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Comparative Kinetic Methods used for the Therapy of Idiopathic Scoliosis in Adolescents

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Abstract

Scoliosis is one of the most common axial deviations of the spine. Because of its incidence and the fact that, with the evolution of technology, adolescents spend increasingly more time sitting at desk, adopting positions often incorrect, this paper aims to study the evolution of adolescent patients diagnosed with scoliosis using different kinetic methods of treatment. Another objective is to highlight the most effective method of treatment in terms of overall rehabilitation period, the time spent by the patient in the rehabilitation centre and the preservation of scoliosis correction. 9 adolescents patients (aged between 14 and 17 years) with idiopathic scoliosis were divided into three groups based on the followed kinetic method. Three patients underwent a physical therapy program based on the conventional Klapp and Cotrel method, three patients performed Schroth method, and the other three patients performed Vojta method. All patients were monitored for 6 months. They followed a certain rehabilitation therapy in a specialized centre under the guidance of specialized therapist. Height, weight and scoliosis curvature (measured by the Cobb angle) were assessed at the beginning of the program and after 6 months of kinetic program. The small number of patients in each group could not issue conclusions regarding the statistical efficiency of the three methods of therapy. However, besides the conventional therapy, both Schroth method and Vojta method represent possibilities to treat the adolescent patients with idiopathic scoliosis.

Key words: *idiopathic scoliosis, Klapp and Cotrel methods, Schroth method, Vojta method*

Rezumat

Scolioza este una din cele mai frecvente deviaţii axiale ale coloanei vertebrale. Datorită incidenţei sale şi a faptului că, o dată cu evoluţia tehnologiei, tinerii petrec din ce în ce mai mult timp la birou, adoptând posturi incorecte de cele mai multe ori, lucrarea de faţă îşi propune să studieze evoluţia pacienţilor scoliotici utilizând metode diferite de tratament kinetoterapic. Un alt obiectiv este reprezentat de reliefarea metodei celei mai eficiente de tratament din punctul de vedere ale duratei de recuperare, al timpului petrecut de pacient în sala de kinetoterapie şi a conservării corecţiei scoliozei. 9 pacienţi adolescenţi, cu vârste cuprinse între 14 şi 17 ani, diagnosticaţi cu diferite forme de scolioză idiopatică au fost împărţiţi în trei loturi în funcţie de tratamentul de recuperare urmat. Trei pacienţi au urmat un program de kinetoterapie bazat pe metoda Klapp-Cotrel, trei pacienţi au urmat metoda Schroth, iar alţi trei pacienţi metoda Vojta. Toţi pacienţii au fost monitorizaţi timp de 6 luni, interval în care au urmat tratament de recuperare într-un centru specializat, sub îndrumarea terapeutică specializată. Înălţimea, greutatea corporală şi curbura scoliozei (prin măsurarea unghiului Cobb) au fost evaluate la începutul programului kinetic şi după 6 luni de recuperare. Datorită numărului mic de pacienţi din fiecare grup, nu au putut fi emise concluzii referitoare la eficienţa statistică a celor trei metode de terapie. Cu toate acestea, alături de terapia clasică, atât metoda Schroth, cât şi metoda Vojta reprezintă posibilităţi de tratament în scoliozelor idiopatice la adolescent.

Cuvinte cheie*: scolioza idiopatică, metoda Klapp-Cotrel, metoda Schroth, metoda Vojta*

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Introduction

Scoliosis is one of the most frequently met deviations of the spine. It has a high incidence in adolescents and is often associated with a negative effect upon their quality of life.

The kinetic program is essential for the treatment of scoliosis. It is often a long-term program, with some disadvantages related to many years of therapy that can lead to abandon by the adolescent patient. That is why the treatment of an adolescent suffering of scoliosis implies the work of a real team made of physical therapist, rehabilitation specialist and sometimes orthopaedic surgeon. The therapeutic indication must be individualised for each patient and should take into account not only the particular aspects for every single adolescent, but also the familial environment and the possibilities to monitor the progression of scoliosis [1, 2].

Because of scoliosis high incidence in adolescents, the present study aims to follow up the evolution of adolescent patients diagnosed with idiopathic scoliosis who performed different kinetic methods. The main objective was to point out the most efficient kinetic method regarding the entire rehabilitation period, the time spent by the patient in the rehabilitation unit and the maintenance of the scoliosis correction.

Material and methods

The study was performed at Excentric Rehabilitation Centre in Timisoara. 9 adolescents (aged between 14 and 17 years) diagnosed with idiopathic scoliosis followed a physical program for scoliosis. They were divided into three groups according to the kinetic method. 3 patients followed Klapp-Cotrel method, 3 patients performed Schroth method and 3 patients performed Vojta method.

