Gergely I.[1], Russu O.M.[1], Zazgyva Ancuța[2], Nagy O.[1], Pop T.S.[1]

Quality of life after anterior cruciate ligament reconstruction

[1] Orthopedics and Traumatology Department, UMF Tîrgu Mureş
[2] Clinic of Orthopedics and Traumatology, Tîrgu Mureş

ABSTRACT.

The purpose of this study was to assess the quality of life of patients who underwent anterior cruciate ligament single-bundle reconstruction (ACLR) which involves reconstructing the ligament using autologous graft (semitendinosus and gracilis tendon). This is a retrospective study undertaken between the 1st of January 2010 and December 31, 2011 at the Clinic of Orthopedics and Traumatology Tîrgu-Mureş, involving 30 patients (6 women, 24 men), 17 to 54 years old (mean age of 30.13 years). All the patients underwent ACLR, with the above mentioned technique. The instrument chosen to assess the quality of life was the Short-Form 36 (SF-36) Questionnaire, completed by telephone. This questionnaire has 8 scales which are noted according to the received answers: Physical Functioning (PF), RF (Role Physical), BP (Bodily Pain), GH (General Health), VT (Vitality), SF (Social Functioning), RE (Role Emotional) and MH (Mental Health). The best way to score these scales is by comparing them to the healthy population, which is why this study uses norm-based scales where the mean value is 50 and the standard deviation is 10. The scales used in the questionnaire are showed the next results: mean norm-based PF 49.19, RF 46.11, BP 49.82, GH 52.19, VT 52.14, SF 50.43, RE 41.36 and MH 47.18. The general Physical Component showed a mean of 48.93 and the Mental Component a mean of 47.33, close to the standard mean of 50. All these results were included in the standard deviation, which showed that the patients' quality of life was very close to the quality of life of the normal population. Patients who have a history of ACLR tend to have a quality of life similar to the normal, healthy population.

Keywords: anterior cruciate ligament, reconstruction, hamstrings, quality of life, normal population

Russu O.M.1

Orthopedics and Traumatology Department
UMF Tîrgu Mureş
Romania

Introduction

The anterior cruciate ligament (ACL) has a stabilizing role in the knee and it is the most common site of complete ligament rupture. Due to improved methods of diagnosis and treatment of these lesions, the number of ACL reconstruction interventions keeps growing. In these circumstances it is essential to properly assess the results of these interventions. In addition, the current trend is to give more importance to collecting self-reported results from the patient, and to rate their satisfaction and the impact of various therapeutic modalities on patient quality of life [1,7].

Quality of life can be defined as an expression of the conceptual model that attempts to present the patient perspective and level of satisfaction expressed by numbers. Postoperative changes in quality of life are variables that currently require special attention, being highly subjective and difficult to assess and quantify.

In this paper we evaluated the quality of life of patients who had undergone anterior cruciate ligament reconstruction with autologous grafts (semitendinosus and gracilis). The aim of the study was to determine the impact of this surgery on overall quality of life and to quantify both the physical and mental component of the concept. We hypothesized that patients undergoing this intervention have a quality of life similar to that of the population considered as normal.

Materials and method

This study has a retrospective design, and it was conducted between January 1st 2010 and December 31, 2011 at the Clinic of Orthopedics and Traumatology Tîrgu Mureş. We selected a group of 30 patients, including 6 female and 24 male patients, aged 17 to 54 years old (mean age was 30.13 years) for whom ACL reconstruction was performed in the above mentioned time frame. All of these patients underwent a single-bundle ACL reconstruction with hamstring autografts and closed braided loop fixation on the femoral side (Retro-Button, Athrex) and interference screw fixation on the tibial side (biocomposite interference screw, Arthrex).

ACL reconstruction was performed with a femur-first technique, in which the two bone tunnels are prepared separately. This technique offers an anatomical placement of the neoligament. Patients were usually discharged 24 hours after surgery, and followed a recovery protocol for 6 months postoperatively.

To evaluate the quality of life of patients we used the Short-Form 36 (SF-36) - a generic instrument for measuring health status, developed and tested by the New England Medical Centre [8]. The 30 enrolled patients were contacted by telephone on average 6 months postoperatively and asked for consent to participate in the study. Questionnaires were completed based on telephone interviews with the patients.

