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The importance of the elemental functional mobility coefficient in assessing the functional status of the coxofemoral joint

Sinziana Calina Silisteanu [1] MD, Andrei Emanuel Silisteanu[2] Stud

[1]Railway Hospital Iasi - Specialty Ambulatory of Suceava - "Stefan cel Mare" University of Suceava FEFS-DSDU
[2] Cluj School of Public Health - FSPAC - Babeș-Bolyai University

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Coresponding author: Sinziana Silisteanu
E-mail address: sinzi_silisteanu@yahoo.com

Peer-reviewed by: **Liviu Lazăr**, University of Oradea, Faculty of Medicine and Pharmacy
Gabriela Dogaru, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca

Abstract
Introduction. The coxarthrosis is a degenerative disorder in the coxofemoral joint, more common in adults aged 40-70 years. The coxofemoral arthritis is important in static and locomotion.
Motivation. The need to evaluate the functional recovery level of the patients diagnosed with primary coxarthrosis by using the elemental functional mobility coefficient.
Material and method. There have been studied 61 patients clinically and imagistically diagnosed with coxarthrosis. They were clinically and functionally assessed by performing joint balance and calculating the elemental functional coefficient for the flexion movement at the coxofemoral level. Pain was appreciated by using the VAS scale. The medical recovery allowed results on joint function, pain management and increased psychosocial quality.
Results. By applying the complex recovery therapy (electrotherapy, massage, kinetic therapy), it is attempted to prevent or slow down the deterioration of the function. The constant continual physical activity (the individualized kinetic program) could reduce the risk of a metabolic disease and the occurrence of degenerative diseases.
Conclusions. The statistical analysis of the studied indicators shows statistically significant results for the VAS scale in both groups. The application of the kinetic therapy program has favorable effects on the joint function, demonstrated for the flexion movement.
Key words: *elemental functional mobility coefficient, medical recovery, physical activity*

Introduction:

The coxarthrosis is a degenerative disorder in the coxofemoral joint, more commonly seen in adults aged 40-70 years [1], being etiologically primitive in about 40% of cases. This condition causes a decrease in muscle strength, joint mobility, balance, and deconditioning [2]. The coxofemoral joint is important in static, both for unipodal and bipodal support, transmitting the body weight from the pelvis to the pelvic limb. It also plays a role in locomotion, making sure that the pelvic limb swings in the balancing phase [3]. Even if it is a chronic progressive slow-moving disease [4], the coxarthrosis may have acceleration episodes with influence on the patient 's walking, mobility, posture and stability, thus affecting the patient's quality of life [4, 5, 6, 7]. It is estimated that the number of older people will increase from 524 million in 2010 to around 1.5 billion in 2050 [8]. The population growth in terms of number of people may also affect the care delivery system, especially in the age group over 65, and due to disabilities, demand for and supply of care services is influenced [9]. The number of people over 60 has tripled globally - from 205 million in 1950 to 606 million in 2000 and is predicted to triple in 2050 [10]. In 2010 over 1 billion people had a type of disability, which means 15% of the world's population, 5% more than the WHO estimated in 1970. The number of people with disabilities is growing, with a high disability risk for the people over 65. They also have other corneal diseases: diabetes, cardiovascular disease, mental illness, depression, etc.

The studies anticipate that there will be 89 million people aged 65 or more in 2050 [11]. This is why the interest in the phenomenon of the aging populations around the world is justifiable, which is associated with the decline in physical function, cardio-respiratory capacity and muscle mass, increasing morbidity and mortality. In social and economic terms, the older persons' disability is costly [12, 13, 14].

That is why complex medical treatment should be applied early and depending on the particularity of each patient [9].

The medical recovery has made it possible to achieve results on the joint function, pain management and increasing the quality of psychosocial life. By applying therapy, it is attempted to prevent or slow down the deterioration of functions. Therapy through exercise can help increasing the strength, resistance

and joint mobility. It can improve posture, balance and mobility. It is indicated to elderly people because it reduces disability [15].

There are patients who, due to their disability, need assistance and support to achieve a good quality of life and to reintegrate into their social and economic life [16]. People aged over 65 who also have disabilities need support and aid to participate in daily activities, to avoid family dependence or the need for social protection [17, 18].

