A Review on Diagnosis and Treatment of Cancer

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ABSTRACT:-

Cancer is a main cause of mortality world wide ,it poses significant challenges to healthcare system because of its complex pathophysiology and heterogeneity. Early diagnosis combined with effective strategies of treatment is most important to improve patient outcomes. This review gives a comprehensive overview of current advancements in cancer treatment modalities and cancer diagnosis. In this we disscus diagnostic technologies which includes molecular imaging , liquid biopsy and next generation sequencing which offers sensitivity and specificity for the early disease monitoring and detection. This review explores the evolution of treatment approach which ranges from conventional therapies like chemotherapy, radiotherapy, surgery to innovative modalities which includes targeted therapy, immunotherapy and personalised medicine. Lastly we will highlight the research which is ongoing aimed to improve survival rates and quality of life . This review helps us to understand the importance of a multi disciplinary approach to fight the complexities of cancer .1,2,3

Keywords:- Cancer , Cancer diagnosis, Pathophysiology, Heterogeneity, Radiotherapy.

INTRODUCTION:-

Cancer is a complex disease that continues to give a major global challenge related to health which accounts million of death yearly . It is characterized by uncontrolled cell growth and ability to invade surrounding tissues and metastasize to different organs . No doubt there are significant advances in medical research early and effective treatment is critical hurdle to reduce cancer related mortality. 4,5

Accurate diagnosis is important as it increases the likelihood of treatment and increases the likelihood of long term survival. Methods which are traditional such as histopathological examination and Imaging are complemented by other technologies like molecular profiling, liquid biopsies and advanced imaging techniques.6 In the past few decades the treatment of cancer has evolved on a large scale but conventional modalities like surgery, chemotherapy and radiotherapy are foundational. The aim of this review is to provide qualitative examination of the current landscape in the treatment and diagnosis of cancer which highlights recent advancements and future directions . The aim is to illuminate the pathways towards personalized and accessible cancer care .7

TYPES :-

There are various types of cancer but some of the main types of cancer are given as follows:
1. Breast Cancer .
2. Prostate Cancer .
3. Melanoma .
4. Colon cancer .
5. Lung Cancer .
6. Leukaemia .8

SYMPTOMS :-

There are various symptoms of Cancer but some of the main symptoms are as follows:
1. Weight loss.
2. Weight gain.
3. Yellowing, darkening or redness of skin.
4. Inability of the skin to heal sores.
5. Change in bowel habits.
6. Chronic cough .

7. Trouble in breathing.
8. Night sweats.
9. Lumps .
10. Loss of appetite
11. Weakness.
12. Nipples discharge.
13. Abnormal bleeding of vagina.9

CAUSES :-

Tobacco is the main cause of cancer about 22% deaths causes due to tobacco. Obesity, poor diet , excessive alcohol consumption are the other causes of cancer by which 10% deaths are caused. Other factors are some infections , exposure to ionising radiation and environmental pollutants. Viruses bacteria and parasites are the environmental factors that cause 16-18% cancer world wide . These environmental factors changes the genes of cell and act. 5-10% of cancer are caused because of inherited genetic defects. Cancer are detected by some signs and symptoms or screening tests . The risk of developing cancers are reduced by not smoking and maintaining healthy weight and eating lots of vegetables and fruits and vaccination against infectious disease and avoiding read meat .10,11,12

RISK FACTORS IN THE TREATMENT AND DIAGNOSIS OF CANCER:-

The cancer development can be influenced by a complex interplay of environmental , genetic and lifestyle factors that cause tumour initiation and progression.

1. Hereditary factor and genetic factors.
2. Occupational and environmental exposure.
3. Lifestyle
4. Infection.
5. Gender and age .
6. Reproductive factor.
7. Hormonal factor .
8. Immunosuppression.
9. Chronic inflammation.
10. Socio economic factors.
11. Access factors.,13,14

DIAGNOSIS :-

Cancer is recognised in early stages because of appearance of symptoms and signs or with the help of screening. Medical tests are used to investigate the people suffering from cancer . These tests include blood tests ,CT scan , endoscopy and X-ray. In biopsy the tissue diagnosis indicates type of proliferating cell, it's histopathological grade genetic abnormalities etc. This information is important that evaluates the prognosis and help us so that we can choose the best treatment.,15 Cytogenetic and immunohistochemistry are also types of tissue tests . These tests gives us information about mutation and fusion genes and thus also help us to choose best treatment. Cancer diagnosis causes psycho social intervention, psychological distress such as talking therapy can help the people with this. Some people used to disclose the diagnosis widely and others keep the information private.,16,17,18

Detailed explanation of cancer diagnosis is as under :

1. Initial assessment.
    A. Physical exam and medical history :- It involves gathering of information about the patient medical history by doctor, family history of cancer and symptoms.
    B. Physical examination:- Physical examination also helps us to identify the signs of cancer such as lumps etc.

