



Analysis of the results after physical therapy treatment on patients with ACL reconstruction

KEYWORDS

ACLreconstruction, rehabilitation.

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ABSTRACT *The complexity of the knee and thenumber of criteria used for its evaluation makes it difficult to evaluate. The aim of our study was to evaluate the effect of treatment with physical procedures and exercises on patients with ligament reconstruction of theACL. Material and method: 12 patients with ligament reconstruction of theACLOfthe knee were included. They were treated with physical therapy and exercises 14 to 40 postoperative days. Evaluation was made with clinical measurements and WOMAKS index. Results: Clinical measurements of range of motion and quality of life show significant improvement of knee function. Discussion:Early rehabilitation and physical therapy gives better results in reduction of swelling and pain. It is apositive effects of ice and electricity on the treated soft tissue. Conclusion:Measurement of clinical parameters with functional assessment with WOMAKS index, havepractical importance for the following effects of rehabilitation.*

Introduction

The complexity of the knee and the number of criteria used for its evaluation of the results makes it difficult for exact evaluation. Interest in measuring the function of the knee began with the formation of conditional-specific tools to determine the outcome. Early instruments included determination of pain, function, range of motion, deformity, stability and muscle strength around the knee. The first attempts to evaluate the treatment of knee were done by O'Donoghue¹ in 1955. His attempt to observe the effect of treatment included an observation review and questionnaire score of 100 points. In 1974 Larson² scale developed with objective, subjective and functional categories. Functional impairment was evaluated by criteria of walking, running, jumping and kneeling.

Surgeons choose methods that are in the interest of the function and the surgical method that is planned, while the rehabilitation team selects method that will be able to assess the function of the knee joint with: the scope of the movement, the presence of pain, muscle strength of upper knee and quality of life. Although both specialties work as a team there are specific methods for surgeons such as the operating method they apply and for the rehabilitators the physical procedures and programs.

During the eighties, Noyes³ and colleagues developed a scale for evaluating the results of conservative treatment for PVL deficient knee. They used a subjective assessment, clinical examination and modification of activities each of these separately scored.

The scales for objective evaluation analyze include symptoms that appear at different levels of activity. Here we face the problem that are caused by the time the knee needs to accept the transplanted graft. And of course the time the graft needs to be completely applied to the knee. During this time we cannot use all available methods for measure because of these delays.

The Swiss orthopedic association's knee study group in 1988, developed system for documentation of inertia of the wheel. The evaluation form included subjective and

objective evaluations and functional testing⁴.

The absence of a standardized scoring system resulted in the need for the establishment of an international board to administer the knee on its pathology.⁵ Anderson and collaborators in 1993 have published the use of 38 different scores for injuries PVL.⁶

As for the ligament injury, there is no ideal instrument yet and requires further study to prove that subjective assessment and measurable clinical parameters can be compared to the Cincinnati system.⁷

The aim of our study was to evaluate the effects of treatment with physical procedures and exercises in patient with ligament reconstruction of PVL in the subacute stage.

Material and methods

Our study was conducted on 12 patients with ligament reconstruction of anterior cruciate ligament in one of their knees. Patients were aged min.16 and up to 50 years, 58% male and 42% female. Including criteria were: 1) all to have early rehabilitation program at surgery department, 2) same surgical method of treatment 3) patient not to be a professional sportsmen. The effect of rehabilitation was followed in the subacute phase of 14-40 postoperative days. To evaluate the effects of treatment we made objective clinical measurements and assessments of pain and function in knee with WOMAKS index.

The maximum score of deficit was 1156 points. Any deficit was scored 1 point. The deficit were determined at 14th and 40th postoperative day.

Clinical measurements of circumference of knee, upper knee and range of motion in the knee were compared with healthy knee. Patients were treated with physical procedures 20 days, with a weekend break, a total of 4 weeks. The application of physical procedures is the following: 1. Kriomassage of knee before mobilization of patella lasting 3 minutes 2. Interferential currents with frequency 0-100Hz, lasting 15 min, 3. Electro gymnastics on m. quadriceps femoris, lasting 10 minute and passive mobilization of the patella.

The program of exercises consisted of: quadriceps exercises, exercises thrown on knee and hip joint, gradual flexion in knee, weight tolerance of the knee and walking with support from 25% -50% -75%.

For evaluation of the effects of rehabilitation program we used Womack index and measurable parameters of physiotherapist protocol such as range of motion flexion / extension in knee, size of swelling and trophy of upper knee muscles on standard way.

The data was analyzed before and after rehabilitation program with score for Womack index, percentage in increase of mobility and muscles mass and decrease of swelling and statistical methods, such as T-test, difference of proportion and significates of $p < 0.05$.

Results

Measurements of clinical parameters of swelling and range of motion are showed in table 1.

Tab.1 Clinical measurements compared with healthy knee

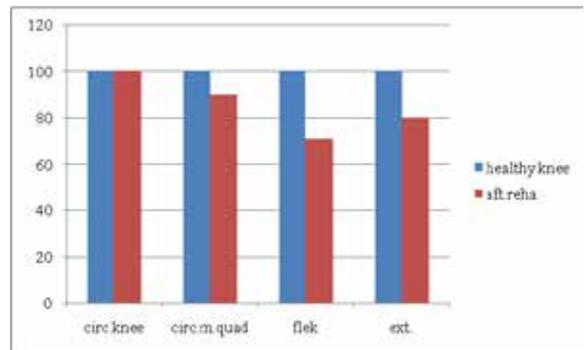
| Measurement | Healthy knee | Before rehabilitation | After rehabilitation | Goodness |
|--|--------------|-----------------------|----------------------|----------|
| Circumstance knee average in cm | 44 | 46 | 44 | 2cm |
| % | 100 | 96 | 100 | |
| Circumstance of m. quadriceps average in cm. | 79 | 66 | 71 | 5cm |
| % | 100 | 83 | 90 | |
| Mobility flexion Average | 145 | 60 | 103 | 43° |
| % | 100 | 41 | 71 | |
| Mobility extension average | 0 (180) | -10 (170) | -2 (178) | 8° |
| % | 100 | 94 | 99 | |
| Total | 400 | 314 | 360 | |
| % | 100 | 79 | 90 | 11 |
| | | T=3.1 P<0.05 | T=1.47 p>0.05 | |

The whole group of patients have a significant deficit compared with healthy knee, $T=3.1$ $p<0.05$, but after the treatment the parameters of deficit are not significant $T=1.47$ $p>0.05$. The treated knee has the same function like a healthy one.

