

## POSTOPERATORY RECOVERY OF PATIENTS WITH HUMERUS FRACTURE THROUGH KINETIC PROCEDURES

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**Keywords:** kinetotherapy, humerus fracture, medical recovery, procedures.

### **Abstract**

A trauma is needed to produce a humerus fracture, such as: accidents, falls, strong impact, overload.

The most common symptoms in humerus fracture and which need to be analyzed are: pain, edema, bruising.

Humerus fractures are diagnosed in most cases based on physical examination and a bone x-ray [2,5,11,13].

In this study, we began from the hypothesis that by using kinetic means, the patient with humeral fracture can be recovered in the best conditions.

The recovery program should be started as early as possible, and should be indicated immediately after immobilization, to prevent complications [1,4,6,12].

Throughout this study, we considered the implementation of the proposed objectives from the beginning and also verification of the hypothesis from which we started. In order for the physiotherapy program to be carried out in optimal conditions, we followed a series of principles.

### **Introduction**

In the context of medical recovery, physical therapy plays a key role in restoring the functional potential of patients with various disabilities. Broadly defined as movement therapy, kinetotherapy deals with the study of neuromuscular and articular mechanisms that ensure normal movement, and at the same time, it studies and develops the principles of structural programs that address the human body, from prophylactically, therapeutically and recuperative points of view [3,7].

A trauma is needed to produce a humerus fracture, such as: accidents, falls, strong impact, overload. For the most part, the cause of fractures is various workplace accidents or traffic accidents. In the case of both adults and children, the most common causes are accidents such as sports, falls from a height or falls from a bicycle [8,10].

The most common symptoms in humerus fracture and which need to be analyzed are: pain, edema, bruising. The pain that the patient accuses is acutely

present in the area where the bone is fractured. The pain is exacerbated by any attempt to mobilize the humerus.

Humerus fractures are diagnosed in most cases based on physical examination and a bone x-ray [2,5,11,13]. The physical examination is preceded by a comprehensive medical history. In addition to the data, we obtain from the patient, and the factors that caused the pathology, we will also perform an exhaustive analysis of the patient “from head to toe”.

After completing the examination of the affected segment, we will evaluate the joint amplitude through a comprehensive joint movement test. It will be positioned and applied to all joints of the affected upper limb [2,10]. Goniometries by which the so-called "joint testing" motion angles are measured. With the help of this instrument, the amplitudes of both active and passive movements can be determined. The amplitude of the movement represents the angle described by a segment from the anatomical zero point, up to the maximum allowed limit of the lesion.

### Material-method

In this study, we began from the hypothesis that by using kinetic means, the patient with humeral fracture can be recovered in the best conditions. The MFI patient was diagnosed following a work accident, with right comminuted humeral fracture in the 1/3 medial-distal area, and after the intervention the result was as follows: post-right humeral fracture status, in the 1/3 medial area, fixed with iron screws and rod, with hypertrophic appearance of the bone extremities and diffuse osteosclerotic changes, with no continuity at this level.

Name	Age	Occupation	Diagnostic	Start date	Completion date
I.M.F	27	Worker	Right humerus fracture in 1/3 postoperative mid-distal	01.11.2020	15.12.2020

### Duration and stages of work:

The study was conducted over a period of about a month and a half, from early November to mid-December 2020, with a number of 4 sessions lasting about 30 minutes.

### Complex recovery:

In order to have a complex recovery, we must set work goals from the very beginning.

The proposed objectives are:

- Combating pain and inflammation; preservation of function; maintaining / increasing joint mobility; maintaining/ increasing muscle strength and endurance; resumption of activities in daily life.

- In our first session we set up a schedule with the patient that we will follow in the upcoming weeks, considering that for the beginning it was more of an accommodation session. We evaluated the patient both from a muscular and articular point of view and we performed anthropometric measurements, all these evaluations being very important because we will be able to observe the results during the kinetic program. I started the kinetic program with a rather low mobility of the affected limb, and towards the end I hope to reach the much-desired result.

### **Kinetotherapy:**

Physical therapy starts with passive movements that begin after the cessation of immobilization and usually after the resumption of active movements.

As recovery objectives we have:

- Restoration and maintenance of movements in adjacent joints;
- Restoring muscle tone and trophicity;
- Restoring stability to controlled movements and skills.

Hygienic-dietary treatment is based on:

- A diet rich in protein, calcium, vitamins and minerals;
- Maintaining a weight as normal as possible;
- Avoiding factors that can aggravate the patient's condition;

Drug treatment consists of:

- Analgesics; Ointment; Vitamins.

The recovery program should be started as early as possible, and should be indicated immediately after immobilization, to prevent complications.

In the first part of the program we began with light, stimulating exercises.

- Active resistance exercises for neighboring joints.

It should be noted that we always work from the distal to the proximal level and we applied the same exercises on the healthy upper limb.

We performed passive, passive-active and active mobilizations at the level of the affected joints. I performed extension-flexion movements on the hands. Increasing the temperature is an important part of the recovery program and should last 5-10 minutes. Before starting the program, I applied heated towels or pillows with warm water.

