

STUDY ON THE FED METHOD APPLICATION IN THORACO-LUMBAR SCOLIOSIS

EFICIENȚA METODEI FED ÎN RECUPERARE A SCOLIOZEI TORACO-LOMBARE

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Cuvinte cheie: fixare-elongare-derotare, kinetoterapie autocorectivă, aparat ortospinal

Introduction. Scoliosis is a chapter that has not yet been resolved, a "black spot" of orthopedics. For this reason we believe that it remains open to explore and search permanent to find more efficient techniques and methods. FED method (fixation, elongation, derotation) was designed to treat spinal deviations and consists in three-dimensional fixation, its elongation and derotation through corrective pressure, performed intermittently or continuously, as well as patient's postural control during periods of relaxation.

Scope of this study is the selection and systematization of existing information about the recovery of scoliosis, using physical means, techniques of elongation-derotation-fixing and physical therapy, and establish an effective therapeutic plan, the implementation in practice of research in recent years. **Material and Methods.** In this case study we chose DT patient female diagnosed with idiopathic thoraco-lumbar scoliosis with right concavity, aged 11 years. The study was conducted during June 2009-March 2011. The subject was evaluated in dynamic, every 6 months, both by Prof. Santos Sastre and Recovery Team Medical Center kinetic Dema Group. **Results.** Height: 168 cm/172 cm, Weight: 49 Kg / 51 Kg, Cobb angle in thoracic region: 25°/16°, the Cobb angle in the lumbar region 25°/16°, vertebral rotation 28°/15°. **Conclusions.** The combination of physical means, techniques of fixing- elongation-derotation- and physical therapy are able to correct scoliosis. Correcting the spine deviation is closely linked to periods of growth of children. For satisfactory results it is mandatory wearing corset Chêneau.

Introduction. *Introducere.* Scolioza reprezintă un capitol încă nerezolvat, o "pată neagră" a ortopediei. Din acest motiv considerăm că el rămâne deschis explorării permanente și căutărilor neînclinate pentru găsirea unor tehnici și metode cât mai eficiente. Metoda FED (fixare, elongare, derotare) a fost concepută pentru tratarea deviațiilor coloanei vertebrale și constă în fixarea tridimensională, elongarea și derotarea acesteia, prin presiune corectivă, realizată intermitent sau continuu, dar și control postural al pacientului în timpul perioadelor de relaxare.

Scopul studiului constă în selecționarea și sistematizarea informațiilor existente cu privire la recuperarea scoliozei, prin utilizarea mijloacelor fizicale, tehnicilor de fixare-elongare-derotare și kinetoterapiei, dar și întocmirea unui plan terapeutic eficient, prin transpunerea în domeniul practicii a cercetărilor efectuate în ultimii ani.

Material și metodă. În exemplificarea studiului de caz am ales pacienta D.T. de sex feminin, cu diagnosticul scolioză idiopatică toraco-lombară dextroconcavă, în vârstă de 11 ani. Studiul a fost realizat în perioada iunie 2009-martie 2011. Subiectul a fost evaluat în dinamică, la fiecare 6 luni, atât de către Prof. Santos Sastre, cât și de echipa Centrului de Recuperare Medicală Kineto Dema Group. **Rezultate.** Talie: 168 cm/ 172 cm, Greutate: 49 Kg/ 51 Kg, unghiul Cobb în regiunea toracală: 25°/ 16°, unghiul Cobb în regiunea lombară 25° /16°, Rotația vertebrală 28°/ 15°.

Concluzii. Asocierea mijloacelor fizicale, tehnicilor de fixare-elongare-derotare și kinetoterapiei sunt în măsură să corecteze scoliza. Corectarea deviațiilor vertebrale este strâns legată de perioadele de creștere ale copiilor. Pentru obținerea unor rezultate satisfăcătoare este obligatorie purtarea corsetului Chêneau.

