

## THE ROLE OF KINETIC METHODS USED IN DUPUYTREN DISEASE

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**Key words: Dupuytren, hand, kinetic therapy, „grabbing”  
capacity**

**Abstract:** The Dupuytren disease is a flexion contraction that usually develops along the years and manifests through the thickening of the hand skin, the fingers can be also affected, especially the metacarpophalangeal joints and the proximal interphalangeal joint.

The majority of the patients suffering from Dupuytren disease are males over the age of fifty, being diagnosed with the bending contraction of the fingers, a major incapacity of using the hand, the capacity of “grabbing” being highly affected.

An important means of treating this disease is kinetic therapy/ physical therapy that can be used before and after surgery in order to maintain and increase the functionality of the hand from both muscular and articular point of view.

### **Introduction**

The Dupuytren disease is an old disease of unknown origin and it is defined by Dorland as: „the conjunctival tissue of the palm is decreasing, is thickening and this leads to a distortion and bending of the fingers”.

The Dupuytren disease is a flexion contraction that usually develops along years and manifests through the thickening of the skin layers of the hand, fingers can be also affected, especially the metacarpophalangeal joints and the proximal interphalangeal joint.[1]

The Dupuytren contraction is characterized by the thickening of the skin layers of the palms and the bending contraction of the fingers. [2].

These cannot be entirely straightened and this leads to daily activities becoming more difficult, usually the ring and the little finger are the most affected, and rarely the thumb and the index finger. There can appear nodules which cause the formation of thick strips in the palm, stretching from one or more fingers towards the palm that leads to the bending contraction of the fingers. The little and ring finger are usually affected

and appear as being clenched. The strips form between the skin layer and the tendons, usually affect both hands and they can vary.

The disease usually appears bilaterally, but just one of the hands is more affected. The Dupuytren disease has three clinical stages: the proliferative stage (the precocious stage), the involution stage (the active/intermediary stage) and the residual stage (the advanced stage)[3].

The causes which lead to this disease are unknown, but has a series of factors as base that are associated with the appearance of this contraction: the age – it frequently manifests after the age of 50 years, the gender-males are more inclined to develop Dupuytren and have more severe contractions than females, the origin- the North-Europeans are more predisposed, sugared diabetes, especially the insulin dependent, the working place, a hard manual job, alcohol and tobacco, smoking represents a high risk probably because of microscopic changes in the blood vessels[4].

### **Study material and method**

The Dupuytren disease is very neglected by the majority, this is why it ends in advanced stages with surgery, when the reduction is not possible anymore and the recovery treatment is not successful.

This is why we selected for study a patient with this disease, aged 65, operated and in an advanced stage.

The aim of this study was to increase the functionality of the affected segment through the recovery of the diminished function, the capacity of „grapping” through various kinetic methods[5].

The patient was evaluated at the beginning and at the end from the point of view of the mobility of the fingers and the fist, of the muscular force, of the „grapping” capacity and the global functionality of the hand [6].

The recovery treatment lasted for a period of 3 months, after the surgery, having a frequency of two meetings per week.

The physio-kinetic therapy treatment took place at *Stefan cel Mare* University at The *Swimming and Kinetic Therapy Complex* during 3 months from the 9<sup>th</sup> of December 2015 until the 12<sup>th</sup> of March 2016, twice a week, having a number of 22 meetings.

The objectives of the treatment were:

- ♣ to prevent the pain and the inflammation
- ♣ to preserve the function of the body
- ♣ to prevent and correct the deformations and the ankylosis
- ♣ to preserve or to increase the articular mobility

- ♣ to preserve or to increase the force and the muscular strength
- ♣ to re-educate the capacity of „grabbing”
- ♣ to re-educate the ability to breathe.

**Means of applying the kinetic treatment:**



The patient sits down, the left hand makes a circle from the exterior to the interior and the therapist applies on his forearm some electrodes. The duration for this procedure is ten minutes on the extending muscles and ten minutes on the flexing ones

The patient sits down, his forearm is rested on a table and ultrasounds are applied on the palm of his hand. The duration: five minutes.



The patient remains in the same position as earlier and he is applied a soothing massage that relaxes the muscles of his palm.



The patient sits down, T1- his forearm and palm are placed side up on the device and he is flexing and extending the fingers; T2- getting back in the first position. He has to repeat this 8 times[7].



The patient sits down at the Canadian table, his forearm is rested on it and he makes circles with the palm of the hand facing up.



The patient sits down and by using different objects (balls, circles) he holds his fingers tight as hard as he can and tries to maintain this for 10 seconds.

### Results and discussions:

Table 1. Fingers joint assessment

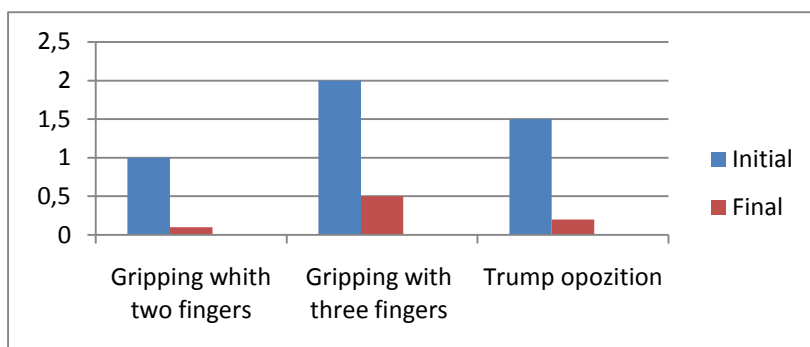
Fingers	Assessment	Index	Middle-finger	Ring-finger	Little finger
MCP	Initial	50	45	45	12
	Final	65	70	67	24
PIP	Initial	70	65	87	75
	Final	90	88	102	90
DIP	Initial	68	82	55	45
	Final	75	85	60	60

Following the testing of the fingers' mobility it was observed an increase in mobility at the level of each tested articulation after the final evaluation.