SF-36 questionnaire uses 8 scales: physical and social function, role limitation (physical and emotional), mental health, vitality, bodily pain and general health. The questionnaire consists of 36 questions and 2 other generic concepts that aggregate scales: physical and mental health. Scales are noted from 0 to 100 – if the value obtained is higher the patient has a better health.

Questionnaire scoring was done online - http://www.sf-36.org/demos/SF-36.html, obtaining graphs for the values of the scales for each patient and individual values compared to the population considered as normal (Figure 1). Because the SF-36 was designed by American scientists, the population considered is that of the United States.
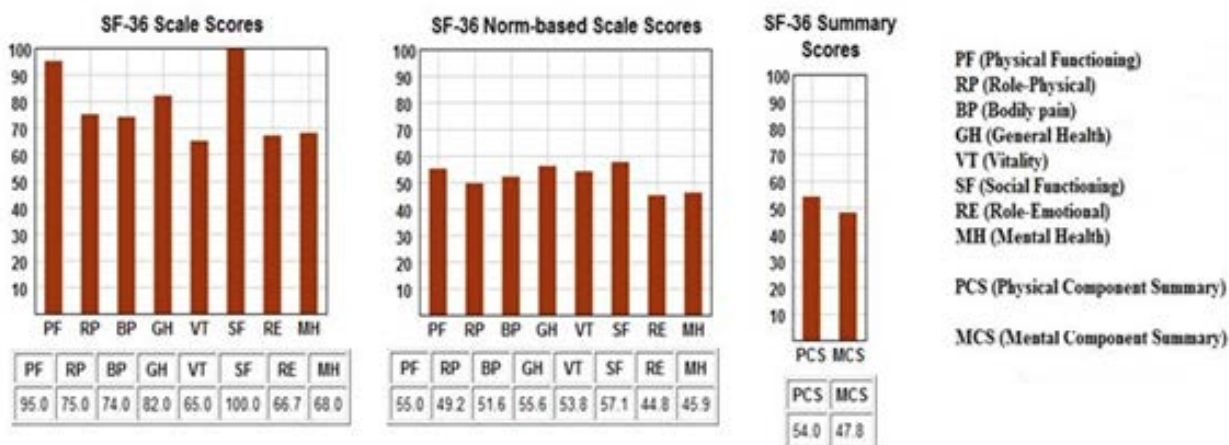

Figure 1 – Example of results obtained by online scoring of the questionnaire
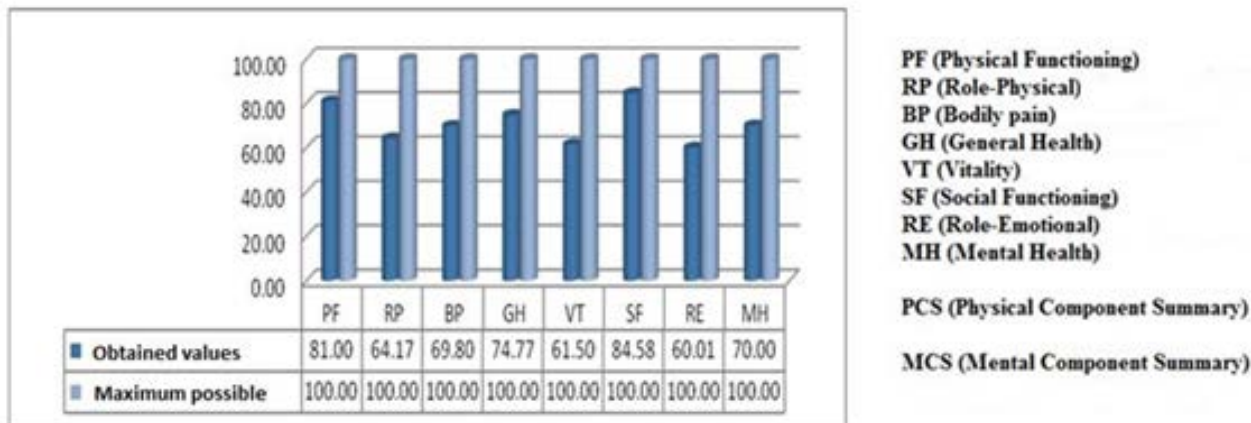
	PF	RP	BP	GH	VT	SF	RE	MH
■ Obtained values	81.00	64.17	69.80	74.77	61.50	84.58	60.01	70.00
■ Maximum possible	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

PF (Physical Functioning)
RP (Role-Physical)
BP (Bodily pain)
GH (General Health)
VT (Vitality)
SF (Social Functioning)
RE (Role-Emotional)
MH (Mental Health)

PCS (Physical Component Summary)

MCS (Mental Component Summary)

Figure 2 – Mean values obtained for the SF-36 questionnaire scales

Data processing and preparing tables and graphs were done with GraphPad software and Microsoft Excel – we calculated the mean value for all scales of the questionnaire and compared them to the values reported for the population considered normal.