Aging is a multifactorial process that results in the reduced functional capacity for the whole body, but especially at the joint level. The aging mechanism is exogenous, which includes the onset and progression of various corneal diseases, especially the degenerative ones, and the endogenous type is dependent on cellular and metabolic changes, catabolic processes exceeding the ability to repair and regenerate the cell [19]. The main element that favors the development of degenerative diseases for people over 50 is the lack of exercise. A group of researchers has demonstrated the influence of mitochondria in regulating metabolism, and action against cellular oxidants by oxidative reactions. Elderly people are experiencing protein and DNA changes that can go up to cellular damage. PGC-1 alpha (the key regulator of energy metabolism involved in the development of degenerative diseases in elderly people) is thought to be controlled by the physical exercise, which also allows an improvement in cerebral metabolism and cognitive function [20, 21, 22]. Degenerative pathology in people over 60 is determined by the impairment of redox metabolism at the mitochondrial level. There is constant evidence that exercise may delay onset and may prevent the progression of aging, thus the occurrence of age-related degenerative diseases by modifying mitochondrial homeostasis. There is thus a link between redox metabolisms at the mitochondrial-aging-degenerative affection-physical exercising level. Aging is associated with reductions in the physiological activity, with decreased bone mineral density and muscle mass, with body fat growth and central adiposity. It is possible for women that the onset of menopause determine the physiological decline associated with the aging process, degenerative affections, correlated with physical inactivity.

The constant continual physical activity (the individualized kinetic program) could reduce the risk of a metabolic disease and the occurrence of degenerative diseases [23]. Practicing regular exercise is an important element that allows for a healthy lifestyle. In order to perform the kinetic therapy program, there is a need of motivation that can be extrinsic (to meet an external requirement, a waiting, that is why physical exercise will be done under pressure), and intrinsic, the most determined motivation when the patient considers the physical exercise pleasant, interesting, useful. There are also authors that show that the motivation to regularly exercise depends on demographic factors (sex, BMI), psychological-emotional factors (joy, anxiety), behavioral abilities (sleep, smoking, quality of life) entourage), current physical activity (media access to view types of exercises). The different types of motivation will determine the proper behavior that increases the way of exercising not only during recovery but also at home. This is why other variables that may influence the possibility of performing the kinetic recovery program will be considered. Other studies have found that women have lower physical performance levels than men. Also, female and male patients have different motivations in regular practice of the kinetic therapy program indicated in the recovery of a condition [24].

For the efficiency of physical recovery through kinetic therapy, it is necessary for the body to normally function by the amount of minerals and ions that provide homeostasis. Especially for the age group over 50, the calcium and magnesium should have normal values. Total calcium and magnesium are two essential minerals for the body, and their deficiency can affect metabolic functions. The necessary daily requirements needs to be ensured through proper nutrition rich in minerals and if needed with supplements of these ions. Studies show that there is a link between magnesium in the body and osteoporosis [25]. The medical recovery aims at improving the functioning by diagnosing and treating the conditions, reducing the damage and preventing and treating complications [15]. In the case of coxarthrosis, it is the application of electrotherapy (low and medium frequency currents), ultrasound, thermotherapy (short waves), relaxing massage and kinetic therapy [26].

Depending on the dose and duration of administration, ultrasound can produce reversible or irreversible tissue effects but also effects on the oxidant / antioxidant balance. Among the physiological effects of ultrasounds we can mention:

fibrinolytic effects and increase cell membrane permeability, increased redox processes that cause local vasodilation, analgesic effects, anti-inflammatory effects, effects caused by the mechanical vibrational action [27]. The kinetic therapy program can determine the increase of bone mass, of joint and muscle flexibility, endo-ligament site, the balance and posture regulation, the decrease of risk of osteoporosis, the increase of self-esteem, increasing the quality of life of people aged over 50 [28, 29 , 30,31].

Practicing physical exercise can improve functional autonomy, increase joint mobility, and reeducate the posture and balance [32]. Studies show that people over the age of 50 should have a physical therapy program at least twice a week in consecutivedays, with exercises that involve all muscle groups at moderate and repeated intensity of 8-10 times each of them, and for weight-based exercises they must be adapted to each person and will be repeated 10-15 times with 2-3 minutes of pause between them. For sedentary persons, physical activity should be gradual, from mild to moderate intensity, to produce results [33] [34]. The elementary functional function of mobility was established by Ch Rocher to be used in the evaluation of articular amplitude.

Objective. The study followed the evolution of the elementary functional mobility coefficient as an expression of coxofemoral joint flexion.

Material and method. A total of 61 patients were diagnosed in the outpatient setting with primary coxarthrosis. The inclusion criteria were: the patients' consent to participate in the study, age over 40, clinical and imaging diagnosis of coxarthrosis. Exclusion criteria were: the patients' refusal to participate in the study, the age of patients under 40 and over 80, patients with chronic decompensated affections or psychiatric disorders.

