THE ADOLESCENT WITH AN EARLY SCOLIOTIC DEFORMITY BY MUSCLE STIMULATION

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Presented are the results of an active treatment by electrical stimulation of the para-spinal muscles on the convex side of the scoliotic curve. The treatment was given nightly for a minimum of eight hourse per session, with the children being free during the rest of the day.

There were one hundred and eight patients who had one hundred and eighty curves that were treated.

All of these patients were carefully examined prior to accepting them for this therapeutic program. Their curves as evaluated by the Cobb method ranged from ten to thirty degrees, the curves had to be supple, and could be corrected by one half on bending Their distal radial epiphyses were open at the onset of the treatment.

Their families after adequate explanation agreed to follow the treatment as long as it was found to be necessary. All of the patients reported upon here had been under treatment and control for at least three years. Treatment was given by a pulsator, that had two channels, functioning simultaneously wherin there were six second of stimulation followed by six seconds of rest. 'The results were graded as improved, arrested or a progression of the extent of the curve, and they show lahl in the category of improved-arrested three eighty percent of the curves.

Key Words: Adolescent Idiopathic Scoliosis. Para-spmal muscle stimulation.

When facet with the problem of Idiopathic Scoliosis in a pre-or adolescent patient there is a certain amount of the "unknown" that we arc faced with. We behold a girl of twelve or thirteen, with a mild curve, and we have no way of knowing as to what will be the ultimate outcome. We can assess the amount of growth that the child will have, but not the extent of the deformity so that one can not be certain as to the most profitable treatment to be prescribed. An examination of the mother and siblings may indicate the presence of the deformity of a familial nature but not of its extent.

It is therefore necessary to begin treatment as soon as it is clear that there is a progression of the spinal deformity. Two distinct medhods arc available, one can either use external braces, or by electrical muscle stimulation.

Barces have been used for many a year, where the spine is externally supported by a rigid frame. This docs give some degree of correction in a passive way, but the benefit is usually lost soon after the removal of the brace.

The other alternative is to stimulate the para-spinal muscles, and by doing so attempt to correct the deformity. It was shown by Monticelli et al. that scoliosis could be developmed in a growing animal, by a one sided continuous electrical muscle stimulation. This study went further to show that having developed scoliosis one could correct the curve, that had developed by stimulating the muscles on the opposite side. These basic experimental studies have led us to the development of a clinical method of treating Idiopathic Scoliosis. This treatment is empirical for the etiology of Idiopathic Scoliosis is an enigma, but some correction of the spinal deformity can be achieved by perserverance accuracy and tenacity.

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MATERIALS AND METHODS

One hundred and eight patients were treated for scoliotic deformities of moderate extent. The criteria in accepting these patients was that they be young enough, and that the distal radial epephysis be in a growing stage. The spinal curves should be of less than thirty degrees, and that the spine be supple, so that a correction of about half be obtained on bending. The parents were also interviewed as to their willing ness to lake part in the program, for the treatment may be of four to five years.

The treatment is given by the use of an intermittent pulsator containing a source of energy (rechargeable batteries), lead wires, and silicone rubber elec-

trodes. A failure of one of these components stops the function of the whole assembly, and hence they have to be examined regularly, usually at each clinic visit. X-Rays must include the whole spine, always taken from the same distance, they must be of high quality, and controlled twice yearly. It is also recommended that the patient always be treated by the same physician, so that the continuity not be lost.

RESULTS

One hundred an eight patients were treated for Idiopathic scoliosis and the treatment lasted for at least three years. Some of these patients had more than one primary curve and each curve was individually treated there were in this study a total of one hundred and eighty curves.

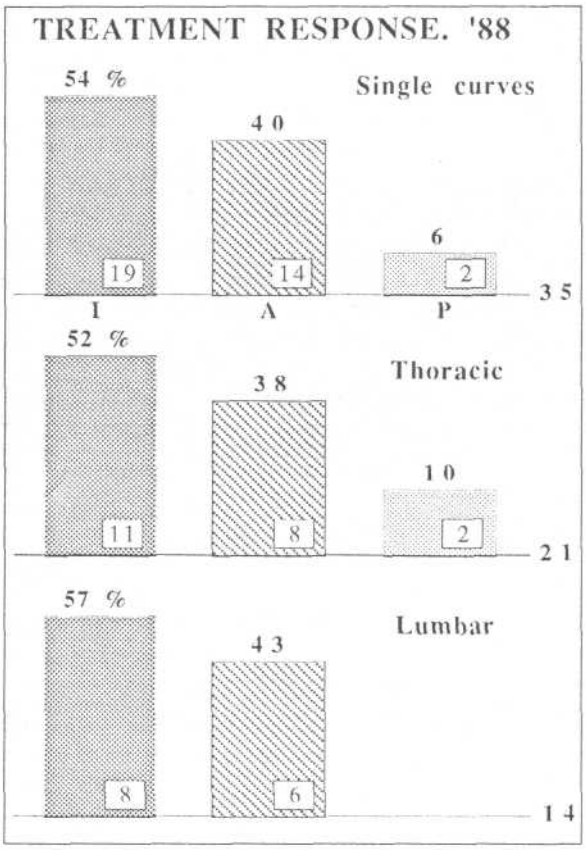

Table I.Treatment response of Scoliotic spines having a single primary curve. I indicates an improvement of the deformity. A an arrest, and P a progression. The top diagram summerizes the results of all of the single primary curves treated, and the lower diagrams show the results of the thoracic and lumbar curves.