Results

The SF-36 questionnaire was filled out for all patients, based on telephone interviews. Table I shows the values of the 8 scales of the questionnaire (physical functioning, role-physical, bodily pain, general health, vitality, social functioning, role-emotional and mental health) for each of the 30 patients included in the study, together with their descriptive statistics (minimum and maximum values, mean, standard deviation and median).

Questionnaire results are also interpreted as average values of the scales compared to the maximum possible value that can be obtained, which is 100 (Figure 2).

For a better understanding of the processed data, a comparison should be made with the population considered as normal in terms of quality of life. The mean value for the scales for the normal population is 50, with a standard deviation of 10 (Figures 3 and 4).
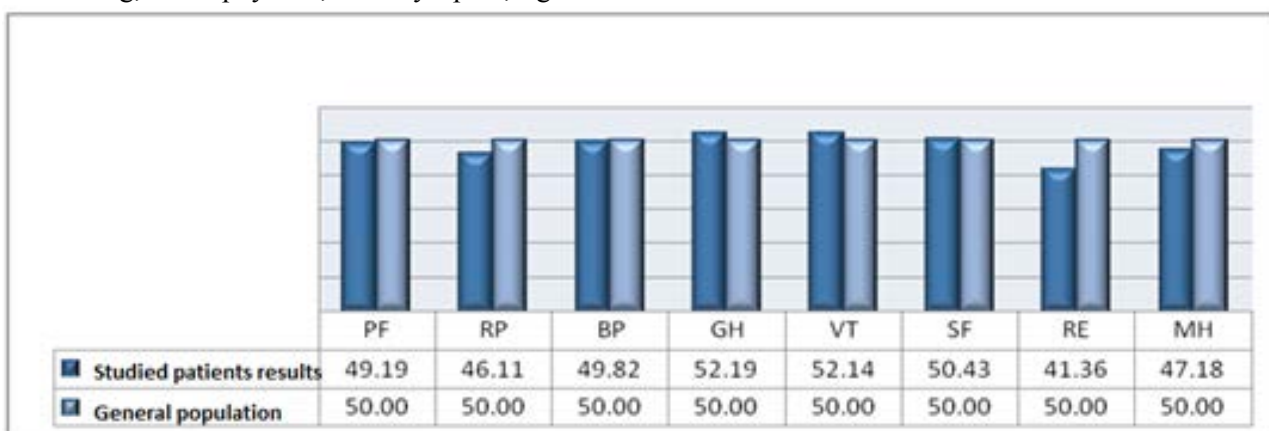

	PF	RP	BP	GH	VT	SF	RE	MH
■ Studied patients results	49.19	46.11	49.82	52.19	52.14	50.43	41.36	47.18
■ General population	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00