Analysis of each measurement are showed in table 2 and figure 1, and we could see that the biggest problem bin the patients was flexion of the knee.

Tab.2 Evaluation of effect of PH&R treatment with measurable parameters

| Measurement in % | Healthy knee | After. PH&R treated Knee |
|---------------------------------------|--------------|--------------------------|
| Circumstance knee average | 100 | 100 |
| Circumstance of m. quadriceps average | 100 | 90 |
| Mobility flexion average | 100 | 71 |
| Mobility extension average | 100 | 99 |
| Total score | 400 | 360 |
| % | | 90 |



The score from subjective assessment with WOMAK index are showed in table 3.

Tab. 3 Assessment of treatment with WOMAK - index

| Number of question | Before rehabilitation/ score | After rehabilitation/ score | Difference % |
|--------------------|------------------------------|-----------------------------|-------------------|
| question 1 | 34 | 9 | 52 |
| question 2 | 19 | 13 | 13 |
| question 3 | 22 | 14 | 17 |
| question 4 | 26 | 12 | 29 |
| question 5 | 29 | 10 | 31 |
| question 6 | 29 | 14 | 31 |
| question 7 | 30 | 15 | 31 |
| question 8 | 32 | 9 | 48 |
| question 9 | 34 | 13 | 44 |
| question10 | 29 | 16 | 27 |
| question11 | 29 | 15 | 29 |
| question12 | 32 | 9 | 48 |
| question13 | 29 | 14 | 31 |
| question14 | 33 | 11 | 46 |
| question15 | 34 | 13 | 44 |
| question16 | 34 | 12 | 46 |
| question17 | 30 | 16 | 29 |
| question18 | 31 | 15 | 34 |
| question19 | 34 | 8 | 54 |
| question20 | 31 | 9 | 46 |
| question21 | 31 | 13 | 38 |
| question22 | 29 | 12 | 35 |
| question23 | 34 | 8 | 54 |
| question24 | 38 | 10 | 50 |
| Total points | 763 | 290 | 473 |
| Deficit % | 66 | 25 | 41 |
| Function % | 34 | 75 | 41 |
| Significance | | T=4.4 P<0.05 | T=11.71 P<0.05 |

Before rehabilitation knee has total function of 34%, and after treatment it was increased on 75%, and $T=4.4$, $p<0.05$.

Discussion

Rehabilitation team from physiatrist and physiotherapist collaborate with surgery doctor. They start their activities on the second day after the surgery treatment. Early rehabilitation program has more benefits on patients knee function. It was proved in our study too, because the patients had good condition before the subacute part of rehabilitation. Our rehabilitation program in the subacute period included physical therapy procedures like ice and electrical therapy. We use physical therapy procedures always in our physical therapy department together with exercise program.

Early rehabilitation and physical therapy procedures together give better results on reduction of swelling and pain. It is a result of the positive effects of ice and electricity on the treated soft tissue.^{8,9} There is a positive effect from the ice massage on reduction of pain and swelling like an example for successful rehabilitation that is done by us.

We can always use a healthy knee to compare the function of the treated knee conservatively or surgically. It is also a good method for statistical analyze too. The most common consulted studies noted lower extremity muscle strength, followed by lower limb symmetry, and knee examination parameters of range of knee motion and effusion like parameters.¹⁰

In our department we had no experience for application of questionnaire for perception of knee function by ourselves. We have used WOMAKS index before rehabilitation of knee patients with frontal knee pain and osteoarthritis. Pain in rehabilitation was measured with NAS. It is a method used in many other studies before and it is specialized for knee and ankle joint.^{11,12} We used it on pa-

tients with ligament replacement with WOMAKS index like a function assessment. Researchers use questionnaires for assessment of quality of life and general health for studies that are aimed on patients with surgical treatment. They understand that it is not only important to do operation, but also the good quality of life of the patient. Rehabilitation has important role in that process. We do not use special tests before rehabilitation because some of them are impossible to use in the acute and subacute part of the rehabilitation.

There is a different assessment for sportsmen and other similar people in function of knee. Deciding factors are based on occupation, sex, activity level of the subject, amount of time spent performing such highly demanding activities, and presence of associated knee lesions. Physiological age and activity level are more important than chronological age as deciding factors when considering ACL reconstruction.¹³ We have consulted many studies for rehabilitation of this condition, but they have no explanation of physical therapy effects, only assessment of clinical measurements and function.^{14,15,16}

In our group sportsmen were excluded and in our opinion it was possible to use WOMAKS index although it is not specific for knee ligament reconstruction because there are no specific tools for it at all.¹⁷

Conclusions

In conclusion of our research we can say following: Measurement of clinical parameters is essential during rehabilitation process, we can repeat them without side effects of knee function. WOMAKS index has practical importance for following the rehabilitation effect on quality of life, but for the effects of surgical treatment specific questionnaires and tests should be used.

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