SIDE - SHIFTING EXERCISES FOR THE TREATMENT OF ADOLESCENT IDIOPATHIC SCOLIOSIS *

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ABSTRACT :

The pathogenesis of idiopathic scoliosis remains unknown despite extensive studies. Muscle dysfunction, skeletal factors, genetic factors, metabolic and chemical factors and abnormal function of the central nervous system might be responsible. These controversies also affect the treatment methods. Bracing is a very old form of management of scoliosis. Electrospinal stimulation is another form of conservative treatment. These two are passive correction methods in scoliosis. The principle of active correction in scoliosis by shifting the trunk sideways over the pelvis is the most common conservative treatment method for scoliosis in our institution since 1990. Early idiopathic scoliosis could be corrected by control of minor lumbar or thoracolumbar curves. All curves were under 30° and we extended the method to the treatment of curves in young children with Risser grades 0-3. Age, skeletal maturity and curve magnitude were analyzed separately. Regarding our results, side-shifting exercises were found to be useful in selected cases.

Key Words: *Idiopathic scoliosis, side shift*

The pathogenesis of idiopathic scoliosis remains unknown despite extensive studies. Muscle dysfunction, skeletal factors, genetic factors, metabolic and chemical factors and abnormal function of the central nervous system might be responsible (3). These controversies also affect the treatment methods. Some curves do not remain small; they may be mildly or severely progressive. Patient's age, skeletal maturity, menarchal stage, and the stage of development of the apophysis of the iliac crest are associated with the risk of progression of the curve in adolescent idiopathic scoliosis. The type and magnitude of the curve, presence of any deformity of the chest, balance as determined with a plumb line, the increase in the patient's height are the other important factors on progression of the curve (4, 6). Patients in early and late adolescence are considered separetely because of the maturity stage of their skeleton.

To help muscle coordination of certain poorly muscled children by exercising, to keep correct position of the spine by bracing, to contract paraspinal muscles by electrospinal stimulation are very well known conservative treatment methods. Each has certain disadvantages. Bracing is a very old form of management of spine deformity. It is always necessary to wear a brace continuously for the major part of the day and even at night during the growing years until skeletal maturity is reached. Recommended treatment duration is at least 3 years or more. It is quite difficult to force an adolescent girl for long term brace wearing because of cosmetical reasons. On the other hand it is not hygienic for the hot and moisty countries. Nightly electrospinal stimulation by surface electrodes seems more attractive and comfortable, but it could not gain wider acceptance due to skin irritation in the sensitive patients, frequent monitoring of electrode placements and regular maintenance of the equipment.

We started to use active correction by side-shifting exercises in the treatment of early idiopathic scoliosis in August 1990, which was developed by Dr. M. H. Mehta.

THE METHOD

The principle of active correction in scoliosis is to shift the trunk sideways over the pelvis (4). This is discovered by some patients to improve their appearance and also to relieve their pain. It is easy to improve the scoliotic appearance when the patient has visual feedback provided by a full-length mirror, with

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the aid of gentle tip pressure applied laterally to the convex side of the rib cage and the contralateral hip. The child is taught to shift the trunk away from the curve convexity as far as the spine will allow, to hold this position for about ten seconds and then relax into the initial position (Fig. 1). Parental supervision is necessary at the beginning to control that the shift is done correctly. Standing radiographs of the spine taken in the relaxed and in the side-shift position help the child to recognize the habitual posture as the position of deformity and the side-shift as the position of correction (Fig. 2). They realize how important to perform the shift repeatedly during the day, standing or sitting, and to acquire the habit of "thinking shift". That means to repeat this exercises thousands time in a day like chewing gum (4).

