Radiation Therapy

Poltava State Medical University
, Department of oncology and radiology with radiation medicine
assistant Nestulia K.I..

Radiation therapy(RT)

The science of the use of AI for the treatment of diseases, mainly malignant tumors.

Early tumor diagnosis.

INDEPENDENT RT

COMBINED RTcombination

chir. treatment and radiation. Preoperative, postoperative RT.

COMPREHENSIVE RT - operation, radiation and chemotherapy, hormone therapy.

PRINCIPLES OF RADIATION THERAPY

- Bringing the optimal dose to the pathological focus
- Minimal damage to surrounding organs and tissues
- Carrying out activities that stimulate the body's defenses

Radiation therapy

RADICAL - the complete cure of the patient - the destruction of tumor cells both in the primary focus and in areas of possible metastasis.

PALLIATIVE - temporary improvement and prolongation of the patient's life, growth retardation and spread of the tumor.

SYMPTOMATIC - removal of the most severe manifestations of the disease (pain, impaired blood flow, edema).

CONTRAINDICATIONS for RT: serious condition of the patient, exhaustion, anemia, leukopenia, acute septic conditions, decompensation of heart, liver, and kidney diseases. Active tuberculosis. The spread of the tumor to adjacent hollow organs, the germination of large vessels.

Inflammatory process.

CLINICAL AND BIOLOGICAL FOUNDATIONS OF RADIATION TREATMENT OF TUMORS

The effect of IR on the tumor.

The basis of therapeutic use is the biological effect of AI. The damaging effect of varying degrees - depends on the absorbed dose.

Radiosensitivity

Radiosensitivity of cells –

reaction to irradiation.

Age and condition of the patient, condition of the tissues surrounding the tumor, histological structure, the presence of hypoxic and anoxic cells, the level of cell proliferation and differentiation.

Radiotherapy interval is the difference in the radiosensitivity of the tumor and surrounding healthy organs and tissues.

Grouping of liver cancer by stages:

Stage I - T1 N0 M0;
Stage II - T2 N0 M0;
Stage III A - T3 N0 M0;
Stage III B - T4 N0 M0;
Stage III C - any T N1 M0;
Stage IV - T and N M1.

tumor size

the number of lesions

distribution to related bodies

the presence of regional and distant metastases

Histological structure of the tumor and SOD Morphological verification of the diagnosis

- Tumor of lymphoid cells:
- 40 50 Gr embryonic and reticular tumors highly sensitive.
- Squamous cell carcinoma and adenocarcinoma: 60 80 G , Cancer - 80 Gy average radiosensitivity.
- Sarcoma: 100 120 Gy soft tissue and bone sarcomas, melanoma - tumors with expected radioresistance.
- Doses for P and gamma rays, a beam of fast electrons).
- Features of tumor growth. Tumor size.

Irradiation modes

Fine fractionation - 1.8-2 Gy 5 g / week.

For tumors with high and moderate radiosensitivity.

Average - 3-4 Gy 3-4 r / week.

For resistant tumors

Large - 4 Gy and more than -10 Gy - depends on the tactics of treatment

Multifractionation

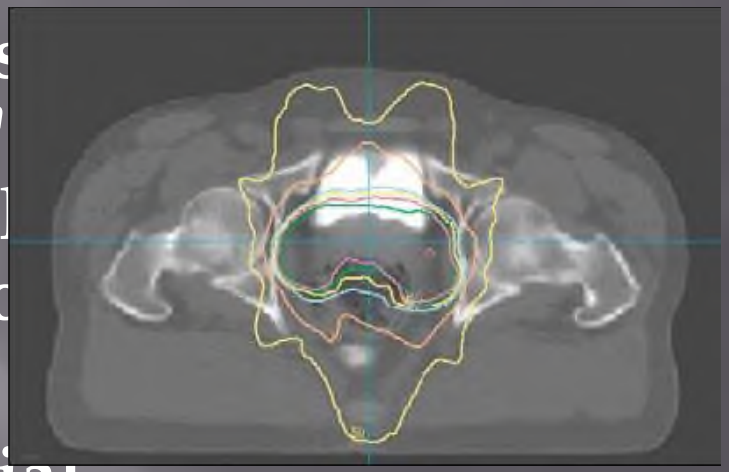
Split course

Continuous mode - days, weeks

Simultaneous irradiation.

Clinical and dosimetric planning of RT.

- Clinical and dosimetric tas
  the creation in the patient'
  body of a favorable spatial
  distribution of PD radiatic
- Exact tumor localization.
  - Topometric schemes in axial projection at the level of the tumor center.



Radiation-physical characteristics of radiation beams

Tolerance dose is the highest dose that is applied to a limited area of skin and does not cause damage.

For P-rays generated at a voltage of 200 keV 100% of the dose - on the skin, a single skin-tolerant dose of KTD = 2Gy

P-rays only for the treatment of superficial formations.

Gamma installations, Co 60 - a beam of photons (1.17-1.33 MeV) of high energy. CTE = 4Gr.