These methods have the role of relaxing the necessary muscles and preparing the segment to work specific exercises. If, after performing muscular exercises, the increased blood supply that irrigates the muscle and the periarticular area, a local edema appears and persists, it can cause a vicious, analgesic retraction of the limb. Local applications are made with ice ensuring an anti-inflammatory and relaxing effect at the same time.

In the first stage of the treatment program, the exercise plan is as follows:

1. From the sitting position with the forearm on the treatment table, we performed passively, then passively-active flexion and extension of the fingers.

2. From the sitting position, with the forearm resting on the treatment table, I performed passively, then passively-actively, the pronation and supination of the injured upper limb.

After gaining a higher degree of mobility, but also a better muscular strength, we started with active mobilizations with resistance.

2. From the sitting position, with the forearm and hand resting on the treatment table, the patient actively performs the flexion and extension of the hand, against an opposite resistance applied by the physiotherapist. We applied it on both upper limbs.

3. The same position, the patient actively performs first keeping his fingers closed, then spreads his fingers apart.

In the second part of the program, we made sure that the exercises were accommodating; we performed simple exercises in which the patient did not overload the affected limb. Exercises that can allow to perform the correct flexion and extension, but also for the internal and external rotation of the affected upper limb.

From this moment on, we paid special attention to the program, so that the patient could learn and correct his positions.

1. From a sitting position, the patient holds a ball in the hand of the affected upper limb and performs the adduction and abduction of the arm. All under strict supervision, we helped the patient where appropriate, to be able to perform the exercise successfully. I also performed this exercise on a healthy limb.

2. From orthostatism, with the arms close to the body, grab a cane, raise the arms forward and return to the starting position.

3. From orthostatism, with the lower limbs apart, grabbing a stick on both ends, lateral tilts to the top right with return to the starting position, and then perform the exercise to the left.

4. From orthostatism, with the lower limbs apart, look forward, arms behind with hands grab a stick on both ends and extend the arms.

5. From orthostatism, with the lower limbs slightly apart, the patient holds a ball in the hand of the affected upper limb and performs the adduction and abduction of the arm.

6. From the same position, with the help of a ball, the patient performs the flexion and extension of the arms.

7. From the same position, with the help of a ball held with both hands, the patient performs internal and external rotation of the arms both to the left and to the right.

We all know that physical therapy for the respiratory system is essential, especially for people with lung problems. The respiratory system consists of the upper and lower airways, the respiratory unit, the rib cage, the diaphragm and the

subdiaphragmatic structures. The main function of the respiratory system is oxygen exchange. It is very important that during an exercise program regardless of the diagnosis, the patient performs free breathing exercises like these:

1. The patient sitting on a chair, looking forward, performs the abduction of the arms, accompanied by a deep and slow inspiration, return with slow and deep exhalation.

In the third stage of the treatment program, we aimed to make the exercises more complex. We performed exercises to tone the muscles of the affected upper limb.

I've done:

- Exercises to tone the brachial biceps;
- Exercises for toning the coracobrachialis muscle (short head of biceps muscle, long head of biceps);
- Exercises for toning the brachial triceps, its characteristic is that it has three heads of origin, namely the long head, medial and lateral;
- Exercises to tone the brachial muscle originating on the anterior edges and faces of the humerus

I paid great attention to this stage, so that through these exercises my patient would be able to increase muscle strength and endurance so that we can succeed in fulfilling my patient's goals and desires.

1. From orthostatism, the patient holds a weight with both hands, and performs the extension of the arms, controlling both the upward and downward movement. This exercise helps to tone the triceps.

2. From orthostatism, with the lower limbs slightly apart, looking forward, with the feet stepping on the elastic band and in the right hand holding the other end of the band, the patient performs the abduction of the arm. I did the same exercise on the healthy upper limb

3. From orthostatism, the patient holds one end of the band to his chest with a healthy hand, with the other hand pulls downwards to perform the extension of the elbow, we perform the same exercise with a healthy limb.

4. From the same position, with the lower limbs spaced at shoulder level, pass the end of the elastic bands under the sole of the foot on the same side as the shoulder to be worked, and hold the end of the straps with your hand. This is the starting position, perform the flexion of the arm, keeping the elbow very slightly bent and fixed in this position, lower (extension) to the initial position and repeat the exercise with the healthy limb.

5. From orthostatism, with the lower limbs slightly apart, with the help of an elastic rope attached to the door handle (or trellis), we perform flexion and extension of the arm. The same exercise on the healthy limb.

6. Also from orthostatism, but this time with the help of the physiotherapist, he holds on to the end of a band, and the patient performs with the diseased limb, the

extension of the elbow, this exercise especially helps to tone the triceps. I did the same exercise on the healthy upper limb.

I mentioned above that breathing plays an important role in a kinetic program, I believe that breathing is our source of life. I would like to mention a few roles that respiratory gymnastics has, respectively:

- Increased respiratory capacity followed by efficient oxygenation of tissues; prevention of ventilatory dysfunction; decreased contraction of the inspiratory muscles; decreased associated pain; exercise training.

