

THE ROLE OF PHYSICAL THERAPY IN THE RECOVERY OF THE PATIENT WITH PECTUS CARINATUM

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Abstract

I chose this theme from the desire to know the different means of recovery through physical therapy of pectus carinatum, since there are quite a few who suffer from this condition. The patient being a child, the desire to recover it was amplified, starting to "the road", with a lot of optimism and perseverance. It turned out to be a great challenge for me, as I realized how much patience you need to have, but especially to be in control of the situation, in order to motivate him to complete his tasks.

The main purpose of the study is to demonstrate the effectiveness of kinetherapeutic means in pectus carinatum and improve the quality of life of the subject undergoing therapy. Through the implemented program, it is aimed at toning the abdominal muscles, paravertebral muscles and respiratory muscles.

Introduction

Pectus carinatum is defined as a congenital deformity of the anterior chest wall. This condition shows an external protrusion of the sternum or chest box. When the sternal manubri is prominent, the deformation is often called „pigeon breast”, while the more common condrogladiolar protrusion, in which the body of the sternum protrudes, is called a "chicken breast". [1,3,5,6]

Deformation can be symmetrical or one-sided, having an inclination of the sternum to the right, more common in the one that is one-sided.

Deformations of the chest change the position of the parenchyma and mediastinal organs, while, the rigidity of the chest and the decrease in the elasticity of the chest cause a decrease in pulmonary ventilation, an insufficient oxygenation of the whole organism.[2,7,12,14]

It is estimated that pectus carinatum occurs up to 0.06% of all births, with an incidence of about 1 in 1000, in adolescents. With more detailed radiographic evidence available with computed tomography (CT), studies are found, which say that milder forms of pectus carinatum can occur in up to 5% of the population.[4,8,10,13]

Patients with pectus carinatum usually develop normal heart and lungs, but deformity can prevent their optimal functioning. In moderate to severe cases of pectus carinatum, the chest wall is held rigidly in an outer position, so, breathing is ineffective, and the individual must use accessory muscles for breathing, more useful than normal chest muscles, during intense physical exercise. The physical development examination will begin with the anamnesis, representing the kinetherapist's dialogue with the subject, or with a member of his family, in order to gather data about the respective deficiency. Through the anamnesis we learn data on the physical development of the ascendants, which give us the possibility of predictions on how the growth processes of the examined patient will unfold; therefore, we can know the evolution of the growth and development of the subject, whether everything went normally, what rhythm it had, what phase of the process it is in, and others.[9,11,15]

Material-method

In order to carry out the proposed research, we started from the following hypothesis: Do the use of physical therapy means have positive effects in the recovery process of the patient with pectus carinatum?

The main purpose of the study is to demonstrate the effectiveness of physiotherapeutic means in the pectus carinatum and improve the quality of life of the subject undergoing therapy. Through the implemented program, it is aimed at toning the abdominal muscles, paravertebral muscles and respiratory muscles. Since this topic does not require a special material basis, the exercise program and kinetic activities were carried out in a very effective way at the patient's home.

In the recovery process of the patient, the following equipment is required: Ball; Cane; Weights; physiotherapy Mattress; Elastic band; Fixed scale; Dumbbells.

In order to carry out the tests, we also needed a metric tape, a stopwatch, but also a tensiometer, to record the blood pressure

Duration and stages of the study

The study was conducted over a period of approximately 4 months, from the beginning of February 2021, to the end of May 2021, with a number of 5 meetings per week, each session lasting approximately 40 minutes. The present study was performed on a patient V.F, aged 13 years, diagnosed as early as 3 years with pectus carinatum and sequelae of rickets, a condition that increases the risk for both associated cardiac, respiratory pathologies, but also some deficiencies of the spine, especially scoliosis.

Table 1-Patient data

Nr.	Name	Age	Occupation	Diagnosis	Start date	Completion
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crt.						date
1.	V.F	13 years	Pupil	Pectus carinatum	01.02.2021	27.05.2021

Organization and conduct of the actual study

Objectives

1. Postural reeducation into static and dynamic.
2. Maintaining / increasing mobility (cervical / thoraco-lumbar).
3. Increased strength and muscles of the spine.
4. Increased exercise capacity.
5. Architectural remodeling of the chest.

The program of recovery of the patient with pectus carinatum V. F. it began on February 1, 2021 and required that an initial assessment be made at the first meeting. The recovery program lasted over a period of about 4 months, of 5 sessions per week, each session having 40 minutes. Having the opportunity to work with the patient at home, we improvised the necessary working materials, which a cabinet possesses, but the chosen location does not. The first session consisted of making measurements, which included somatoscopic evaluation, tests to find out the effort capacity, but also tests on the mobility of the spine, which were necessary to keep a record regarding the evolution of the quoted patient.

