. If complete healing can be visualized by x ray within 6 weeks and if a follow up contrast radiograph obtained several months later shows a normal appearance.

Management
Completes surgical removal of the tumor with resection of adjacent lymphnodes offers the only chance for cure. A subtotal gastrectomy is treatment of choice for patient with distal carcinomas, while total or near total gastrectomies are required for more proximal tumours.

Prostate cancer [26, 30]
Benign and malignant changes in the prostate increase with age. Autopsies of men in eighth decade of life show hyperplastic changes in more than 90% and malignant changes in more than70% of individuals.

Aetiology
The relative risk of developing prostate cancer is higher (RR = 2.48; 95% CI 2.25–2.74) in men who have a first-degree relative with prostate cancer. This risk is higher in men under 65 (RR = 2.87; 95% CI 2.21–3.74) compared to older men, and if the affected relative was a brother rather than a father (RR = 3.14; 95% CI 2.37–4.15). Family history is clearly important, but only 35% of the familial risk is currently explained by known genes. Although rare (about 1 per 300), a BRCA2 mutation confers up to an 8.6-fold increased risk in men below 65 years of age, and such mutations have also been related with aggressive cancer. Some studies, but not all, have suggested that the risk for prostate cancer is increased in men with a history of urinary tract infections. nfections might influence the risk for prostate cancer by causing chronic intra-prostatic inflammation, and pathological studies have also suggested that inflammation may be involved in the development of prostate cancer. Smoking is associated with a moderate increase in the risk of prostate cancer. This association is much stronger and the increase more pronounced for aggressive or fatal cancers, particularly in current or heavy smokers who appear to be at a 2-fold or higher risk. For sex hormones, a pooled analysis of individual participant data from 18 studies found no significant associations but more data are needed to explore the relationship where both, decreased overall risk and an increased risk of high-grade cancer have been reported. or insulin-like growth factors (IGFs), a pooled analysis of individual participant data from 12 studies showed a significant positive association between circulating IGF-I and prostate cancer risk more data are required on IGF-II and IGF binding proteins.

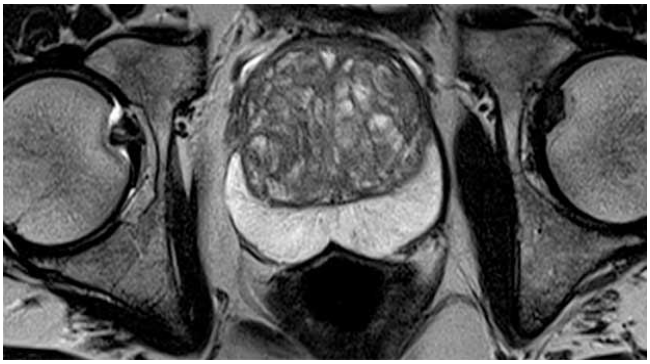

Fig 5: MRI of the Prostate cancer

Clinical features
Most prostate cancer diagnoses are made in symptomatic men. Prostate cancer should be suspected in men over 50 years old presenting with lower urinary tract symptoms (LUTS), visible haematuria or erectile dysfunction. LUTS are also a common presenting symptom of benign conditions affecting the prostate, such as benign prostatic hyperplasia (BPH) and prostatitis, creating a diagnostic challenge. The widespread use of PSA as a screening test for prostate cancer in some countries has led to increasing diagnoses being made in asymptomatic men. Men may present to their doctor complaining of LUTS or other genito-urinary symptoms, and are thus investigated for prostate cancer. It also is suspected that there are a significant number of men who go through life and die with undiagnosed prostate cancer; this suspicion is based on the findings of autopsy studies showing that up to three quarters of men over the age of 85 had neoplastic changes in the prostate, not all of whom had been diagnosed prior to their death. LUTS are very common as men get older, with studies estimating a prevalence of greater than 50% in men aged 50 years and above, increasing further with increasing age. Other genitor urinary symptoms may also suggest that an undiagnosed prostate cancer is present. Visible haematuria is well established as a high-risk symptom for possible urological cancer, including prostate cancer.

Diagnosis
Debate continues around the role of PSA in the early detection and diagnosis of prostate cancer. PSA levels can be raised by a number of benign conditions, including BPH, prostatitis, ejaculation, and exercise (false positive). PSA can be within the normal range for up to 25% of men with prostate cancer (false negative). Urine dipstick testing, with or without microscopy, culture and sensitivities (MC&S) should be performed prior to PSA testing to rule out lower urinary tract infection. The current gold standard diagnostic test for prostate cancer is a prostate biopsy, usually via a transrectal (TRUS) or transperineal approach guided by ultrasound. Primary care clinicians suspecting prostate cancer after assessing a patient or finding an elevated PSA result should refer on a cancer pathway to their local urological service for diagnostic testing.

Management
Localized prostate cancers are those that appear to be non-metastatic after staging studies are performed. Patients with

localized disease are managed by radical surgery, radiation therapy or active surveillance. Choice of therapy requires the consideration of several factors: the presence of symptoms, the probability that the untreated tumor will adversely affect the patient during his life time and thus require treatment and the probability that the tumor ca be cured by single modality therapy directed at the prostate or requires both local and systemic therapy to achieve cure. As most of the tumors detected are deemed clinical significant most men undergo treatment. Radical prostatectomy is to excise the cancer completely with a clear margin to maintain continence by preserving the external sphincter and to preserve potency by preserving the autonomic nerve in the neuro vascular bundle. Radiation therapy is given by external beam by radioactive sources implant in to the gland or by a combination.

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