POST IMMOBILIZATION SYNDROME

The *post immobilization syndrome* appears usually after prolonged periods (weeks or months) of having a joint or joints maintained in an immobilized condition, by splint, tape, or cast, following fracture reduction, surgical repair, or a soft tissue injury (joint sprain or muscle tear).

The major components that make up the *post immobilization syndrome* are atrophy, weakness, tonic muscle setting, contracture, and pain. Muscle *atrophy* and *weakness* are a natural consequence of enforced muscle inactivity or disuse since *tonic muscle setting* occurs as muscle spindle afferent activity from antagonists becomes static (unchanging) while the tonic stretch reflex mechanism has no demands placed on it. This causes the supraspinal structures, by way of muscle spindle tonic sensory elements, to become sensitive to any muscle stretch, causing them to enforce or maintain the static antagonistic muscle lengths that have been created. Any attempt to contract any involved muscle will result in a very quick, relatively strong answering contraction from its antagonist, inhibiting any joint motion initiated by the agonist. *Contracture* occurs as atrophy progresses to the point where muscle tissue is replaced by connective tissue.

Treatment

Pain usually results from forcible attempts to increase joint range of motion through manual passive stretch of the joint(s) by the therapist, or active stretching and exercise by the patient. Adverse soft tissue responses to manual stretching or increases in exercise include inflammation, swelling, and pain.

Electromyometric (EMM) neuromuscular reeducation has been shown to be helpful in the treatment of the *post immobilization syndrome*. Through EMM training, the patient may be shown how to voluntarily reactivate musculature while inhibiting antagonist response, thus combating tonic setting. EMM training is particularly helpful during the acute phase of the *post immobilization syndrome*, before the appearance of swelling or inflammation, usually within the first few days after the cast or splint have been removed. This reeducation is accomplished by teaching the patient to control myoelectric activity produced by the involved muscles. This process reduces the stretch reflex, fosters toning in the agonist, and promotes lengthening of the antagonist. These techniques have allowed patients to achieve notable functional ranges of motion (as much as 90°), with almost no apparent discomfort, and in very short periods of time (days instead of weeks). However, EMM neuromuscular reeducation has clinically been shown to be ineffectual in establishing flexion ranges more than 90°, especially in the knee.

Traditionally, the treatment of *post immobilization syndrome* contracture and weakness has involved manual stretching of the involved joint(s) by the therapist, isotonic (progressive resistive) exercise, and the utilization of exercise techniques that promote changes in muscle length as well as strength, including the hold-relax and contract-relax proprioceptive neuromuscular facilitation (PNF) techniques. These techniques tend to produce pain for the patient and can be a source of frustration for the administering practitioner. This is primarily because most of these techniques depend on the patient, or the therapist, to force intrafusal and extrafusal muscle lengths to change. Frustration with the particular treatment technique may mount if the tissue stresses caused by the stretching and exercise results in soft tissue inflammation and swelling. The inflammation response to stress may complicate the process of muscle relengthening by reducing the system's ability to maintain forcefully achieved muscle lengths (pain does not foster muscle relaxation). The inflammation process may even provoke the formation of adhesions between associated soft tissue layers, which also restrict motion, promote further pain and foster continued inflammation by acting as a continuing irritant. Adhesions may also inhibit normal circulation that would otherwise defeat the inflammation process.

A more realistic, less traumatic approach involves utilizing soft tissue manipulation to eliminate any existing adhesions. This is far less painful than stretching and it often results in immediate increases of joint ranges of motion (refer to Soft Tissue Manipulation). Medium frequency

electrical stimulation is sometimes applied, at levels that produce a brisk contraction in the stimulated muscle tissues, is often used as a preliminary procedure to help soften the adhesions. It is generally applied for a 15-minute period. It is also important to reduce any inflammation that may be shown to be present (through DSR survey) with the phonophoresis of an effective non-steroidal anti-inflammatory into any inflamed sites. Inflammation may also be reduced and prevented by picking up capillary circulation through electrical stimulation. This latter procedure usually takes the form of wide-pulsed galvanic current applied to the major muscle group(s) in the area of the affect joint(s), for a 20-minute period, at a pulse rate of seven Hz (refer to Electrical Stimulation, Circulation Enhancement). Following this approach, complete restoration of normal ranges of motion may dramatically occur in just a few sessions.