Dynamic Chiropractic

REHAB / RECOVERY / PHYSIOTHERAPY

Joint Rehabilitation and the Use of Exercise Tubing

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Many professionals have found that exercise tubing is an effective tool in rehabilitating various joint injuries. There are several systems that are popular with chiropractors. One of these is comprised of surgical tubing with adjustable straps for the wrist/ankle and thigh and a retainer that attaches into the hinge side of a door. With this system, most patients can be instructed within minutes and then perform the prescribed exercises at home.

Experience has revealed that combining the chiropractic adjustment with the appropriate exercise will speed recovery, due to the increased ability of the musculoskeletal system to "hold" the adjustment. Other positive results have been shown to occur with the application of tubing exercise. Such results include: significant increase in both the size and strength of muscles exercised; reduction of muscle atrophy; pain relief; an increase in the facilitation and velocity of muscular contraction; enhancement of joint endurance; reduction in healing time required (due to improved vasodilation); and a decrease in new adhesions at the site of injury (allowing for more efficient and pain-free range of motion).

Using exercise tubing can increase muscle size and strength, reduce healing time, and offer pain relief.

Guidelines for Use

To achieve optimal results with exercise tubing, several guidelines must be followed. All exercises are to be pain-free; pain produced as a result of exercise is counterproductive and results in decreased strength, atrophy, swelling, etc. Straight single-plane motions are utilized prior to rotational motions. Short arc movements are prescribed prior to full-range movement. Prior to advancing to full-range exercise, the motion must also be able to be performed pain-free. Bilateral exercise is always preferred, and it is essential that the uninvolved side be exercised prior to the involved. This speeds the recovery process due to the cross-education afforded.[1,2]

Exercise Phases

There are four phases which comprise the established protocols for utilizing resistive-motion exercise. Start with slow and short-range motion. Proceed to fast and short range. Progress to slow, full-range exercise; and finally to fast, full-range movement (see Table 1). The patient generally spends two weeks per phase. If the patient spends more than one week per phase, it is recommended that an every-other-day schedule be followed. The general rule to apply prior to advancing to a higher phase of exercise is the ability of the patient to perform the next phase pain-free.

Table 1: The four exercise phases using tubing.

Phase 1 -- Slow Pace, Short Range
Phase 2 -- Fast Pace, Short Range
Phase 3 -- Slow Pace, Full Range

Phase 4 -- Fast Pace, Full Range

Phase one's slow paced, short-range sessions generally provide benefits to the circulatory system. This is due to an improvement in venous and lymphatic drainage, thus increasing the muscular pump and ridding the area of excess fluid. The connective tissue starts to conform to Davis' law ("soft tissue models according to imposed demands"), as the fibroblasts align to tissue stress. Adhesions are less likely to form, and those that do form will produce a small but flexible scar.

Because of their fast-paced movements, phase two exercises improve collagen healing. They also facilitate the neurological pathway, as provided for in the law of facilitation: "When an impulse passes through a certain set of neurons to the exclusion of others, it will take the same course on future occasions; and each time it traverses this path, the resistance in the path will be less." This results in muscular tonus; joint integrity starts to improve because of the increase in joint lubrication. Along with nourishing the articular cartilage, further adhesions are prevented because of the quick movement. This integrity forms the basis for further strengthening and endurance training.

As the patient performs the daily living activities of work, home, sports, etc., the neuromuscular system is coordinated. This can be demonstrated by performing before-and-after manual muscle testing of the involved exercise motion. It will be generally found that, prior to the phase two exercise, the involved muscles providing the exercise motion will respond in abnormal tonus, whereas immediately after the phase two exercise the manual muscle test reveals a "normal" tonus.

When tonus is evaluated by manual muscle testing, there is a 10 degree overflow on each side of the tested position which would apply to the results obtained.[3] For example, if one were to completely assess shoulder flexion from 0 to 180 degrees, the specific positions to perform manual muscle testing would have to be at 0, 20, 40, 60, 80, 100, 120, 140, 160 and 180 degrees. This would evaluate the neurologic tonus throughout the range-of-motion via manual muscle testing. It cannot be assumed a range-of-motion is in normal tonus by testing only at one point in the plane of motion. Manual muscle testing provides the clinician with neurological tonus information. The phase two exercise becomes the exercise to normalize every neuromuscular position through an entire range of motion.

These short-range exercises facilitate lubrication and fluid dynamics.[4] Furthermore, short-range movement disperses the synovial fluid, helps nourish the cartilage, helps prevent its deterioration and prepares the joint for the demands of further exercise and rehabilitation.[5]

One of the many goals of the phase one and phase two exercise programs is to reduce strength loss as well as not allow decrease in the size of the muscle, which occurs during the atrophic process. In any neuromusculoskeletal condition entering the chiropractic office, the nervous system (due to the previously mentioned law of facilitation) will have set up abnormal facilitated pathways that are viciously cyclic, and are being manifest by muscle spasm, ischemia, hypoxia, pain, muscle weakness and joint instability. The facilitated pathways must be resolved with phase two exercise to obtain any degree of permanency in a rehabilitation program. Due to the law of facilitation, the neurological impulse will take the same course on each occasion; each time it traverses the path, the resistance will be less. Thus, we re-educate the pathway of muscle contraction.

Phase three begins the slow-pace, full-range exercise wherein we start to duplicate functional movements. Here we start to increase the strength and endurance capabilities of the particular joint. Phase four is the final phase and provides the full functional capabilities of strength,

endurance and joint stability needed for daily living.

Muscular strength is described functionally as the greatest amount of peak tension a muscle group can generate dynamically during one contraction. Training the muscle for strength involves overloading the muscle through work-induced hypertrophy and hyperplasia. A muscle may be overloaded by fluctuating the amount of repetitions or the amount of resistance. By stretching the exercise tubing in phase three or phase four, the patient overloads the muscle by fluctuating the resistance and increases in strength are realized. Likewise, the velocity of limb movement may be held constant while increasing the number of repetitions. During phase three or phase four, the muscle can be overloaded by increasing the intensity of muscular work by the addition of more repetitions.

This principle of strength is a physiological law attempting to accomplish a greater amount of peak tension in the involved muscle group. This is accomplished by contracting the involved muscle on an every other day regimen to the point of complete peripheral fatigue. It is essential in strength training after seven weeks that the involved muscle not be contracted on consecutive days. This will simply deteriorate muscle tissue versus enlarging and strengthening.

It is recommended that at the completion of each session the patient routinely perform an ice massage for 10-15 minutes to reduce any joint irritation which might be caused by the prescribed movement.

References

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NOVEMBER 1997

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