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Introduction

Scoliosis, by its multitude of forms, evaluation and treatment methods represented a vast field of medical study along the centuries; it's a domain which stays partially unknown even today. Scoliosis represents a chapter still unsolved, a „black spot” of the orthopedics. Due to this, we consider it stays open to the permanent exploration and to the ceaseless quests for finding some techniques and methods as efficient as possible. Designing some adequate programmes can be done only if this deviation is seen as a whole and if there are taken into account the multitude and complexity of its aspects.

Scoliosis isn't a controversialist problem, but it is an incompletely solved one.

Due to its very large frequency, 2-3% from the total of the childhood diseases and also due to its severity, untreated or insufficiently treated, scoliosis shortens patient's life. The mechanic turmoils show up quite from the childhood: asymmetrical, unbalanced and baggy chest, with consequences on intrachest organs. These attract also behaviour and emotional turmoils: the children are usually hypodynamics, lonely, physically frail and as adults all these problems will increase. The complexity of this disease requires also the complexity of the treatment, these assuming the multitude of the psychic aspects of family and social integration.

Regardless of the disease severity, physiotherapy is a constant of the indicated treatment. Due to the precocious tracking down, of the treatment individualising we can speak about an efficacious therapy nowadays depending on the scoliosis stage. The physiotherapy goal is to achieve a positional education, which can reach the neuro-motion integration of an improved body image. This means that the subject must learn to keep an as accurate as possible position, during the attitudes and gestures of the current life. It is ideal the creation of an automatism, prolonging that way a position with a vertebral correction, as long as possible.

Introducing quickly the kinetic treatment in the scoliosis recovery is an important goal in its approach; applying the complex therapy, by associating different physical means and techniques of fastening- elongating- de-rotating, according to a scientifically supported methodology represent an efficient solution for correcting the deviation and their social integration.

FED method (fastening, elongating, de-rotating) was conceived for treating the spinal column deviations and it consists in the tridimensional fastening, its elongating and de-rotating, by corrective pression (Sastre, S., 2006) (fig. 1a și 1b), realised intermittently or continuously, but also a positional control of the patient during the relaxing periods.



Fig. 1a



Fig. 1b

By correcting the position of spinal column, the patient will receive stimuli of acquiring this position. As a consequence of these received information will be stimulated the spinal receivers, the neuromuscular plate and Golgi corpuscles, which, normally don't act. Is initiated

under an apparatus assistance a neuromuscular facility which informs about motion, with the involvement of some muscular fibres, which stays permanently atrophied due to the lack of activity.

The rhythm and the coordination of breath, the awareness and the reeducation of the position control are initiated when the patient is in suspension in FED device.

It is known that the experimental denervation of the spinal musculature in animals produces scoliosis.

So, the patient who suffered a deformation of the spinal column in time comes to acquire some position skills he isn't aware of, just because the interoceptoris don't act normally anymore. That's why is necessary a corrective, outer force, for the patient to be aware- step by step, again- of his correct position and to be able to stimulate his adequate mechanisms, which allow him to self correct. A perfect patient- physiotherapist collaboration is asked in the acquiring of this FED method, as it is an extremely difficult work; but with the help of the device the learning is easier, quicker and more efficient.

The device allows the programing of the mechanic arm force, the correction and the awareness of the orthostatic position. Another advantage of this technique is that is produced the de-rotating of the spinal column, the elongation of the retracted musculature, getting a coming back in a normal position of the spinal column.

The effects of the FED method are the following:

- the development of the inhibited neurocentral and epiphysis cartilage (fig.2);
- the modification of the pathological orientation of the fibrous ring of the intervertebral disk;

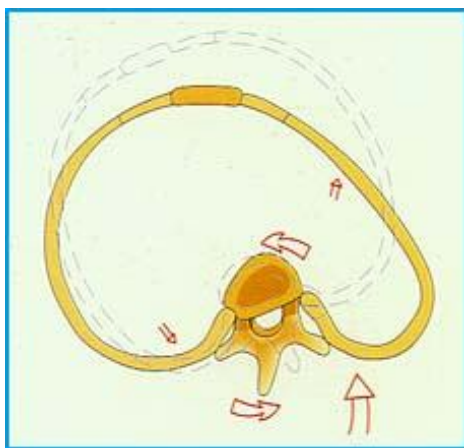


Fig. 2

- concave part correction of the deformations of the intervertebral joints (articular capsule, ligaments, muscles);
- the increasing of the articular mobility and at the intercostal level;
- concave part stimulation of the systems which inform on motion.

