

**Let's Talk About the Spine: Physical Therapy Intervention**  
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## **Introduction**

Physical therapy treatment for spinal pain and dysfunction requires a multifaceted approach. Treatment follows a detailed evaluation and is specific to the needs of each patient. No two backs are the same even with the same diagnosis. In this part of the session, we will cover physical therapy interventions that address changes that occur in the body due to spinal diagnosis and aging with polio. The presentation will include information on modalities to address symptoms along with body mechanics and ADL modifications to decrease stressors on the spine. Therapeutic exercise for flexibility, strengthening and general conditioning to improve the supportive structures will be discussed.

Our bodies continue to change throughout our lives. Changes that occur specifically to the spine include:

- loss of disc height
- vertebral bodies become thinner due to loss of mineral content
- bone spurs may develop
- trunk becomes shorter

## **Modalities**

Modalities are often utilized in the physical therapy treatment of spinal pain. Physical therapy modalities such as ultrasound, electrical stimulation, heat, cold or massage are beneficial to decrease pain, decrease inflammation, improve blood flow, and relax muscles. Each modality has its own indications and contraindications. Following an evaluation, a physical therapist will determine the appropriate modality for each patient situation.

The therapeutic application of heat and cold has long been utilized for pain control. Heat accelerates the metabolic process by increasing circulation. This helps flush out the waste products of a muscle spasm and reduces pain. It is soothing and relaxing during its application. Local cooling decreases the metabolic process thereby decreasing the inflammatory response. It offers an analgesic effect by decreasing nerve conduction and muscle contractibility. This helps decrease muscle spasms. People with a history of polio are often less tolerant to the application of cold. Using moist heat adjacent to the cold usually makes it tolerable.

Myofascial release and soft tissue mobilization have been found to be effective in the treatment of back pain. Massage brings increased circulation to the area; aids in the release of muscle spasms; allows stretching of abnormal fibrous tissue; and increases extensibility of the soft tissues. It also increases endorphin levels and promotes generalized feelings of relaxation and wellness.

Ultrasound is a modality that uses sound waves to treat pain and promote healing. The thermal effects of continuous ultrasound cause increased friction and heat on a molecular level. This promotes healing by increasing the metabolism of the cells in the soft tissue. The mechanical effects of pulsed ultrasound cause expansion and contraction in the tiny gas bubbles of the soft tissue. This micro massage occurs without thermal effects and helps decrease the inflammatory response and tissue swelling, thus decreasing pain.

Electrical stimulation can reduce pain by sending small electrical impulses through electrodes placed on the skin to underlying nerve fibers. Pain reduction can occur by blocking the pain signals to the brain or by causing a release of endorphins, natural chemicals in the brain which act as an analgesic. This form of electrical stimulation is commonly known as TENS (transcutaneous electrical nerve stimulation). TENS should not be confused with EMS (electrical muscle stimulation) which can be used to stimulate a muscle contraction.

### **Therapeutic Exercise**

Therapeutic exercise refers to physical activities prescribed to improve function, correct an impairment or obtain a state of well – being by restoring strength, endurance, flexibility, stability and balance.

To properly prescribe an exercise program, a physical therapy evaluation of the individual must be completed. In the case of a polio survivor with spinal issues, it is imperative that the medical history and physical assessment is thorough. An individualized manual muscle test will guide the physical therapist in shaping an appropriate exercise program. The progress is monitored and the plan is modified as needed.

The first objective of the therapeutic exercise is to assist the body in reducing pain and inflammation. Once that is achieved, often in conjunction with modalities, the exercise focuses on improving range of motion, increasing muscle strength and endurance. There is not a cookie cutter recipe of exercises available for specific spinal diagnoses, especially not for those with a history of polio.

Exercise can be a challenge for individuals with a history of polio. The fine line balance between overuse and disuse must be achieved. It is essential to have an exercise program that is tailored to the individual's specific muscle test in order to be safe and effective. Check with your doctor before beginning any exercise program. The extremities used in exercise must be able to move through a complete range of motion against gravity. Fatigue should be avoided by using stronger limbs and alternating exercises.

With polio affected muscles, if an exercise is too strenuous, certain signs of overuse may occur within 24-48 hours. These signs include muscle cramps or spasms, muscle twitching, moderate to severe muscle pain and extreme fatigue. This needs to be reported to your physical therapist so the exercise program can be modified.

