

Does Physiotherapy Contribute to the Improvement of Functional Results and of Quality of Life after Primary Total Hip Arthroplasty?

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ABSTRACT

Introduction: This paper aims to determine whether physiotherapy succeeds in improving the functional results (expressed by the Harris hip score) and the quality of life after primary total hip arthroplasty, especially in very elderly persons.

Material and Method: A prospective study has followed up 100 patients with coxarthrosis, who underwent a primary total hip arthroplasty and who were subject to an early initiation of a recovery treatment, adapted to each individual, focused on regaining functionality and independence and continued at home after discharge from hospital. After 3 months, the Harris hip score was compared with the preoperative one and the quality of life was assessed according to a simplified questionnaire derived from SF-36.

Results: The average preoperative Harris hip score was significantly lower in patients aged over 75 years, as compared to the other 3 age groups (under 40 years, between 41 and 60 years and between 61 and 75 years). After 3 months, the average Harris hip score was significantly improved, in comparison to the preoperative one (85.89 as compared to 40.06) and there were no statistically significant differences between the average Harris hip score in all 4 age groups. The quality of life was regarded by patients as being good on average, in all 4 age groups.

Conclusion: Very elderly people benefit equally with the other age groups from a functional recovery after primary total hip arthroplasty, even if this recovery is initially more difficult and more cautious.

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INTRODUCTION

Coxarthrosis, which is the degenerative rheumatism of the hip articulation, is accompanied by pain, by a progressive limitation in the joint mobility as well as by muscular atrophy. The clinical exam emphasizes a muscular atrophy of the affected lower limb and, in paraclinical terms, it shows a cross-section reduction in these muscles – as per computed tomography – and a 10% increase in the fatty infiltration (myosteatorsis) – as per magnetic resonance imaging (1-3). Immediately after surgery, the muscular strength decreases by about 28% in the first week (4). One year after surgery, the results still show the existence of functional limitations, with a muscular strength decrease between 10-21%, with postural control deficits of the operated hip and with instability while walking, phenomena that can persist even after 2 years, in spite of the life quality improvement (5-8). A steady and independent walking, standing up from a chair, walking up and down the stairs, all these contribute to a great extent to a satisfying quality of life. All of these goals are achieved on the grounds of a satisfactory muscular efficiency. The efficiency of the whole lower limb represents an important predictive factor with respect to the quality of life after total hip replacement (9). It is achieved by means of an early functional recovery. Surgery together with functional recovery, equally contribute to winning the battle in order to get a stable new joint.

The purpose of functional re-education is to gradually return to daily activities within 4-6 weeks, continuing with a normal social and professional reintegration over the next 3-6 months after surgery.

Nowadays, the necessity of functional recovery after primary total hip arthroplasty is uncontested. Its role in regaining, as soon as possible, the current daily activities and also in returning to social and professional life is generally accepted.

Nevertheless, during its application, the functional recovery faces some obstacles related to the patient, to the awareness of the latter with regard to the importance of recovery, to age, to body weight status, to the functional status of the contralateral hip, to associated diseases, to the mental state of the patient, taking into account that all these obstacles can be

overcome only by adapting the recovery program to the specific features of each individual case (10-12).

Although they mention the difficulties faced by functional recovery in its application, the data in specialized literature do not reveal its methods of individualization in each patient and they do not mention the results obtained in each group of patients. □

MATERIAL AND METHOD

The research undertaken represents a prospective study of 100 patients, consecutively included, hospitalized and submitted to primary total hip arthroplasty, at Foisor Orthopaedics and Traumatology Hospital, between February 7, 2011 and October 8, 2012. Surgery was performed by head physicians of Foisor Hospital and it consisted in the implantation, by a classical approach method (not by a minimally invasive method) of some classical total prostheses (not short stem prostheses), cemented or uncemented. The recovery took place immediately after surgery, in the hospital and it continued until discharge from hospital (5-7 days), when the patients received a recovery program for home, in written form.

The inclusion criteria consisted of:

- patients with primary total hip arthroplasty performed on the very day when the recovery was started;
- patients without early intra- or postoperative complications, that may prevent the immediate beginning of recovery;
- patients with primary total hip arthroplasty, regardless of their age, of their associated diseases, of their obesity degree or of the type of prosthesis implanted;
- patients who, 3 months after surgery, came for a medical examination and were able to have their Harris hip score calculated;
- patients who, 3 months after surgery, completed the questionnaire regarding their satisfaction after arthroplasty (in order to assess the quality of life).

The exclusion criteria consisted of:

- patients with intraoperative complications that prevented the immediate beginning of recovery;
- patients with early postoperative complications that prevented the immediate beginning of recovery or the continuation thereof;

- patients with contraindications to begin recovery immediately;
- patients who could not have their Harris hip score calculated 3 months after surgery;
- patients who did not complete the questionnaire regarding their satisfaction in surgery 3 months after the prosthesis implantation.

