

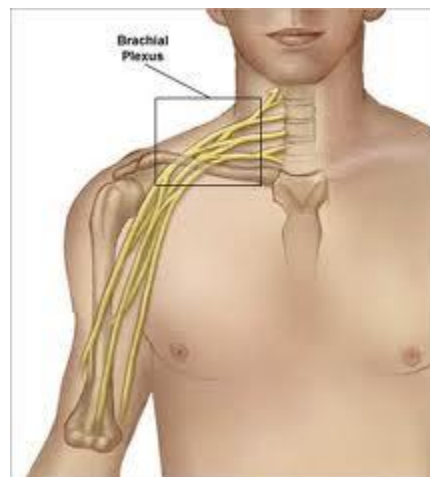
Radiation-Induced Brachial Plexopathy

Today I would like to address the important and often neglected issue of radiation induced brachial plexopathy (RIBP), and how it relates to lymphedema. This first part covers the causes and symptoms of this condition, the next blog entry will discuss the treatment of RIBP with special considerations to the presence of lymphedema.

Radiation-Induced Brachial Plexopathy is caused by radiation damage to the brachial plexus, a network bundle of nerves located near the neck and shoulder. The nerves forming the brachial plexus originate at the spinal cord in the neck and are responsible for the sensory and muscular innervation of the entire upper extremity.

The beneficial effects of radiation therapy in breast cancer and other malignant diseases are well known and documented. However, this life-saving therapy has potentially adverse effects on a number of body systems, which are exposed to the rays during treatment - such as skin, nerves and inner organs.

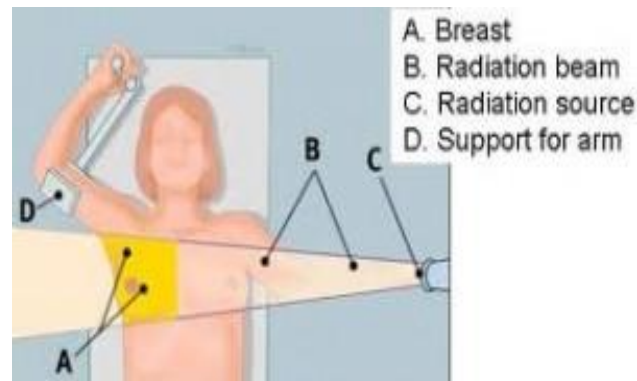
In breast cancer, radiation treatment is administered to the axillary area, chest, or neck. Radiation damage to this network of nerves can result in sensory and/or motor damage, with or without accompanying pain in the brachial plexus distribution in the arm. Symptoms may include paresthesia (tingling, pricking, numbness), dysesthesia (abnormal sense of touch, such as burning, itching, feeling of an electric current, “pins and needles”, pain), decreased sensitivity, partial loss of movement (muscle weakness and difficulty performing simple tasks such as opening jars, or containers, holding objects), complete paralysis of the arm, muscular atrophy, impaired mobility and partial dislocation of the shoulder joint.



Brachial Plexus

The exact mechanism of RIBP is not yet completely understood; research indicates that damage to the brachial plexus results from a combination of direct nerve cell damage from ionizing

radiation and more progressive damage by the development of scar tissue (radiation fibrosis) in and around the nerves, combined with damage to adjacent vessels that supply these nerves with oxygen and nutrients. Radiation of nerve tissue also causes the nerve cells to shrink, resulting in a decrease in elasticity of nerve fibers, which further aggravates the situation. The extent of damage is associated with the radiation dose and technique, and the concurrent use of chemotherapy.



The progressive damage to vessels and the development of scar tissue continues to evolve significantly in some, and gradually in other patients ^[3] after the initial radiation therapy, which explains why some patients develop RIBP symptoms many years after radiation treatment. Most patients develop symptoms within the first three years; however, the average interval between the last dose of radiation and the onset of RIBP symptoms reported in the literature varies widely (range between six months and 20 years ^[1, 2]). The prevalence of RIBP is reported to be between 1.8% and 4.9% ^[1]; RIBP is more common after radiation in combination with chemotherapy, and nerve tissue of younger patients seems to be more vulnerable ^[4].

The Relationship between RIBP and Lymphedema

Individuals who had surgery and radiation for breast cancer and do not present with post-mastectomy/lumpectomy lymphedema are considered to be in a latency stage, and are always at risk to develop lymphedema. Any additional stress to the lymphatic system, such as trauma, loss of mobility or pain may cause the onset of lymphedema in the upper extremity.

The presence of RIBP, especially in cases with partial or complete loss of mobility is one of these triggering factors. The return of lymphatic fluid from the upper extremity partially depends on the pumping action the muscles exert to the outside of the lymph vessels. Immobility of these muscles due to pain, partial or complete paralysis has a detrimental effect to the return of lymphatic fluid and causes lymph to stagnate in the extremity. Combined with the adverse effects of gravity, this may trigger the onset of lymphedema.

Those individuals who already have lymphedema and develop RIBP may experience an increase in swelling due to pain and partial or complete loss of motor function.

Stay tuned for the next blog entry covering the treatment of RIBP with special considerations to the presence of lymphedema.