*Stretching, Strengthening, Conditioning*

Muscle flexibility and joint range of motion are achieved through stretching and movement. The stretching exercises help lubricate the joints and prepare the nervous system. Hold a stretch position for 20-30 seconds. Don't bounce into the stretch. People with spinal issues often have tightness in their lower back and hamstrings muscles. However, if paresis of the hamstring occurred with polio, these muscles are often overly flexible. Do not overstretch weak flexible muscles. The goal is to balance the system. If you are spending more time in a wheelchair or scooter, it is possible that the hip flexors have become tight. When tight, these muscles can pull on the pelvis, causing an anterior pelvic tilt and an increased lumbar lordosis. This in turn tightens the low back muscles and can increase low back pain.

Strengthening exercises are performed with resistance using weights, stretch bands, or your own body. Often the core muscles are weak with spinal issues. However, when complicated by a history of polio, the exercise guidelines must be observed. Do not use muscles with strength of 3/5 or less for conditioning or strengthening exercise. These muscles must work all day to fight gravity in basic activities of daily living. Attempting to strengthen these muscles may cause overuse and increased weakness. Strengthening exercise can be done with muscles of strength greater than 3/5. However, remember to start with minimal number of repetitions (5-7) within tolerance. Increase resistance and number of repetitions cautiously. Watch for signs of overuse. As a general rule, muscles that have a grade of 3/5 or less should be protected and not exercised. Grade 3+/5 muscles can be exercised with caution; grade 4 -4+/5 can be exercised moderately; and grade 5/5 muscles can be exercised more vigorously. If the core muscles cannot be strengthened, an external support can be recommended. It is more beneficial to perform the strengthening exercise with good form and technique and less resistance, rather than with aggressive resistance.

Endurance exercises engage large muscle groups over a longer period of time. When the muscles have good endurance, they will support the spine and provide postural stability throughout the day. When easily fatigued, the spine is subject to more biomechanical stress. Start a conditioning program slowly. Often 3-5 minutes of conditioning is all that can be initially tolerated. If needed, start with one-minute intervals with rest periods and SLOWLY build up endurance. Watch for the signs of overuse.

## *Aquatic Exercise*

An excellent way to achieve improved flexibility, strength and general condition is with aquatic exercise. Aquatic exercise is very beneficial, as the buoyancy of the water will help to support weak muscles and decrease joint stress while it can also provide resistance to strong muscles. Exercises can be modified in the water and core muscles can be strengthened by using the resistance of moving both arms at one time.

Aquatic therapy was utilized during the recovery phase from acute polio. Aquatic exercise offers unique physical and physiological benefits, in addition to general exercise benefits. Water exercise supports the body and reduces joint stress, offering the ability to improve flexibility, strength, aerobic condition and function. Water can facilitate a workout that can be tailored to each person's strength.

Simply being immersed in water has a positive therapeutic effect on our bodies. These physical properties of water make exercise less difficult and less painful, while increasing its effectiveness for polio survivors.

**Buoyancy** of water provides support while decreasing gravitational forces on weak limbs, offering less strain to move underwater.

**Hydrostatic pressure** helps with circulation, cardiac efficiency and distal swelling, but can be stressful to those with respiratory involvement if fully immersed.

**Relative density** accounts for the fact that dense, lean and muscular limbs will sink; limbs with more adipose tissue, edema or paresis will float.

**Fluid resistance** is the force that opposes the motion of an object through a fluid. Aquatic therapy supports while also resisting movement, providing a perfect environment for balance exercise.

**Turbulence**, the random motion of the water as it responds to a disturbance, provides therapeutic benefits of massage and resistance.

## **Body Mechanics**

Body mechanics refers to the way we move during daily activities. Good body mechanics may help prevent or correct problems with posture and protect the back from pain and injury.

Adjustments during daily activities may be required to accommodate body changes related to aging, spinal dysfunction and polio related issues. Movement methods used in the past may not be safe and effective with the physical changes occurring in your body.

Your spine goes through the midline of your back, giving your back stability and controlling its movement. The spine is made up of thirty-three bones called vertebrae; shock absorbers called discs; the spinal cord and nerves that send messages from your brain to your body; small joints that allow movement and help to stabilize your body; and muscles and ligaments that provide strength and power, support and stability.

Good body mechanics and proper positioning can help protect your spine and may help alleviate some associated problems with digestion, swallowing and breathing. Posture, an important aspect of spine protection, will be covered at length in an afternoon session.