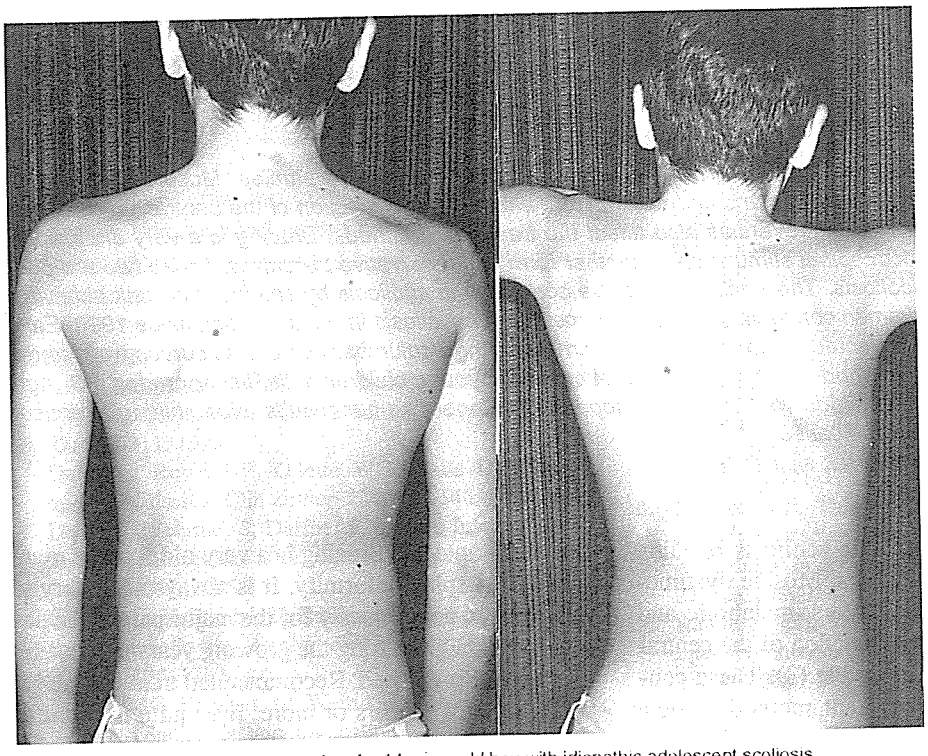

Figure 1: Photographs of a 14 years old boy with idiopathic adolescent scoliosis
A. Normal standing position (left side) B. During side shifting exercise (right side). Overcorrection in both thoracal and lumbar curves exercise can be seen easily compared with rest position

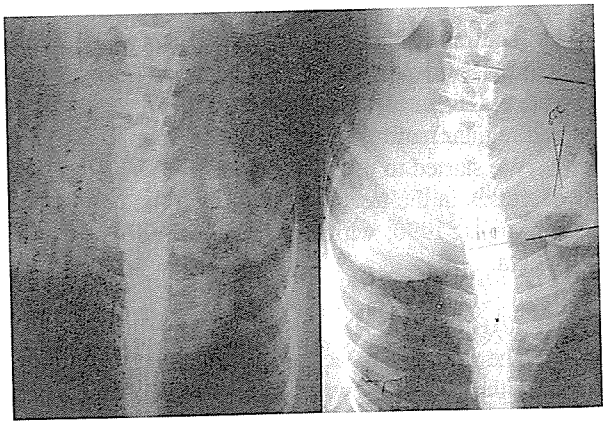

Figure 2: Radiographs of a 14 years old girl taken
A. At normal standing position (left side)
B. During exercise (right side)
Note the correction achieved during exercise

MATERIAL

Children with adolescent idiopathic scoliosis who have been on the side-shift treatment were followed up in our institution between August 1990 and February 1996. The number of the children was 32. (25 girls, 8 boys) Their mean age at the beginning of treatment was 15.5 years (10-22). Four of the girls were premenarchal. The curve pattern was 14 thoracolumbar, 4 lumbar, 8 right thoracic/left lumbar, and 6 thoracic (Table 1). The Cobb angle in the 32 children ranged from 10 to 24 with a mean of 18.8. The Risser sign is 0 in 12 children, 1-3 in 17 children, and 4 in 3 children (Table 2).

Table 1. Curve patterns of the patients

Curve pattern	Number of patients
Thoracolumbar	14
Lumbar	4
Right thoracic / left lumbar	8
Thoracic	6

Boston Brace was given to 9 fast growing children with Risser grade 0 for only night wear to reduce the hump by passive pressure molding.