Taking into account that in severe scoliosis the vital capacity is decreased with 30-50%, the respiratory reeducation is part of the physiotherapy programme and it has as a goal the reeducation and the supporting of the respiratory function on the whole and also stretching in correction, the shaping of the chest area, the respiratory reeducation for the improvement of the chest morphology.

The final goal of this FED methods is to get a position correction and a socio-professional integration of the persons, who are bearer of scoliosis. Is a method, which if it's correctly, continuously and constantly executed, under the guidance of the specialists, can avoid the surgical intervention and it removes the high costs for the Romanian health system. It is non invasive, it combines the action of FED device with physiotherapy, it complete each other and the results are incredible for many specialists.

Goal

The goal of the survey consists in *the selection and the systematisation of the existing information concerning the scoliosis recovery, by using the physical means, the fixing-elongating- de-rotating techniques and physiotherapy, but also the elaboration of an efficient therapeutical plan, by transposing in practice of the researches done in the late years.* In the same time, the paper intends to *associate these means and techniques in a way which justifies its efficiency in scoliosis correction.*

The objectives we settled in the actual research achieving are the following:

1. making up of the evaluation sheet card, realised in dynamics, on the basis of some specific items;
2. applying some *physical means, of the fixing-elongating- de-rotating techniques (FED) and physiotherapy.*
3. making and wearing Chêneau corset;
4. evaluation in dynamics of the subject, for the appreciation of the efficiency of the used means and for the eventual modification of the treatment diagrams.

Material and Methods

In illustrating the case study we chose D.T. patient, of a feminine gender, having as a diagnosis idiopathi lumbar-chest dextroconcave scoliosis, with the age of 11.

The study was realised between June, 2009 and March, 2011. Between July, 2009 and August, 2009 the subject followed a complex treatment made by *physical means, fixing-elongating- de-rotating techniques (FED) and physiotherapy* at Recovery Centre of professor Santos Sastre, Barcelone, Spain. Further, she followed the physiotherapy programme at Kineto Dema Group Medical Recovery Centre and from January, 2011 the subject started again the FED sessions. We mention that the patient wore the Chêneau corset, made at Barcelone, just during the night and she was evaluated from this point of view by the specialists of The Orthotic Centre of Dr. Salinas Felip, once at 3 months.

The subject was evaluated in dynamics, at every 6 months, both by Professor Santos Sastre, and by the team of Kineto Dema Group Medical Recovery Centre.

In fixing the therapeutic programme the following aspects were analysed:

- the type of scoliosis and its severity (King Moe classification): the clinical diagnosis was fixed by the orthopedic doctor;
- somatic-functional characteristic features of the patient;
- associated pathologies;
- the degree of involvement of the family and its financial possibilities.

The evaluation paper card used during the whole study, common to both Medical Recovery Centres from Bucharest and Barcelone contains three main components:

- a) identity data (first name, last name, date and place of birth), completed with the clinical diagnosis and information resulted from the case history realised with the parents;
- b) anthropometrically measurements – size, brought to normal size, bust, brought to normal bust, weight, chest perimeter, chest elasticity, cifo-lordosis parameter, vital capacity, hump, rigidity, the length of the inferior members, the force of the abdominal musculature and of the spinal column's expanders;
- c) radiologic measurements: Cobb angle, vertebral rotation (Raimondi ruler), osseous age (Risser sign).

The tests the subject was complied with were made in dynamics, so that:

- The initial test was realised immediately after the determination of the diagnosis and the introduction of the subject in the study; the evaluated elements represented reference data for subsequent tests and for the setting of the *physical means, the fixing-elongating- de-rotating techniques (FED device) and physiotherapy.*
- The intermediate test was realised at every 6 months after fixing the diagnosis and starting the treatment, respective at every 3 months for the corset and it measured the

response of the subject to the applied treatment; so, it was possible to adjust the programme in accordance with the patient state.