If you have a caregiver that assists you with transfers and ADLs, it is important they use proper body mechanics to protect their spine from injury.

Following are some basic guidelines to help you with good body mechanics: of course, this can be difficult depending on your physical limitations. Supports, braces and positioning devices can help with proper body mechanics.

***When standing:*** Wear shoes. Keep your feet flat on the floor separated about 8 inches (shoulder width apart). Keep your back straight. If there is not a seat nearby and you are tired, lean against a wall.

***When walking:*** Keep your back straight as you walk. Weakness of the hip abductors can cause a side lurching gait pattern that puts excess biomechanical stress on the spine. Sometimes, a simple cane can alleviate the trunk shift. Leg length discrepancy can change over time, exacerbate spinal conditions and should be evaluated for shoe lifts. Adjust your walker, cane or crutch heights to the change in your height. For example, if you have scoliosis or degenerative disc disease, you may be shorter than you were in the past.

***When lifting an object:*** Stand with feet apart, back straight. Bend from knees, not the waist. Get close to the object. Lift the object using your arm and leg muscles. Do not use your back muscles. Pivot to turn, do not twist. Ask for help if you are unable to lift the object. Many devices are available to help move or lift objects. Reachers or straps can be helpful. When lifting your braced leg onto the wheelchair footrests, be aware of proper lifting technique.

***When carrying an object:*** Hold the object close to your body. Do not carry things that are too heavy for you. The seat of a rolling walker can carry your lunch tray, a laundry basket or groceries and take the stress off of your spine.

***Sitting:*** Sit on a supportive chair with armrests. Use a small pillow, rolled towel or lumbar roll to support your lower back. Sit on a wedge shaped cushion if there is significant atrophy of one buttock in comparison to the other. Do not sit for long periods of time. Get up and change positions.

***In the Office:*** Adjust the monitor of your computer so that the top is at the same level as your eyes. Use a paper holder so that the document is at the same level as the computer screen. Use a headset or the phone speaker if you use the telephone often.

## **Home Modifications for Back Pain Relief**

Home modifications that focus on keeping the spine straight can provide less stress on the spine, decrease the pain, and provide increased safety in the home environment. Extensive home modifications can be costly. Here are a few practical suggestions that are cost effective.

### ***Bathroom***

Install a raised toilet seat or a commode chair with arms. These provide back pain relief because they make it easier to get up, putting less strain on the lower back. Put in grab bars, to make it easier to sit and stand. Be sure to place the bars at a height that will make them easy to reach. Do not use towel racks or soap dishes as grab bars. Use secure, anti-slip bath mats. Invest in a shower seat or transfer tub bench to allow for a more comfortable shower and safe transfer. Organize toiletries on an easy to reach shelf. If renovating the bathroom, consider a comfort height toilet, vanity counter heights and a walk in shower.

### ***Bedroom***

A firm mattress allows you to move in bed as one unit (log rolling) as opposed to bending or twisting. Power adjustable bed frames can assist with positioning and bed mobility. A body pillow between the knees when sleeping on the side can help keep the pelvis level.

### ***Kitchen***

A stool may be placed at the kitchen counter to be used when washing dishes or preparing meals or lower workspaces could be provided at the table to allow a seated person to complete tasks. Difficulty reaching kitchen items may require the kitchen to be reorganized. Frequently used items should be placed on the counter top, the top shelf of lower cabinets or the bottom shelf of upper cabinets. Pull out cabinet shelves or rolling carts under the counter are helpful. Heavy pots and pans could be stored on the stove. Appliance controls should be positioned toward the front to allow easier access. Other useful products include a front loading dishwasher or washer and dryer, a side-by-side refrigerator/freezer, and lazy susans.

### ***Living Room***

Opt for supportive chairs with armrests. Stay away from soft, low sofas and chairs with rollers. Use lumbar cushions if needed.

### ***Driving***

When you are driving, adjust the seat to a comfortable distance from the steering wheel. Sit back in the seat. Adjust your rearview mirror – if you notice that you can no longer see well out of the mirror after driving a distance, adjust your posture – NOT the mirror. Use cruise control and heated seats if available. Stop to get out and stretch if driving distances.

### **Conclusion**

Physical therapy evaluation and treatment of spinal dysfunction provides intervention and guidelines for the long term management of symptoms. To maintain the results achieved in physical therapy, compliance with a realistic exercise program, simple lifestyle modifications and small adjustments to movement is essential. Improvements in spinal health and a general sense of well-being can be attained.

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