It is presumed that all of the patients were treated nightly, and according to the recommendations received, but this is not always possible, and one can never know as to how the treatment was given in the various homes. This uncertainty may be a cause for some of the failures encountered. The results arc tabulated (Table 1). A deviation of three degrees in the shape of the curve is not considered as an alteration, but a change of greater magnitude is considered significant and it is duly recorded.

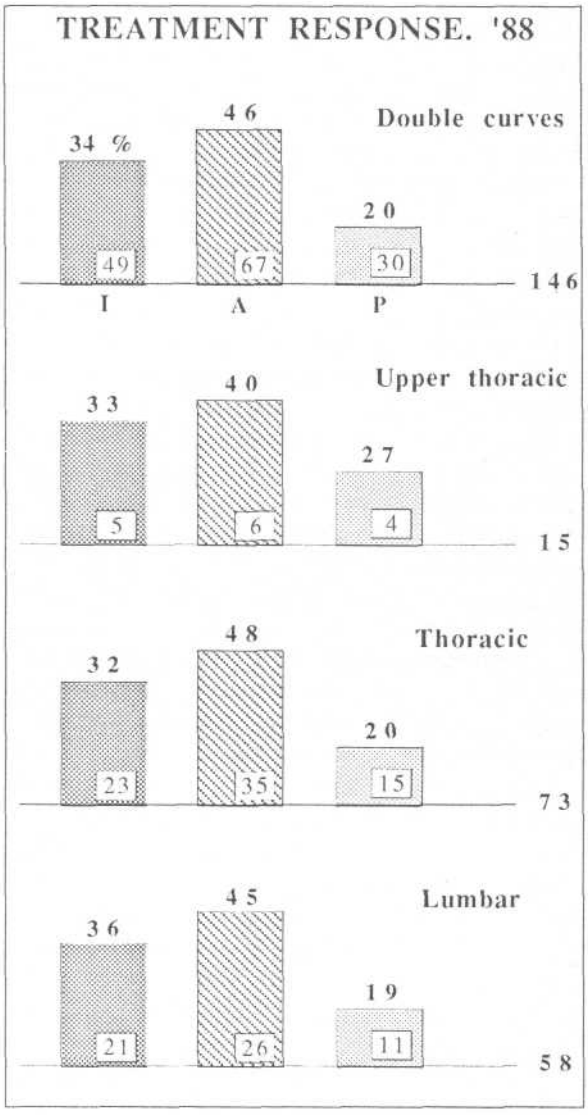

Table II. Treatment response of Scoliotic spines having two primary curves. The top diagram summerizes the over all results, and the lower three tables report on the behaviour in each anatomical area, namely the upper thoracic, thoracic an lumbar.

The evaluation was made for single and double curves as seperate entities, and each such spine was examined anatomically into the thoracic and lumbar segments. Each such region reacts differently to the treatment, for the.anatomical structure of each segment varies in its mobility, and this affects the result.

In the spines with a single primary scoliotic curve there was an improvement of fifty four per cent, an arrest in forty, and a progression of the curve in six per cent. Of these curves there was an improvement of fifty two per cent in the thoracic region, and an arrest in thirty eight per cent. In ten per cent there was a progression. In the lumbar region of those primary curves there was an improvement in fifty seven per cent, and an arrest in forty three per cent.

In the spines with double primary curves, we have three distinct anatomical segment, namely the upper thoracic that affects the upper five thoracic vertebrae, the thoracic and the lumbar, The over all results of treatment of the spines with double curves there was an improvement in thirty four per cent, an arrest in forty six per cent, and a curve progression in twenty per cent. (Table 2)

Regionally the upper thoracic curve had a thirty three per cent improvement, an arrest in forty per cent, and a progression in twenty seven per cent. It must be stated that these curves of the upper thoracic region, cause the greatest physical deformity, and because of the anatomical rigidity, arc difficult to treat by external physical forces.

In the thoracic region there was an improvement af thirty two per cent, an arrest of forty eight per cent, and a progression in twenty per cent. The lumbar curves when part of a double primary curve had an improvement of thirty six per cent, an arrest in forty five per cent, and a progression in nineteen per cent.

DISCUSSION

The treatment of mild and moderate Idiopathic scoliotic curves by electrical stimulalion has given very favourable results. The advantage in adopting this mode of treatment is that throughout the period of adolescent growth the children arc not restricted by braces, and they lead a normal life. They may partake in physical and competitive activities, the only drawback being that there must be an eight hour session of treatment every night. The advantages to this form of treatment is that it is inexpensive, and that the children readily accept it. There arc two disadvantages in thai the treatment is family dependent, for the children can not apply the electrodes unaided in their exact locations, and at times there is a skin irritation.

The method of transcutaneous electrical stimulalion has been in use for over eight years, and its has produced favourable results and it may be recommended.

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