Recovery program

The therapeutic exercise program was structured in several stages, according to the goal proposed for that objective. In the first stage I applied postural reeducation exercises. During these exercises, the therapist and the patient will progressively go through the working positions of the posture from the minimum tension, in order to reach the final position with final tension, this depending on each patient, depending on the condition and capacity of each person.

Then followed a slight **global analytical warming** for the spine, scapulo-humeral belt, consisting of simple exercises of flexions, extensions, etc. The exercises proposed under the programme were carried out by 2x10 repetitions, or whenever it was mentioned in the description of the exercise.

Since structural changes in the chest also have implications for cardio-respiratory function, we continued recovery by introducing exercises to increase mobility (ball exercises, exercises with the baton, exercises with dumbbells).

During these exercises, we aimed for the patient to have a correct position of the body, and to consciously and actively participate in the exercises. In the second stage of the program we introduced exercises with dumbbells, but also exercises from decubitus to tone the muscles, following the complexity of recovery.

Then followed the exercises in the **Williams program**, one of the most well-known exercise complexes, through which we worked the abdominal muscles, the large buttock muscle, the muscles of the anterior thigh, the flexor muscles of the hip, and passively being worked the muscles of the lumbar spine, the purpose of which was to provide stability to the lumbar area of the patient.

Increasing exercise capacity is an important element in recovery. So, we have introduced exercises to achieve this goal, but also exercises to tone the patient's muscles, putting a lot of emphasis on the correct breathing.

Results and discussions

Interpretation of results and dynamics of evolution

Next we will present the data collected at the initial and final evaluations of the tests applied to the patient.

Table 2 Joint balance of the spine

Joint balance sheet of the CV	Initial assessment	Final assessment
Finger-to-the-ground test	10 cm	0 cm
Occiput-ground distance	127 cm	100 cm
Side-tilt	left -43 cm	27 cm
	right-42 cm	27 cm
Chest elasticity	In inhale:87	87cm
	In exhale:80	77 cm

Table 3 Joint balance of the cervical spine

Mobility of the cervical spine	Initial assessment	Final assessment
Distanța menton-stern	Flexion -2cm	0 cm
Occiput-wall index	Extension-2 cm	0 cm
Tragus-acromion	right-4cm	1cm
	left-4 cm	1cm

Analyzing the 2 tables we can see that this pathology affected the patient's mobility of the entire spine, but following the recovery sessions, we are witnessing an increase in mobility.

Table 4 Muscle balance

Assessment	F0	F1	F2	F3	F4	F5
Initial assessment					X	
Mid-term evaluation						X
Final evaluation						X

Also, following the exercises of toning the muscles within the recovery, the patient's strength has changed, as we can see from F4 to F5.

Table 5 Ruffier test

Assessment	<0 (very good)	0-5,0 (good)	5,1-10 (mediocre)	10,1-15 (Satisfactory)	>15 (unsatisfactory)
Initial assessment		x			
Final evaluation	x				

After analyzing Table 4, the patient's exercise capacity is observed to increase, since exercise led to a decrease in the Ruffier index of 4.8 to less than 0 (-1).