Figure 3 – Comparison of the studied patient group with the normal population

Table I – The values of the SF-36 questionnaire scales for the studied patients

Patient	Physical function	Role-physical	Bodily pain	General health	Vitality	Social function	Role-emotional	Mental health
1	90.0	100.0	84.0	75.0	75.0	100.0	66.7	76.0
2	85.0	75.0	74.0	72.0	40.0	75.0	66.7	60.0
3	80.0	50.0	62.0	77.0	55.0	75.0	66.7	68.0
4	100.0	100.0	74.0	100.0	90.0	100.0	66.7	64.0
5	85.0	50.0	62.0	57.0	50.0	75.0	100.0	76.0
6	85.0	75.0	84.0	95.0	65.0	100.0	100.0	72.0
7	90.0	50.0	74.0	77.0	60.0	75.0	33.3	80.0
8	45.0	0.0	41.0	37.0	40.0	50.0	0.0	68.0
9	90.0	75.0	74.0	92.0	65.0	100.0	66.7	72.0
10	100.0	75.0	100.0	100.0	75.0	75.0	33.3	76.0
11	95.0	75.0	74.0	82.0	65.0	100.0	66.7	68.0
12	85.0	75.0	84.0	82.0	50.0	87.5	33.3	80.0
13	85.0	100.0	72.0	92.0	95.0	100.0	100.0	80.0
14	80.0	50.0	62.0	77.0	55.0	75.0	66.7	68.0
15	80.0	100.0	72.0	82.0	65.0	100.0	33.3	56.0
16	70.0	50.0	72.0	57.0	45.0	62.5	33.3	56.0
17	75.0	50.0	74.0	82.0	75.0	75.0	66.7	80.0
18	90.0	75.0	84.0	95.0	65.0	87.5	100.0	64.0
19	90.0	75.0	72.0	67.0	70.0	100.0	33.3	64.0
20	80.0	50.0	84.0	77.0	50.0	87.5	66.7	56.0
21	80.0	50.0	62.0	57.0	55.0	87.5	100.0	76.0
22	95.0	100.0	84.0	100.0	90.0	100.0	66.7	84.0
23	70.0	50.0	41.0	77.0	50.0	75.0	33.3	68.0
24	75.0	50.0	74.0	72.0	60.0	100.0	33.3	68.0
25	75.0	75.0	62.0	67.0	80.0	87.5	66.7	80.0
26	80.0	75.0	74.0	82.0	55.0	100.0	66.7	76.0
27	60.0	25.0	41.0	47.0	50.0	75.0	33.3	76.0
28	70.0	50.0	62.0	52.0	60.0	50.0	66.7	64.0
29	85.0	75.0	74.0	57.0	60.0	100.0	66.7	60.0
30	60.0	25.0	41.0	57.0	35.0	62.5	66.7	64.0
	Physical function	Role-physical	Bodily pain	General health	Vitality	Social function	Role-emotional	Mental health
Mean	81.0	69.2	69.8	74.7	61.5	84.5	60.0	70.0
SD	12.1	21.5	14.3	16.7	15.0	15.6	25.3	8.1
Minimum	45	0	41	37	35	50	0	56
Median	82.5	75	74	77	60	87.5	66.7	68
Maximum	100	100	100	100	95	100	100	84

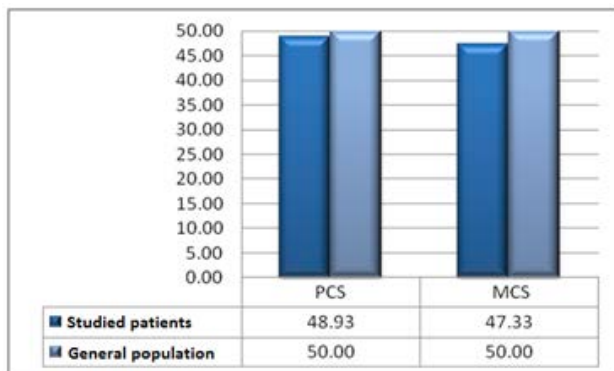*Figure 4 – Comparison of the generic components of the group and the general population (PCS – Physical health, MCS – Mental Health)*

	PCS	MCS
■ Studied patients	48.93	47.33
■ General population	50.00	50.00

Discussion

The term "quality of life" had different definitions over the years, but generally is based on four key principles: functional capacity, level of satisfaction, socio-economic level and personal protection of own health. It can also be understood as a subjective concept, based on the individual's own perspective, the only one who can define quality of life being the patient himself.

Defining and especially measuring quality of life is complicated, since both definition and measurement may be affected by cultural, ethical and religious values, as well as the set of personal values and perceptions. Therefore there is a lack of consistency and unanimity in the definition of quality of life due to different meanings of the concept and the little information we have about the tools used to measure it.

According to the literature, quality of life is affected by the following factors: psychosocial coping strategies [3], individual personality characteristics, expectations for life [2], self-concept, perception of crisis control and social support received from significant people.

The results obtained from the Short Form-36 questionnaire have confirmed our initial working hypothesis, in which we assumed that patients undergoing surgical reconstruction of the ACL have a quality of life comparable to that of the people considered normal.