The evaluation was complex and was performed initially at the onset of treatment, after 14 days of treatment and 45 days after completion of the recovery treatment. The VAS scale, the joint balance, the Rocher's functionality coefficient were used in the evaluation.

The 61 patients were divided into two groups as follows: the control group with 32 patients and the study group with 29 patients. The two groups received pharmacological treatment as indicated by the guidelines, namely nonsteroidal anti-inflammatory drugs, decontractants, vitamins, electrotherapy with antalgic and decontracturant feature (low, medium and high frequency currents), thermotherapy and relaxing massage. For the study group was added a complex kinetic therapy program that aimed to increase the joint amplitude, the increase of muscular force for the thigh and hip muscles.

Results

In the control group, out of 32 patients, 17 patients were female (53.12%) and 15 male (46.88%). The statistical analysis for the joint balance performed for the flexion movement at the coxofemoral level indicates the following values:

LOT 1 Statistic functions	flexion right hip			flexion left hip		
	I	F	C	I	F	C
Median	60	60	82.5	54.5	75	80
Standard deviation	15.66	38.53	40.04	23.18	25.33	26.39
t-student test	0.0513	0.0147	0.526	0.0296	0.0023	0.0012

Table 1 Joint balance for hip flexion movement

The elementary functional mobility coefficient presents the following values for the flexion movement:

LOT 1 Statistic functions	flexion right hip			flexion left hip		
	I	F	C	I	F	C
Median	29	33	34	29	39	54.5
Standard deviation	6.1889	11.7045	12.0323	11.4891	10.3584	10.4331
t-student test	0.0115	0.0915	0.0003	0.0222	0.0298	0.0213

Table 2 Evolution of elementary functional coefficient of mobility for flexion movement

The pain was evaluated by the VAS scale, the results being statistically significant for the initial-final and final-control moments and statistically insignificant for the initial-control moment. In the study group, out of 29 patients, 17 patients were female (58.62%) and 12 male (41.38%). The results of the statistical analysis for the joint balance carried out for the flexion movement at the coxofemoral level are in the table below:

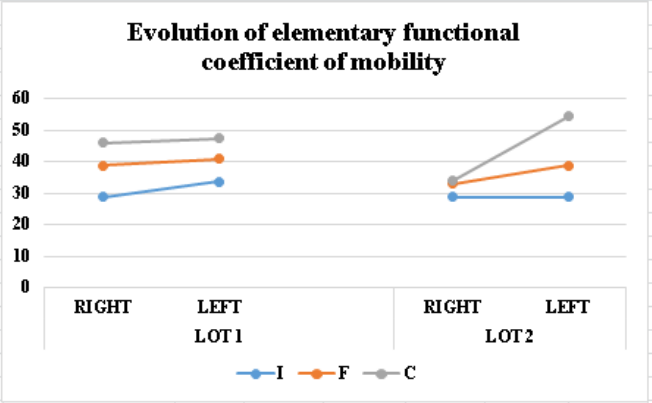
LOT 2 Statistic functions	flexion right hip			flexion left hip		
	I	F	C	I	F	C
Median	50	75	100	62	89	114
Standard deviation	19.45	19.74	16.38	23.18	25.33	26.39
t-student test	0.0377	0.0088	0.0157	0.0268	0.0048	0.0108

Table 3 Joint Balance for hip flexion movement

Statistically, the elementary functional mobility coefficient presents the following values for the flexion movement at both hips:

LOT 2 Statistic functions	flexion right hip			flexion left hip		
	I	F	C	I	F	C
Median	29	39	46	33.8	41	47.5
Standard deviation	10.3078	6.3991	3.0136	8.3269	5.6687	2.4304
t-student test	0.0206	0.0021	0.0052	0.0078	0.0006	0.0043

Table 4 Evolution of elementary functional coefficient of mobility for flexion movement



Graphic 1 Evolution of the elementary functional coefficient for flexion movement

The pain assessment was made by using the VAS scale and the results were statistically significant at all times.

Conclusions

In the control group for the flexion movement, the results are statistically significant with p <0.05 at all moments and for both coxofemorales, except for the right coxofemoral, where the results are statistically insignificant for the initial-final and final-control moments with p> 0.05

In the study group the results are statistically significant for the flexion movement of both coxofemorales and at all moments, p <0.05

For the elementary functional mobility coefficient in the control group, the results are statistically significant at all moments and to both coxofemorales with the exception of the right coxofemoral at the final-control moment, where the result is statistically insignificant, p> 0.05, compared to the study group where the results are statistically significant in both batches and at all evaluation moments.

The application of the kinetic therapy program has favorable effects on the joint function, which is demonstrated for the flexion movement.

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