Treatment of deep tumors.

Linear accelerators generate bremsstrahlung and electron beams:

Braking radiation of high energies 25 MeV - Mach PD - at a depth of 4-6 cm, but a slow decline in dose.

High-energy electron beams - PD swing at a depth of 1-3 cm, rapid dose drop, at a depth of 10 cm tissue is not irradiated.

For deep tumors - bundles of heavy charged particles (protons, alpha, peonies).

Methods of radiation therapy

Specialized radiology departments. Radiation control, observance of NRB.

Remote methods - IR is at a distance from the patient.

Contact methods - IR is adjacent to the hearth.

COMBINED RADIATION THERAPY simultaneous and consistent application of different RT methods.

Remote irradiation.

The concept of distance source - skin (RIC).

Long-distance therapy - RIC = 30 cm-1.5-4 m. Frequently -50-80 cm.

Short-range therapy -1.5-25 cm,

h a sch e - 1.5-7.5 cm. Superficial radiotherapy.

Percentage depth dose (PGD) is the ratio between the value on the skin and the dose at a given depth.

PGD depends on the REC.

Devices

linear accelerator- generates beams of photons or electrons of high energies.

Contact methods of irradiation - brachytherapy

application - is placed on the surface of the irradiated area above the superficial tumor (skin, mucous membranes) -

no more than 1-2 cm in depth.

Inside the cavity - the introduction of AI to bring high PD to the tumor located in the hollow organ. Co 60, California Cf 252 (gamma and neutrons) for the treatment of resistant tumors.

Closed AI - exposure to radioactive islands is excluded

into the environment. Needles and tubes with Cs 137 and Co 60 Radium, iridium, etc.

Open AI: I-131, P-32, Sr-89, colloidal solutions of yttrium - are administered enterally or into the bloodstream

The internal method is the introduction of IR directly into the tumor tissue.

Continuous creation of a high dose.

(granules, grains).

Radioiourgical method - on the operating table (after removal of the tumor in the tumor bed within healthy tissues, or in an inoperable tumor).

Remote irradiation - immediately after tumor removal.

Introduction of colloidal solutions of isotopes in the cavity.

Methods of external irradiation of the patient

- **Static irradiation:**
Single floor
Two-floor,
Multi-field

Mobile:
Rotary
sectoral
tangent convergent

To form a working beam of IR:

-compensators (bolus)

-wedge filters,

lattice filters,

shielding and splitting units

-Fixing devices

-Individual protective blocks

THE ORGANISM'S REACTIONS TO EXPOSURE

General and local reactions - accompany therapy, pass without special treatment.

General:

CNS disorders,

CCC dysfunction, digestive disorders, hematological changes

Treatment: vitamins, liquid, antihistamines, hematopoietic stimulants, antibiotics.

Local skin reactions:

e r i t e m a, s u h o y r a d i o d e r m a t i t

persistent pigmentation and thinning of the skin.

Warning: indifferent powders, fish oil, sea buckthorn oil, prednisolone, etc.

M e s t n y e r e c t i o n

from mucous membranes:

pain, dysphagia, radioepitheliitis, colitis, cystitis.

Warning: remediation of cavities, damage, disinfection. solutions, oils, novocaine.

Local radiation disturbances

-early

- late

Subcutaneous radiation sclerosis, ulcers, pneumonitis, colitis, rectosigmoiditis, dystrophic bone changes, indurative edema, myelitis, radiation cancer, etc.

Special treatment.

Radiation therapy of non-neoplastic diseases

Strict indications for the ineffectiveness of other methods.

Single and total doses are small - 0.1-0.7 Gy

a day before SOD - up to 4-7Gr.

The main method is direct local irradiation of the hearth remotely.

Irradiation fields - by the size of the hearth,

with inflammation - 0.5 cm more.

Use remote therapy at deeply located centers (X-ray therapeutic installations)

Inflammatory processes

Boils, carbuncles, hydradenitis, panaritium, thrombophlebitis, erysipelas, anastomosis, osteomyelitis.

local plethora, increased capillary permeability, formation of bioactive substances, lymphocyte breakdown.

The principle of treatment: the more acute the process, the lower the dose.

In the initial stage - termination of the process, reduction of pain, removal of inflammation.

In the phase of necrosis and suppuration - accelerated melting of the infiltrate and its delimitation.

In the regeneration phase - rapid epithelialization of the wound.

Degenerative-dystrophic diseases of the musculoskeletal system:

periarthritis, deforming arthrosis with pain,

heel bursitis, osteochondrosis.

We reduce the pain syndrome - we affect the immunospecific reactions of joint tissues and nerve receptors.

Remote irradiation, 0.3-0.5 Gy, SOD - 3-5 Gy, interval - 48 hours.

Neurological diseases:

inflammatory diseases of the CNS - neuritis, neuralgia, radiculitis.

Changing functions. states of nerve centers and nodes, a decrease in the concentration of bioactive in-in.

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Post-amputation pain syndrome

stump, reflexogenic zones, nodes of the sympathetic nervous system