In the process of the recovery one of the most important aims was the exercise of the prehension which was evaluated through the intermediary of making different types of grabbing things.

**Tabel 2 Gripping assessment**

<i>Types gripping</i>	<i>Initial assessment</i>	<i>Final assessment</i>
Gripping whith two fingers	1 cm	0
Gripping with three fingers	1.5 cm	0.2 cm
Thumb oposition	2 cm	0.5 cm



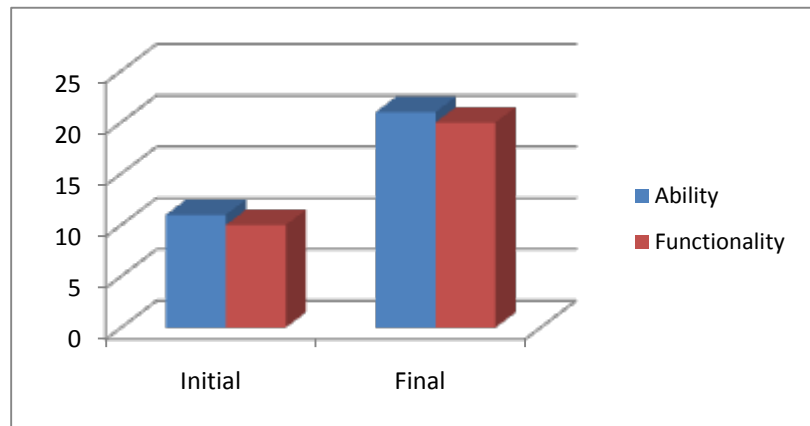
**Fig. 1 Dynamics of gripping**

As a consequence of this exercise one can observe a certain fulfillment of the re-education of this ability.

**Tabel 3. Muscle Strength**

<b>Muscles tested</b>	<b>Initial assessment</b>	<b>Final assessment</b>
Wrist flexor ( palmar large , small palmar , cubital above )	F3	F5
Wrist extensors ( extensor radial, second radial , cubital posterior )	F3	F4
Finger flexors (deep flexor, superficial flexor)	F3	F4
Fingers extensors( extensor common, extensor own index, extensor finger V)	F2	F5

At the beginning of the recovery programme the muscular strength was decreased because of the long period of immobility, at the end the muscular strength at the level of the fingers and the fist was close to normal.



**Fig. 2. Hand ability and functionality**

Following the application of the Michigan questionnaire the ability and the global functionality of the hand was evaluated and a considerable improvement was observed at the final evaluation.

#### **Discussions:**

The diseases of the hand can lead to major disfunctionalities and it is recommended the active kinetic therapy that involves voluntary muscular contractions [8, 9].

The occupational therapy has a significant role in the recovery of the patient with functional deficiencies in the professional as well as family life [10, 11].

Complex recovery is made through the intermediary of social activities that offer the patient the capacity to re-adapt to daily activities without whom the kinetic treatment methods would be insufficient. To prevent Dupuytren disease to re-appear the continuation of active moves of extension of the fingers is recommended after the end of the kinetic programme as well.

### **Conclusions:**

Following the kinetic programme we observed:

- the deformed hand was corrected: from the appearance of the hand characteristic to Dupuytren disease the patient succeeded to have almost a normal aspect of the hand
- the articular mobility increased at the level of the affected articulations and the fingers: the index from 50° increased in mobility to 65° , the middle finger increased in mobility from 45° to 70° , the ring finger increased from 45° to 67° and the acoustic from 12° to 24°
- the increase of the strength and muscular resistance at the flexing muscles of the fingers from F3 to F5 and at the extension muscles of the fist from F3 to F4
- the re-education of the prehension/ grabbing capacity by making different types of „grabbing”: two fingers grabbing, the distance from the thumb to the index, from 1 cm to 0, three fingers grabbing, from 1,5cm to 0,2 cm, with opposite fingers from 2 cm to 0,5;
- the increase of the capacity to do daily activities (ADL): the functional capacity of the hand increased becoming autonomous: the ability to button himself, the ability to lock/unlock the door, the ability to hold the cutlery
- by applying the kinetic means adapted and personalized it was obtained a fast reintegration in the social-professional life

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## ROLUL MIJLOACELOR KINETICE ÎN MALADIA DUPUYTREN

***Cuvinte cheie: Dupuytren, mână, kinetoterapie, prehensiune***

**Rezumat:** Maladia Dupuytren este o contractură în flexie care de obicei se dezvoltă peste ani și se manifestă prin îngroșarea țesuturilor pielii la nivelul mâinii, putând fi afectate și degetele, în special articulațiile metacarpofalangiene și articulația interfalangiană proximală. Majoritatea pacienților cu maladia Dupuytren sunt bărbați după vârsta de 50 ani, determinând contractura în flexie a degetelor, cu impotenta funcțională majoră a mâinii, prehensiunea fiind grav afectată în această maladie. Un mijloc important în tratarea acestei maladii este kinetoterapia, care se poate utiliza atât înaintea intervențiilor chirurgicale cât și după acestea, cu rolul de a menține și de a crește funcționalitatea la nivel articular și muscular al mâinii.