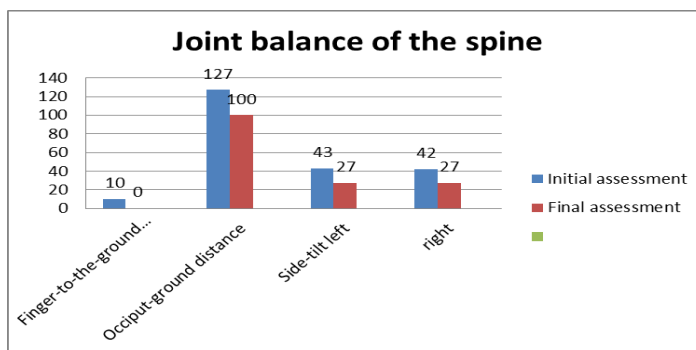


Chart 1 Joint balance of the spine

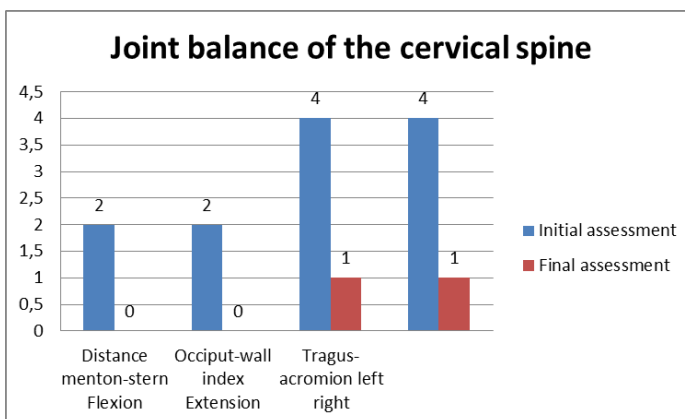


Chart 2 Joint balance of the cervical spine

Comparing the data from Graph 1 and Graph 2, we can note that the mobility of the spine has improved considerably as a result of the treatment. Thus, we can see how after the final tests, we have the following results: following the toe-ground test, the patient can touch the ground with his fingers, so cv flexion has increased in this case by 10 cm. Mobility per extension has increased, being a difference of 27 cm between the initial and final evaluation; at the right lateral

inclination increased mobility by 15 cm, and on the left by 16 cm, while, the chest elasticity, increased from 7 cm to 10 cm. Following the evaluation of the mobility of the cervical spine, we are witnessing an increase, so that the flexion and extension have reached the normal limits of 0 cm, and in terms of tragus-acromion distance, mobility has increased by 3 cm.

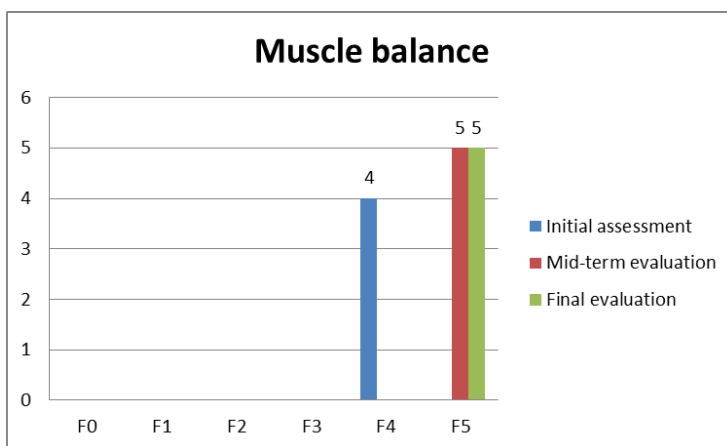


Chart 3 Muscle balance of the spine

Analyzing the data on this graph, we can see that the patient presented at the initial evaluation the force 4, while at the final evaluation, we notice the increase in strength, thus the patient reaches the threshold of force 5.

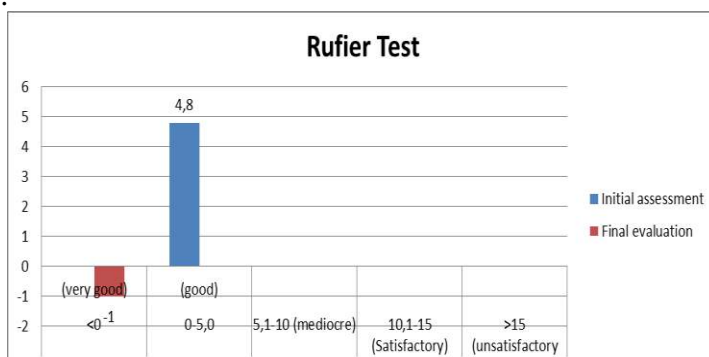


Chart 4 Rufier Test

Chart 4 shows an increase in the patient's effort capacity, as exercise led to a decrease in the Ruffier index from 4.8 to -1.

Therefore, we can say that all these measurements have led to the achievement of the objectives proposed in the program, and the confirmation of the

hypothesis formulated. Thus, with the application of kinetic means, their effectiveness in the recovery of the patient with pectus carinatum of the patient is proven.

Conclusions

Following the established kinetic programme, the following conclusions can be drawn, regarding the changes occurred, as follows: Throughout this study, it was considered to put into practice the objectives initially proposed, thus checking the hypothesis from which it was started. The therapy program for treating the chest in the hull brought benefits in the patient's life, so I believe that the exercises were well chosen, the results being satisfactory.

- ✓ I find that the needs of physical therapy are quite diverse and complex, so that they can influence an equally complex condition. The mobility of the spine has increased considerably, producing changes in the chest as well, increasing its elasticity, and even the breathing process has improved.

Although the **reoccupation program** is over, the patient wants to continue physical activity, which is also indicated, since this condition involves performing exercises daily, but also to prevent complications.

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