Klapp method is one of the most important and frequently met methods used in scoliosis rehabilitation. It implies exercises for flexibility of the spine in quadruped position. There are certain positions that block specific spine segments, making thus movement possible only in the affected region. The exercises use the quadruped position in order to activate the muscles of a horizontal, unloaded spine. Cotrel method is made of three components (derotation, elongation and lateral flexion). The exercises are performed in supine position with lower limbs completely extended and upper limbs straight near the ears. The patient extends the whole body. Afterwards, the arms are extended, the trunk is in lordosis and lower limbs extend. In order to correct the curve, an upper extremity is directed towards the hip, while the other upper extremity is directed up, near the ear [3].

Schroth method is a conservative, non-surgical treatment of scoliosis that uses specific exercises for scoliotic curvatures and corrective respiratory exercises. But the Schroth exercises for scoliosis are not typical. The patients perform trunk exercises and thus the spine aims to be corrected in the three dimensions through movements associated to “rotative respiration”. The objectives are derotation, deflexion and correction of the spine in the sagittal plane. All these will lead to elongation of the spine.

Schroth method implies the following: integration of the respiratory training program in the everyday physical training, control of the respiratory movements towards the thoracic parts of the affected spine in order to correct them, and the correction of the spinal pathologic curvatures.

The active elongation can be obtained with or without mechanic devices, but always using an occipital push by lateral movements of stretching in cephalic direction. Postural correction rectifies the lateral profile, but also the anterior and posterior parts of the trunk. This makes a hypercorrection of the spine.

Schroth method is based on the idea that in all cases of scoliosis there is a posture disorder in the anterior-posterior plane making the trunk posteriorly deviated and the pelvis anteriorly deviated. That is why the postural disorders are the first to be corrected. The pelvis is moved posteriorly, while the trunk is moved anteriorly. Only after the postural correction, the rotative respiration is started.

The rotative angular respiration is performed in three directions with the arms positioned in a right angle. This enlarges the concavity and uses the ribs as a lever to derotate the ribcage. When the trunk and the spine have reached an optimal posture, the rotated parts of the trunk can be mobilized independently [4-6].

When using the Schroth method all possibilities of postural correction, including the respiration, should be used so that the patient can help himself. The patient learns to understand the different stages in order to make the best postural correction. Thus, he will learn to accept and perform the physical program on long-term. In the same time, maintenance of a corrected posture during the

activities of daily living will prevent the progression of scoliosis.

Vojta method is a global therapy based on reflex locomotion. The reflex locomotion leads to the inhibitation of reflex activities in children and to neuromotor development in a physiologic manner. Changes in spinal automatisms, as well as the respiration control in order to increase the vital capacity are also obtained by using the Vojta method.

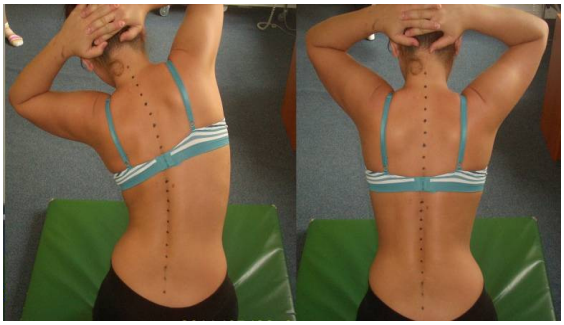
A certain stage of normal development is characterised by attitudes corresponding to precise goals (orientation, accommodation and locomotion). After Vojta the active-reflex exercises have an impact especially on the musculature in the deep layers of the spine. These muscles cannot be influenced by the patient's active implication. The reflex motor response to a proprioceptive stimulus in the regions described by Vojta is a chain of muscle contractions accomplished using an archaic model.

The originality of Vojta method is related to the cinematic content of the locomotion strategies. The attitudes, the support polygons and the movements that characterised the main stages of evolution are extremely well defined. In the supine position, the child evolves a triangular support polygon with a symmetric support on both elbows that determines the lift of the pectoral arch and of the superior trunk. The head is maintained free in space in the interior of the polygon. This postural mechanism assures the rectification, symmetry and stability of the spinal axis and of the pectoral arch, with a coordinating rotation of the head. The artificial activation of these synergies is possible during the reflex locomotion.

The motor response determines an active alignment of the spine, the activation of abdominal muscles and an important reduction of lumbar lordosis. The lower limbs are in medium flexion, with a slight abduction and external rotation of the hips. The active correction is insufficient for the cervical spine and for the feet. These can be changed by changing the combination of stimulations.