Mean values obtained for the questionnaire scales fall in the range of 60 - 81, but these taken by themselves are difficult to interpret without a reference value. For a correct interpretation, it is necessary to refer to people considered normal. According to the SF-36 questionnaire scoring rules, the standard population has a mean value of 50 for each scale with a standard deviation is 10. Thus comparing the results obtained for the group of studied patients with the general population results, it appears that our values range from 41.36 to 52.19 (Figure 3), values that are considered normal based on the scoring of the SF-36 questionnaire. Also, physical and mental health scores (PCS and MCS) are comparable to those of the normal population. This shows that the initial hypothesis is true and the studied patients have good quality of life compared to that considered normal.

A similar study [5] conducted on patients post-ACL reconstruction that used the same SF-36 questionnaire was published by authors at the Orthopedics Department of Udewalla, Sweden. These authors reached the same conclusions as our study regarding the good quality of life of these patients compared to that of the general population. Moller and all. [6] followed 56 patients for a mean period of 11 years, noting that patients undergoing ACL reconstruction surgery had a quality of life similar to the population of the same age and sex in Sweden.

At the Orthopedic Centre of Umbro, Perugia conducted a study on a group of 60 patients with a mean age of 30 years undergoing ACL reconstruction. The patients filled out the SF-36 questionnaire both pre- and postoperative, and the results were compared with those of the healthy Italian population of the same age [4]. Patients experienced a net decrease in quality of life preoperatively (compared to the population considered normal) in the absence of other comorbidities, but at 12 months postoperatively had a net improvement compared to the initial results and even increased in terms of mental health compared to the normal population. Our results are consistent with the above mentioned studies.

This study could be improved by correlating

the results of the SF-36 questionnaire with a score performed preoperatively (e.g. Lysholm score). Also, for a better comparison of results we might consider the healthy population of Romania. In addition, closer monitoring of quality of life might imply the use of the SF-36 questionnaire both preoperatively and postoperatively at different intervals from 2 weeks to 12 months.

Conclusions

Quality of life of patients undergoing anterior cruciate ligament reconstruction is close to that of the population considered as healthy, which means that the traumatic episode followed by surgery does not affect medium-term quality of life, and that recovery after ACL rupture is overall, good.

The procedure of ACL single-bundle reconstruction with hamstring autografts and close braided loop (Retro-Button, Athrex) and biocomposite interference screw (Arthrex) fixation had excellent results in the group of patients studied, resulting in a quality of life comparable to the normal population.

Regarding the SF-36 questionnaire used in this study, we found that it can be successfully used in evaluating the quality of life of patients who have undergone ACL reconstruction, being a viable tool, easy to use and to interpret with the provided program.

Acknowledgment:

References

1. Amadio, P.C. (1993). Outcomes measurements. *The Journal of bone and joint surgery. American volume.* 75(11), 1583-1584.
2. Calman, K.C. (1984). Quality of life in cancer patients - a hypothesis. *Journal of medical ethics.* 10(3), 124-127.
3. Kempen, G.I., Ormel, J., Brilman, E.I. & Relyveld, J. (1997). Adaptive responses among Dutch elderly: the impact of eight chronic medical conditions on health-related quality of life. *American journal of public health.* 87(1), 38-44.
4. Lucania, L., Beccarini, A., Lupparrelli, S. & Cecconi, S. (2003). Arthroscopically assisted anterior cruciate ligament reconstruction. An analysis of impact on health-related quality of life and knee function. *Arthroscopy: the journal of arthroscopic & related surgery: official publication of the Arthroscopy Association of North America and the International Arthroscopy Association.* 19(6), 18-19.
5. Mansson, O., Kartus, J. & Sernert, N. (2011). Health-related quality of life after anterior cruciate ligament reconstruction. *Knee surgery, sports traumatology, arthroscopy: official journal of the ESSKA.* 19(3), 479-487.
6. Moller, E., Weidenhielm, L. & Werner, S. (2009). Outcome and knee-related quality of life after anterior cruciate ligament reconstruction: a long-term follow-up. *Knee surgery, sports traumatology, arthroscopy: official journal of the ESSKA.* 17(7), 786-794.
7. Quintana, J.M., Escobar, A. & Arostegui, I. et al. (2006). Health-related quality of life and appropriateness of knee or hip joint replacement. *Archives of internal medicine.* 166(2), 220-226.
8. Ware, J.E. Jr. &, Sherbourne, C.D. (1992). The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Medical care.* 30(6), 473-483.