Radiation Toxicity (Acute Radiation Toxicity)

PLAY PICMONIC

Pathophysiology

Cellular and DNA Damage

Cellular-phone DNA-strand Damaged

Acute radiation toxicity causes cellular and DNA damage through the direct or indirect production of free radicals.

High Dose Radiation in a Short Time (Within Minutes)

High Dose Radiation-radio

Radiation toxicity is presented as acute due to high-dose radiation in a short time (within minutes). This can be seen in nuclear reactor accidents and radiotherapy. Rapidly regenerating stem cells such as bone marrow, GI tract, skin, and gonads are the most sensitive tissue to radiation injury.

Skin

Alopecia

Aloe-plant on Bald-head

Hair loss is also known as alopecia. Patient hair follicles can be damaged by radiation, causing epilation.

Erythema

Earth-red

Erythema of the skin can occur due to damaged basal cell layer by radiation. This can be temporary and associated with pruritus after a few hours of irradiation.

Hematopoietic

Myelosuppression

Suppressed Red and White Blood Cells

The patient can seem well even if the bone marrow is starting to die. Progressive myelosuppression may occur with a drop in blood cell count, resulting in the risk of infection and hemorrhage. Patients may experience fever, malaise, and anorexia.

Respiratory

Radiation Pneumonitis

Radiation-radio Nude-Mona-on-fire

Radiation pneumonitis occurs due to radiotherapy to the chest, causing inflammation of the lung that can appear 1 to 3 months after the radiotherapy treatment. It can be a complication of radiotherapy breast and lung cancer treatment.

Gastrointestinal

Diarrhea

Toilet

Diarrhea can occur a few hours after exposure. Death can be seen two weeks after exposure due to infection, dehydration, and electrolyte imbalance.

Nausea, Vomiting

Vomiting

Nausea and vomiting are one of the earliest signs of radiation toxicity. Symptoms of GI can appear if the radiation dose exposure is > 10 Gy (> 1000 rads), but some can manifest as low as 6 Gy or 600 rads.

Neurovascular

Altered Mental Status

Nerve-guy with Altered-brain

Altered mental status as a part of CNS syndrome can appear in patients with a dose exposure of 50 Gy (5000 rads), but it can also be manifested as low as 20 Gy or 2000 rads.

Evaluation

Absolute Lymphocyte Count

Absolute Lime-lymphocyte Count

Repeat CBC analysis is needed by checking the absolute lymphocyte count, represented by the exact or absolute number of cells instead as a percentage. The analysis is repeated every 2 to 3 hours for the first 8 to 12 hours after exposure and every 4 to 6 hours for the following 2 or 3 days. The Andrews Lymphocyte Nomogram is used to check the sequential changes in absolute lymphocyte counts over time.

Treatment

Supportive Care

Supportive IV Bags

Supportive care is important in treating radiation toxicity because it can save lives. These may include fluid management and early detection and treatment of any infection. Patients also should be disrobed and bathed because it reduces exposure to 80%.