Vojta method offers the opportunity to provoke precise muscle games by synergistically acting on chosen body segments. It is important when treating body parts whose voluntary control is difficult or damaged. The first responses after Vojta method are neurovegetative. The current practice proved that the technique first influences the blood circulation and the respiration. The long-term effects are especially noticed on the development of the osteoarticular system. Besides, the activated muscle chains imply the paravertebral muscles of the trunk, making thus an important improvement of the respiration [7, 8].

The three patients who followed the conventional kinetic treatment for scoliosis based on Klapp and Cotrel methods (Figures 1 and 2) performed three weekly sessions (about 1 hour per session).



Figures 1 and 2. Exercises of Klapp and Cotrel method

Three patients performed the Schroth method (Figure 3), three times a week (45-60 minutes per session).

Figure 3. An adolescent patient performing an exercise of Schroth method

The three patients who followed Vojta method (Figure 4) had previously been in the conventional physical training program for scoliosis. The results were unfavourable so that another kinetic program

for scoliosis (Vojta method) was in view. For the Vojta method 3 or even 4 sessions are needed every day. Each session is about 15-20 minutes. The patients could performed only one session in the rehabilitation centre because of the high expenses and the time spent in the outpatient centre. The parents of the adolescents who followed Vojta method were trained in order to perform the stimulation at home 2 or 3 times per day.

Figure 4. Activations of the spinal muscle chains activations during Vojta method

All 9 adolescent patients followed the certain physical training program for scoliosis for 6 months.

Results

The patients' data regarding their height, weight and Cobb angle were recorded before starting a certain kinetic method and after 6 months of therapy for scoliosis (Table I).

Table I. Patients' assessments before and after performing the 6-month kinetic program for scoliosis

	Height initial (cm)	Height final (cm)	Weight initial (kg)	Weight final (kg)	Cobb angle initial	Cobb angle final
Klapp-	165	165	63	60	25°	19°
Cotrel	166	167	58	58	15°	15°
method	174	176	70	75	22°	23°
Schroth	188	193	74	75	18°	20°
method	163	163	54	55	30°	25°
	165	166	53	52	23°	21°
Vojta	167	170	61	62	20°	22°
method	174	175	60	60	16°	14°
	172	177	65	65	25°	20°

No patient used a spinal orthosis or corset during the 6-month period of the follow-up. Seven of the adolescent patients had an increase in height after 6 months. There was a decrease in Cobb angle in two out of three patients in each study group.

The compliance of treatment was high for all three kinetic methods, although the adolescents who followed Vojta method complained of the difficulty to make the home sessions 3 times per day.

Discussions

The idiopathic scoliosis in adolescent is the most common type of scoliosis. That is why a much larger therapeutic approach is necessary in rehabilitation units.

The adolescent spend around 6 hours per day sitting, in many cases, in nonergonomic banks. Besides, they spend another 2 or 3 hours per day sitting in the desk at home. This fact may represent a factor that may facilitate an abnormal posture of the body [9].

Even though there are conventional kinetic programs for scoliosis such as Klapp and Cotrel, there are therapists that have promising results after performing other method. In spite of the fact that Schroth method was initially designed for scoliosis, it is not so frequently used in our clinical practice. Vojta method is largely used in children with neurologic disorders. Its indication for scoliosis in adolescents is less known and accepted by the medical community.

Regarding the study patients, the chosen kinetic method was not made based on objective criteria. When the Cobb angle was analysed between the three groups, approximately similar results were noticed. The groups were quite small so that no correlations of height, weight and Cobb angle between groups were applicable.

No matter what kinetic program was performed, the treatment is long-term and the results are not always spectacular. But all the adolescents patients implied in the study noticed an improved capacity to perform a mild or heavy physical activity and a pain relief in thoracic or lumbar spine if present.

There are limitations concerning the appliance of Schroth and Vojta methods in clinical practice as the therapists should be trained for using these techniques. This is especially true concerning the Vojta therapists who are a few in Romania and who are involved in the therapy of children with cerebral palsy and other neurologic disorders.

Conclusions

Rehabilitation has an essential role when treating an adolescent with idiopathic scoliosis. There are different kinetic programs that are used when dealing with such a patient. The choice of a certain

kinetic method takes into account both the adolescent patient and the physical therapist. The last one has a specific training and an experience when treating a scoliotic adolescent.

Although Klapp and Cotrel method is one of the best known kinetic programs for scoliosis, other kinetic methods have proven their efficiency. Because of the small number of patients in each study group, no conclusions regarding the statistical significance of the three kinetic methods can be issued. But besides the conventional program, both the Schroth method and the Vojta method represent possibilities to treat the adolescent patients with idiopathic scoliosis.

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