Table 2. Risser grades of the patients

Risser grades	Number of patients
0	12
1-3	17
4	3
5	0

RESULTS

The period between the beginning of the treatment and the last examination extended from one to five years and averaged 2.9 years. Patients at higher risk were followed every three to four months until they are skeletally mature, usually at the age of about 18 in girls and 19 in boys. It is very difficult to keep in touch with the child and the family for such a long time. Generally the enthusiasm of the children and their patients disappear with the long duration of therapy.

All of the premenarchal girls had menstruation durig this period. At the last examination, 4 children were in Risser grade 0 to 3 compared with 29 in the beginning of treatment.

When we evaluated the curves at the end of this average 2.9 years, a reduction of more than 5 degrees is considered improved, and either a reduction or an increase of up to 4° is considered unchanged and an increase of more than 5° is considered worsened. Group 1 consisted of 7 (22%) children with an average of 10.3° improvement of curves (5°-17°). Curves of 23 (72%) children were unchanged (Group 2). Group 3 consisted of 2 (6%) children, with worsened curves by an average increase of 15° (10°-20°), who underwent surgery (Table 3). Four children was considered to be most at risk because they were young, with a mean age of 10.1 years, premenarchal, and showing no ossification of the iliac apophyses, i.e., Risser grade 0. We performed surgery for two of them. This indicates that the active correction exercise might not affect the early curves by slowing down their rate of progression during a time of rapid growth.

Table 3. Results of treatment

	Average age	Avarage Cobb Angle
At start of treatment	15.5	18.8
At last examination	18.4	13.6
Change	2.9	5.2

DISCUSSION

It is a fact that approximately 50%-60% of all patients with scoliotic curve of 20° or less spontaneously improve. But there are not any absolute criteria for discriminating at an early stage between progressive and nonprogressive scoliosis (1, 2, 5). Why should two seemingly identical 14 years old girls have dramatically different outcomes of their scoliosis, one developing a mild curve in adult life with the spine in good balance and no back pain, and the other developing a severely restricting and painful scoliosis.

The decision to start treatment is deferred until a curve has been seen to increase to an arbitrary limit (4, 7). The earlier treatment might give better results. But, on the other hand, the discomforts and inconvenience of treatment by the existing methods make reluctant children to the treatment. It is difficult to give a brace because of the psychological hazards of subjecting normal children over a prolonged period. Electrospinal stimulation has much problems too. Since the side - shift treatment does not in any way restrict the child's daily activity, children almost always are willing to begin treatment sooner. It is also possible to get some early good results, and this stimulates to work hard at the side-shift. Children cooperate completely in the first 3 months, when they know each other as a club member, it motivates them for better results like a competition. But after six months, they slacken in their effort. The exception to this general pattern is children who maintain a high level of compliance throughout because of either the example of a family member with scoliosis or a passionate determination to avoid the alternative treatment by brace.

The size of the curve, the curve pattern, and the degree of the compliance with treatment all contribute to the outcome of treatment by the side-shift or any other conservative method. Thoracolumbar and low thoracic curves respond best to the side-shift, lumbar curves less so (4).

The side-shift is not an exercise program to be learned or performed in physiotheraphy departments. It is an autocorrective exercise therapy and much more effective than any passive treatment method such as brace therapy. The design of the brace restricts the full lateral trunk displacement whih is necessary for full correction, but side-shift has enough

power to correct or even to overcorrect the curve. Electrospinal stimulation effects few muscle which is superficial, but side-shift activates a number of muscles to work synchronously: the paraspinals and abdominals to move the spine, and the deep spinal muscles to hold it in the corrected position.

The possibility to begin the treatment in the early stages is not the only advantageous of side shift over other conservative methods. It can also be used as maitenance therapy to prevent progression of the curve and to avoid pain due to scoliosis in adult life.

We believe that side shift is an effective conservative treatment method in selected cases of idiopathic scoliosis.

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