- The final test was done after one year and nine months of treatment. We mention that this won't be the last test; the subject will continue the recovery programme and she will be evaluated in the same rhythm, till the end of growing process.

The patient started the physiotherapy sessions, just right after the determination of the diagnosis by the orthopedic doctor and the initial evaluation in Kineto Dema Centre, on the basis of the setting the immediate objectives and of those of perspective.

The content and the work methodology of the physiotherapy sessions *were continuously adjusted*, on the basis of the data obtained at the intermediate evaluations and in accordance with the objectives settled as a consequence of these evaluations.

The used objectives and techniques were chosen in accordance with the following basic criteria: etiology, anatomical shape, the severity of the deformation, its reducibility, the evolutionary prognosis, the subject age. All of these oriented the physiotherapy to a specific dominant; stretching, neuro-muscular reeducation, position reeducation, respiratory reeducation.

Physiotherapy programme included analytical or global techniques, symmetrical or asymmetrical ones, specific to Schroth method. Is necessary the use of both classical methods of reeducation of the scoliosis and elements from the motion reeducation (relaxing methods) and elongation and de-rotating of the spinal column techniques.

For stretching the contracted musculature were used techniques from Mézières method.

The hypercorrective exercises were passive, active, assisted active, but the real hypercorrection of the spinal column deformation was obtained passively when the patient was complied with the action of the corrective forces in the device.

The selfcorrective exercises consisted in the selfcorrection of the deformation by the active effort; they were done from hypercorrective positions *on the orthospinal device (Fig. 3a and 3b) (the only one from Romania)* and they had as a main objective the equalization of the hypotone or shortened muscular groups, responsible for the apparition and fixation of the vertebral deviation. The use of this device offered us the possibility of getting some hypercorrective positions at the level of pelvis, inferior and superior members, in accordance with the deviation's localization, but also with making pressures on the maximum of flexion.



Fig. 3a



Fig. 3b

There were used relaxing exercises for regaining the normal values of the physiological constants (pulse, respiratory and cardiac rhythm) and the remove of the eventual blockings (there were used simple techniques of breathing and complex techniques of equalization).

The treatment scheme was the following:

Table 1 Physical means, FED device and physiotherapy used during the survey

Period	June 2009	June 2009 – November 2009	November 2009-April 2010	April 2010 September 2010	September 2010 March 2011
Means and techniques					
<i>Physical means</i>	20 daily sessions	-	-	-	30 sessions (3 sessions/week)
<i>FED device</i>	20 daily sessions	-	-	-	30 sessions (3 sessions/week)
<i>Physiotherapy</i>	5 sessions/week	5 sessions/week	2,3 sessions/week	5 sessions/week	5 sessions/ week

The family involvement in the complex therapy programme was a very good one, materialized by continuing with some techniques, recommended by the physiotherapist at the residence and the use of Chêneau corset.

Results.

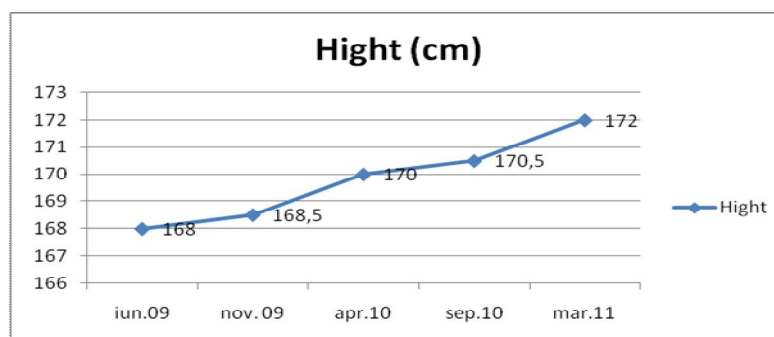
The obtained results at every evaluation were included in table matrix, as it follows:

Table 2 Results got at the evaluations

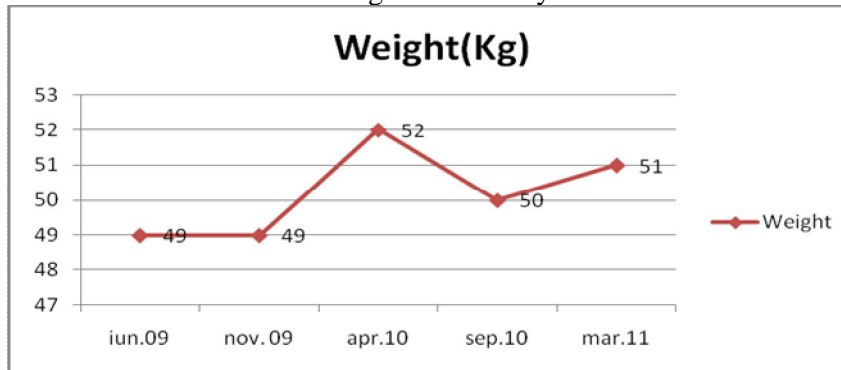
	<i>Initial evaluation</i>	<i>Intermediate evaluation</i>			<i>Final evaluation</i>
	June 2009	November 2009	April 2010	September 2010	March 2011
Height	168 cm	168,5 cm	170 cm	170,5 cm	172 cm
Weight	49 Kg	49 Kg	52 Kg	50 Kg	51 Kg
Cobb Angle T3-T10	25 ⁰	18 ⁰	21 ⁰	18 ⁰	16 ⁰
Cobb Angle T11-L4	45 ⁰	29 ⁰	37 ⁰	35 ⁰	26 ⁰
Vertebral rotation L1	28 ⁰	10 ⁰	20 ⁰	20 ⁰	15 ⁰
Cifo-lordosis parameter	3/0,5/4	5,5/0/4	5/1/5,5	4/0/4,5	0,3/0/5,5
Rigidity	3/5	3/5	3/5	3/5	3/5
Risser Sign	2	3	3	3	4

Discussion the results

By analysis of the results obtained at the height evaluation we can notice a constant grow of the patient in height (graph 1), fact that lead to a ligament laxity, a decrease of the stabilizing musculature force of the spinal column, but also an increase of the tension state in the posterior musculature of the entire body.

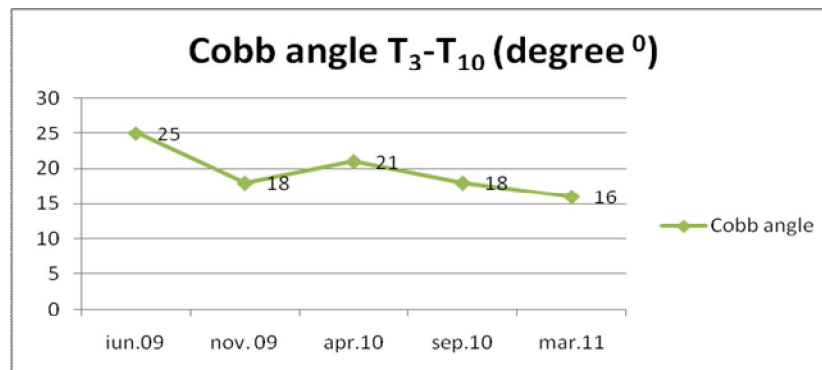
**Graph 1 The evolution of the height during the treatment**

The weight stayed approximately constant, excepting period between November 2009 and April 2011, when the patient gained 3 kg weight. The effects were felt during corset wearing, the pressure put on the maximum of curve being non correctly realised.