That's why throughout my recovery program I introduced breathing exercises; I guided the patient to learn to breathe correctly during each exercise during a physical therapy session, an exercise performed by us being:

7. The patient in orthostatism, with the lower limbs slightly apart, looking forward, with both hands holding a weight in his hand and inhaling deeply and slowly, returning to exhale slowly and deeply. At the time of expiration the patient turns to the right of the wheel.

Both at the end and at the beginning of the sessions, I opted for a few stretching exercises. Stretching is the lengthening of a muscle or muscle group, which is very important in physical training. Among the benefits of stretching are: the development of mobility, helps to make the muscles more flexible. Stretching exercises should be done on their own, without causing pain.

The kinetic exercises aimed at: speed, increasing the amplitude in the affected joints and last but not least toning the muscles.

## Results

Tabel 1 Joint balance

Movement	initial evaluation		final evaluation	
	right	left	right	left
Shoulder flexion	40 <sup>0</sup>	170 <sup>0</sup>	160 <sup>0</sup>	170 <sup>0</sup>
Shoulder extension	right	left	right	left
	20 <sup>0</sup>	50 <sup>0</sup>	45 <sup>0</sup>	50 <sup>0</sup>
Shoulder abduction	right	left	right	left
	45 <sup>0</sup>	180 <sup>0</sup>	175 <sup>0</sup>	180 <sup>0</sup>

We found after performing the joint assessment that the patient was left immobilized with a fairly small range of motion in the shoulder joint, the movement being limited by pain.

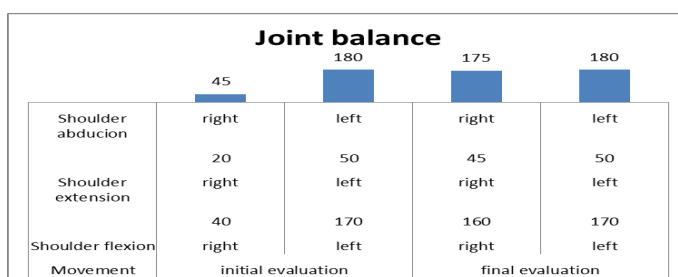
Tabel 2 Muscle balance

Evaluation	F <sub>0</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>5</sub>
initial evaluation	X					
interim evaluation	X					
final evaluation	X					

Following immobilization, the entire upper limb muscles were functionally affected, especially the arm muscles, both anterior and posterior.

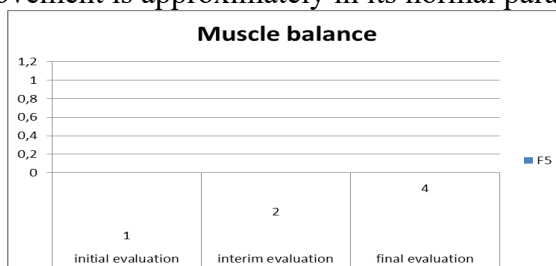
Tabel 3 Anthropometric measurement

Segment	initial evaluation		final evaluation	
Arm circumference	right	left	right	left
	31 cm	35 cm	35 cm	35 cm



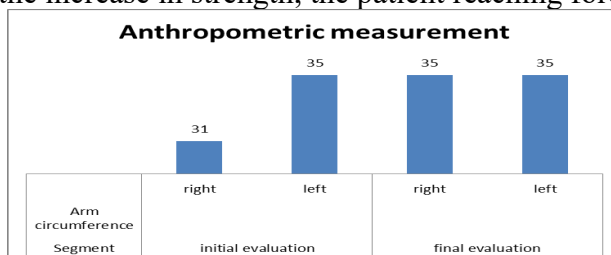
Graph 1 – Joint balance

Comparing the data on the graph, we can easily notice that after the treatment, the mobility of the shoulder has considerably improved. If at the beginning of the kinetic program the shoulder joint was in functional deficit, now the amplitude of movement is approximately in its normal parameters.



Graph 2 – Muscle balance

Analyzing the results on this graph, we found that the patient after the initial assessment showed a force 1, compared to the last assessment, where you can easily notice the increase in strength, the patient reaching force 4.



Graph 3 – Anthropometric measurement

Following the kinetic program performed, the patient managed to develop his muscles in such a way that in the end, the circumference of the arm managed to increase, as we can see on the graph.

## Conclusions

Throughout this study, we considered the implementation of the proposed objectives from the beginning and also verification of the hypothesis from which we started. In order for the physiotherapy program to be carried out in optimal conditions, we followed a series of principles. The program has been strictly developed according to the needs of the patient. Reaching the final period of the recovery program, I consider that the exercise program was a beneficial one, the results being some satisfactory and visible.

At the same time, I found that the mobility of the shoulder is now performed on the full range of motion, also the strength and endurance are now in normal parameters.

The obtained results highlight the role of physical therapy in functional recovery. The patient showed good discipline, his interest being very high, clearly with a great desire for healing which is observed in his results. We started from a hypothesis that was confirmed following the case study: the patient I.M.F. 85% healed in the process.

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