

Electrical Stimulation In Idiopathic Spinal Deformity

Idiopathic spinal deformity, also called idiopathic scoliosis, is a curvature of the spine that cannot be attributed to any other known cause or diagnosis. While some youngsters spontaneously get better, or as some say "grow out of their scoliosis," for most children it is critical to treat the problem as soon as it is discovered in order to have the optimal benefit of treatment during their growth years. Once the skeleton is mature, the alignment of the spine can only be changed by surgical intervention. It is not possible to predict which children will spontaneously recover and so it is imperative that all children with spinal curvatures have an evaluation by a skilled team of expert medical caregivers. If the child is a candidate for electrical stimulation to treat their idiopathic scoliosis, the home protocol is easy to implement.

Who Is A Candidate?

Based upon research over the past four decades, there is a "Golden Zone" for electrical stimulation as well as other conservative treatment. To be in the Golden Zone, the child must have true idiopathic scoliosis, have a lateral curve of less than 35 degrees and have at least two years of skeletal growth remaining.

While there is controversy among orthopaedic surgeons who have tried to replicate the original research findings in their clinical practice, medical teams that adhere strictly to treatment of patients in the Golden Zone and who have physical therapy follow up report results that are equivalent to or better than the use of bracing and exercise. These concepts cannot be over-emphasized. The protocol will not be successful without regular physical therapy and physician contact as well as technical support to keep the electrical stimulation devices operational. It is difficult to read and compare the reports of previous investigators because of the criteria established for "failure of ES." For example, in several studies ES is considered a failure if the curve progresses 5 or 6 degrees. This amount of change, however, is within the measurement error of measuring the lateral spinal curve on an x-ray.

The goal of conservative management of idiopathic spine deformity is to maintain the curve, or reduce it, in order to assure that the lateral curve of the spine is less than 30 degrees at the time of skeletal maturity. It has been demonstrated that a spinal curve of greater than 30 degrees at the time of skeletal maturation will continue to deform after skeletal maturity, at the rate of 1 to 3 degrees per year throughout life.

If the child has spinal deformity because of another disorder, has a curve greater than 35 degrees or has less than two years of skeletal growth remaining, conservative treatment [ie electrical stimulation or bracing and exercise, or both] cannot be expected to work. Surgical intervention is indicated to stabilize the spine.

Electrical Stimulation Protocol

Electrical stimulation is applied, with skin electrodes, to the muscles between the ribs on the side of the chest or torso, directly under the arm. The electrodes are placed so that contraction of the muscles has the greatest effect on the apex of the curve. For example, if the lateral curve is a right T10 curve, the electrodes are placed above and below the 10th rib. Stimulation characteristics are chosen to contract the muscles comfortably and obtain the best possible correction of the curve. The correction during ES is verified by x-ray and electrode placement may need to be adjusted to achieve the best result.

Electrical stimulation is usually employed at night, during sleeping hours. The stimulation is cycled on and off for up to eight hours each night. Initially, the ES is cycled for approximately 30 minutes and the time is increased to eight hours over the first few weeks of the program. The ES characteristics and timing are adjusted by the physical therapist at regular intervals. This adjustment of the stimulation characteristics as the muscles become trained by the ES is extremely important to the success of the program. It assures the the greatest number of contractions per hour of stimulation. It is necessary to repeat x-ray assessment of the spinal curvature at regular and frequent intervals, as prescribed. Spinal curvatures can progress very quickly during skeletal growth spurts and it may be necessary to adjust the electrical stimulation home protocol on a regular basis during these periods. If there is a progression of the curve (within the 35 degree limit), it may be necessary to combine the ES with bracing and exercise.

Summary

If the child is a candidate for electrical stimulation, the treatment protocol can be implemented easily at home. The child is not required to wear a brace throughout their growth years and is not penalized in physical and social activities. Psychological testing of adolescents who wore a brace versus those who used ES revealed more positive coping strategies with less hostility as well as a greater compliance with the treatment protocol in the ES users.

While bracing and exercise have been shown to be similar in effectiveness to electrical stimulation in the management of patients in the "Golden Zone," there is no evidence in the literature to support the effectiveness of exercise alone in idiopathic scoliosis. When a brace is indicated, electrical stimulation may be utilized during the sleeping hours and added to exercise protocols.

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See:

- General Considerations in the Clinical Application of Electrical Stimulation
- References:
 - ES in Idiopathic Spine Deformity
 - Comfort in Electrical Stimulation