2. Diagnostic Tests :-
    A. Laboratory Tests :- Tests like urine tests ,blood tests help us to identify the abnormality that might be indicative of cancer.
        • Tumour Marker tests .
        • Complete Blood Count.
    B. Imaging Tests :-
        • X-ray
        •CT scans
        •MRI
        • USG
        • PET scans

C. Biopsy:- In this we take a small tissue sample which is examined under the microscope to see whether the cancer cells are present.
• Surgical Biopsy
• Needle Biopsy

D. Endoscop :- In this procedure a thin tube with a camera is inserted into the body in order to view internal organs .

3. Staging and Grading :-
A. Staging:- Staging process is used to determine the extent of cancer which includes location, size and whether it has spread to any part of body.
B. Grading :- It is used access how aggressive the cancer is and to access how quickly it is spreading.19,20,21

TREATMENT :-

A wide range of treatment are available for different types of cancer . Each cancer type needs specific treatment. Treatment include ,
• Chemotherapy
• Radiation therapy
• Targeted Therapy
• Hormonal therapy
Other therapies are hyperthermia , immunotherapy, photo dynamic therapy, stem cell therapy. Commonly series of therapies are involved before surgery such as chemotherapy.
Angiogenesis inhibitors are commonly used that improves the effect of immunotherapy. The main aim of cancer treatment is to cure cancer by removing it completely or prolonged individuals life . There are various types of cancer and most of these are successfully treated if they are detected in early stages.22,23,24

TYPES OF TREATMENT:-

1. Surgery :- Tumour is cured if it is removed entirely by surgery. But when the cancer has metastasized to the other sites already surgical excision is impossible.
   Example of cancer surgical procedures are mastectomy, lumpectomy for breast cancer and prostatectomy for prostate cancer and surgery for lung cancer.
   The aim of the surgery is to either the removal of tumour only or the entire organ . A single cancer cells can not be seen through naked eyes but it regrows into a new tumour, this process is called recurrence. In addition surgery is necessary for staging to remove the primary tumour. Surgery is performed after or before other forms of treatment. The treatment before the surgery is called as neoadjuvant. 25

2. Radiation therapy :- Radiation therapy is also called as radio therapy. It uses ionising radiation to shrink tumours by damaging their DNA and causes Cellular death. It is used to treat every type of solid tumour. It is used to treat leukaemia and lymphoma . In Radiation therapy radiation dose depends on the number of factors, which includes the radio sensitivity of every cancer type . Radiation therapy causes dry mouth from exposure of salivary gland to radiation which results the decreased the saliva secretion.26

3. Chemotherapy :it is the procedure in which cancer cells are destroyed with the help of drugs that is anti cancer drugs .these drugs can be given in a variety of ways like injection into muscles, veins , skin ,or drugs can be taken from mouth in the form of pills . In chemotherapy these anti cancer drugs interfere with cell division in all the possible ways . Most of the chemotherapy drugs target dividing cells and do not target those cells which are normal cells . Those tissues which have high replacement rate can be harmed by anti cancer drugs because of their high replacement rate. These cells can repair themselves after the chemotherapy process . Sometimes two or more than two drugs are given at the same time to cure tumour because some drugs works better together than alone . This type of chemotherapy is called as combination chemotherapy. As chemotherapy effects the whole body, it has lot of side effects. Patients usually find that they started losing their hair after the use of drugs that are fighting against the cancer cells. In the treatment of tumour it may cause a patient to loss of appetite, leads to fatigue and continuous vomiting.27

4. Immunotherapy :- Cancer immunotherapy is a set of therapeutic strategies which is designed to induce patients immune system to fight with Tumour. Methods to generate an immune response against tumour are intravesical BCG immunotherapy for superficial bladder cancer. And other cytokines induce immune response in renal cell carcinoma and melanoma.28

5. Hormonal Therapy:- The growth of cancer are inhibited by blocking or providing some hormones. Some hormones sensitive tumour are certain type of breast cancer and prostate cancer . It is important to block estrogens and testosterone for treatment. Side effects of the hormone therapy vary depend on the type of patients who experience symptoms like hot flashes , nausea, and fatigue.29

CONCLUSION :-

The patient outcomes are significantly improved by the advancement in the diagnosis and treatment of cancer. Accurate and early diagnosis driven by innovation molecular profiling, imaging, biomarker discovery is important for effective treatment planning. Finally , in future cancer care is more preventive, predictive and patient centred that will improve survival rates and quality of life for the patient in the whole world. Therapeutic landscape has

been transformed by the personalized medicine which includes targeted therapy and immunotherapy which offers more accurate and less toxic treatment.30

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