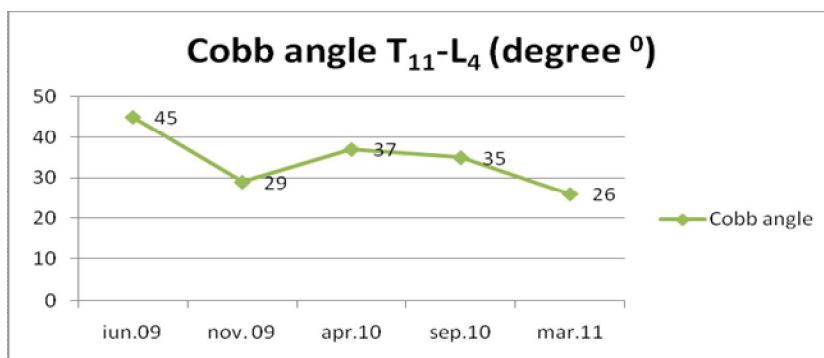
Graph 2 The evolution of the weight during the treatment

As we can see in graphs 2 and 3 the initial measurement shows a Cobb angle higher in lumbar area. After putting into practise, in the first year, the corrective treatment represented by **physical means, techniques of fixing-elongating-de-rotating (FED) and physiotherapy**, it can be seen an important decrease of the Cobb angle both in the chest area and in the lumbar one, from 45° (indication of surgical intervention) to 29°. We want to mention that between November 2009 and April 2010 the results obtained distinguish a slight aggravation of the flexions, influenced by the sudden grow of the patient in height, gaining 3 kg, the apparition of the first signs of the puberty (menstruation), but also by the decrease of the treatment sessions number from 5 to 2.



Graph 3 Values of Cobb angle at the chest level

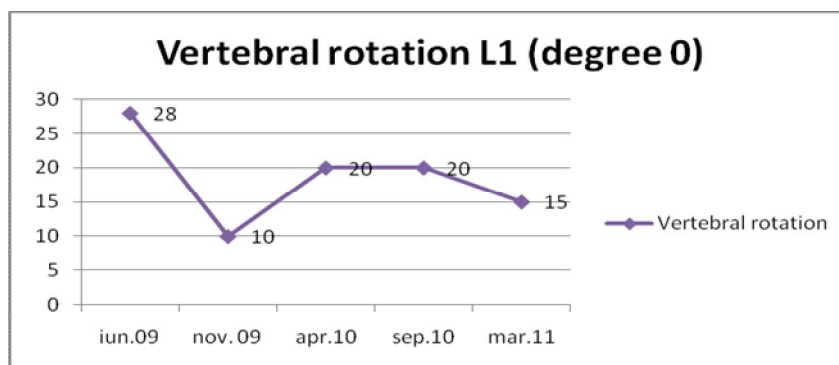
We can notice also an important decrease of the Cobb angle at a lumbar level between September 2010 and March 2011, having as a reason the change of the corset with a new one, an adapted one and the reintroduction of FED device.



Graph 4 Values of Cobb angle at the lumbar level

By analysing the values obtained at the measurement of the vertebral rotation (graph. 5) we can see a decrease of it, fact that determined a decrease of the dimension of the existing humps at the chest and lumbar level.

The values of the cifo-lordosis parameter and of the rigidity reveal the existence of a normal mobility of the spinal column, fact that represented an advantage in scoliosis correction.



Graph 5 Values of the vertebral rotation at the lumbar level

Conclusions

1. Untreated scoliosis badly influences the child and adolescent development and also his functional activities, determining high costs both for the family and for the national system of health. That's why is necessary the involvement of all the specialists, meaning that they must join their forces and knowledge to approach with a lot more responsibility the patient who is a bearer of a deviation of the spinal column.

2. Scoliosis recovery is a difficult process, a long term one, which means sacrifices, perseverance, tenacity both on the part of family and the specialists.

3. The corrective treatment imposes the precocious put into practise of **physical means, techniques of fixing-elongating-de-rotating (FED) and physiotherapy**, just right after the setting of the diagnosis. This way can be prevented the surgical intervention.

4. Using the passive and active stretching and also of the isometric contractions reduces the tension state of the contracted muscles and it improves the muscular force of the hypotone ones.

5. The reeducation of the conscious control on the alignment of the trunk determines the maintaining of the correct attitude reflex, fact that assures holding some corrective positions during the daily activities.

6. The apparition of the puberty leads to the aggravation of the spinal column deviation.

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