



Aging & Chronic Diseases

Rehab opportunities in radiation fibrosis syndrome

How can we prevent lifelong dysfunction?

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Radiation treatment for cancer is very effective in killing cancer cells and often used as adjuvant therapy post-surgery.

Toxicity may be acute (burnt skin, cough, pains) but can also present years later as a progressive condition called radiation fibrosis syndrome (RFS).

RFS can affect any tissue type, including the skin, ligament, tendon, muscles, viscera, nerve, as well as lungs, the gastrointestinal and genitourinary tracts, bone, or other organs, depending upon the treatment site.

RFS is similar to inflammation, wound healing, and fibrosis of any origin. The mechanisms linking radiation to chronic vascular dysfunction and subsequent tissue sclerosis, fibrosis, and atrophy are complex and not completely understood.

It is assumed that injury to the vascular endothelium in the radiated area leads to abnormal accumulation of fibrin in the intravascular, perivascular, and extravascular compartments. This may be responsible for the progressive tissue fibrosis and sclerosis that characterizes RFS - a sort of chronic hypoxia to the affected area.

Factors aggravating RFS are recent surgery, chemotherapy, a large radiation treatment (RT) field and high total RT dose, all of which happen often simultaneously in a cancer patient.

Symptoms of RFS include:

- Nerves: (neuropathic) pain, sensory loss, weakness and autonomic dysfunction. Plexopathy is common and results in extensive disability
- Muscles: myopathy; weakness, increased fatigability, painful muscle spasms
- Tendons and ligaments: progressive fibrosis with consequent loss of elasticity, shortening, and contracture
- Bone: osteoradionecrosis, osteopenia in the radiation field
- Skin: progressive fibrosis, sclerosis and intractable adherence to underlying tissues
- Lungs: diffuse alveolar damage; edema, bleeding, thrombosis and inflammation

Diagnosis is a challenge because of late onset and non-specific symptoms. The details of the patient's pain, spasm, tightness and the language they use to describe their symptoms are important: pulling, cramping, stabbing, searing, burning.

Physical examination is key, supported by MRI (spine, soft tissue, joints), CT (visceral involvement) and EMG.

Rehabilitation of RFS has to be a complex procedure consisting of education, physical therapy, occupational therapy, orthotics as well as medication. Education on basic physiopathology and interrelationship of complaints is the starting point.

Physical therapy:

- Physical activity during and after RT
- Optimize ROM and muscle strength, life long
- Synergistic muscle exercises, postural retraining, core strengthening
- Fascial techniques
- Myofascial relaxation techniques

Orthotics:

- Neck collars as energy conservation device in cervical weakness
- Ankle foot orthoses for plantar flexion weakness



- Upper extremity orthotics for plexopathy
- Knee-immobilizers

Medication:

Treatment of (neuropathic) pain and muscle spasms: pregabalin, NSAIDs, opioids and baclofen, benzodiazepines are discussed.

Novel therapeutic approaches, particularly the combination of pentoxifylline and vitamin E and hyperbaric oxygen treatment is a promising modality, but not available world wide yet.

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