In terms of functional recovery, it is advisable to take into consideration certain factors such as: age, sex, type of the implanted prosthesis, status of the contralateral hip, body mass index etc. In this research paper, we have considered, in particular, the age factor.

In order to render objective the results obtained by the recovery treatment, the hip functionality was assessed through the Harris hip score, calculated preoperatively and 3 months after surgery (13,14). Out of the existing scores for the assessment of the hip functionality, we chose to use the Harris hip score, which in addition to pain and mobility, also evaluates a series of functional abilities necessary to daily life (putting on shoes, standing up from and sitting down on a chair, walking up and down the stairs, getting on and off transportation means etc.), where the participation of the coxofemoral joint is essential. Considering that the main purpose of the primary total hip arthroplasty is not to obtain a certain amplitude of motion, a certain degree of muscular strength or the disappearance of pain, but to regain a functionality as close to normal as possible, we have chosen the Harris hip score as a means of assessment.

Three months after the prosthesis implantation, on the occasion of a medical examination, the Harris hip score was calculated and compared to the preoperative one. It is considered that the Harris hip score has been substantially improved if its functional aspect has increased by at least 20 points as against the preoperative one (15). Moreover, the results obtained can be considered as being excellent, if the Harris hip score is between 91 and 100 points, as being good if the score is between 80 and 90 points, as modest, when the score ranges between 71 and 79 points and as poor when its value is lower than 70 points.

Besides the calculation of the Harris hip score 3 months after surgery, we have considered that the subjective opinion of patients on the postoperative quality of life was at least

equally important. In order to calculate it, we used a simplified questionnaire, derived from SF-36 Questionnaire (16).

According to the points earned for the patients' answers to the questions in the questionnaire, the quality of life can be poor, if it does not totalize at least 35 points, moderate if it totalizes between 35 and 60 points, good when it gets between 61 and 80 points, very good when it gets between 81 and 90 points and excellent when it totalizes between 91 and 100 points

Out of 170 patients submitted to surgery and initially enrolled in the study, only 100 have answered the questionnaire, being included in the statistical analysis.

In the study conducted, we have tried to establish whether the primary total hip arthroplasty determines an improvement of the operated hip functionality as well as of the patient's general condition and whether this improvement reflects the patient's subjective assessment of the quality of his/her life. We have also tried to determine which factors (such as age, pre- and postoperative functional score, quality of life etc.) might affect the outcomes of the recovery treatment.

The results obtained have been statistically processed. Data have been expressed as average values, standard deviations, percentages. The ANOVA one-way test (Bonferroni correction) and the Student's t-test have been used to evaluate differences in the average values of quantitative calculations. The StataC 11 Program (StataCorp LP, Texas, USA, version 2009) has been used for data analysis. The probability value $p < 0.05$ has been considered statistically significant. □

RESULTS

The preoperative average Harris hip score in all the 100 patients studied was 40.06, with extreme limits between 18 and 60. Three months after surgery and recovery treatment, the average Harris hip score was more than twice the initial value of 85.89, ranging between 35.50 and 98.75.

Except for 4 cases, the postoperative Harris hip score for the rest of 96 cases had minimum 20 extra points for the functional activities, as compared to the preoperative score. In terms of qualitative results, 8 patients had a poor re-

sult, 7 a modest one, 47 a good one and 38 an excellent result (Figure 1).

The patients assessed the quality of their life as being, on average, 74.88 (ranging between 38 and 97), hence, as being good on average (with variations between excellent and modest). Half of the patients (51%) assessed the quality of life as being good, 31% considered it as being very good, 7% assessed it as excellent and only 11% as modest (Figure 2).

Comparing the assessment of the team that operated the patients and took care of them with the beneficiary's assessment, a match between them can be noticed, but the strictness

of the care team was slightly higher (85%, representing the totality of good results as against 89%, representing the patients' assessment).

The preoperative Harris hip score, according to the 4 age groups, was 39 in the age group under 40, 41.10 in the 41-60 age group, 41.75 in the 61-75 age group and significantly lower, i.e. 34.36 in the age group over 75 ($p = 0.041 < 0.05$) (Figure 3).

After surgery and recovery, although the perception of the quality of life was very different (from modest to excellent), the Harris hip score ranged, on average, to a lesser extent (an average of 86.20 at ages under 40, of 81 at ages between 41-60, of 86.65 at ages between 61-75 and of 81.65 at ages over 75), the differences being statistically insignificant. All average values of the Harris hip score, 3 months after surgery, in the 4 age groups, were within the range of good results (Figure 3).

The results of the postoperative Harris hip score, based on age, are shown in Table 1.

The quality of life ranged, on average, from 74.80 for ages under 40, to 77.10 for ages between 41 and 60, to 73 for ages between 61 and 75 and only to 66 for ages over 75. As a whole, the quality of life was maintained at an average value assessed as good for all 4 age groups (Figure 3).

The distribution of ratings on the quality of life according to age groups is shown in Table 2.

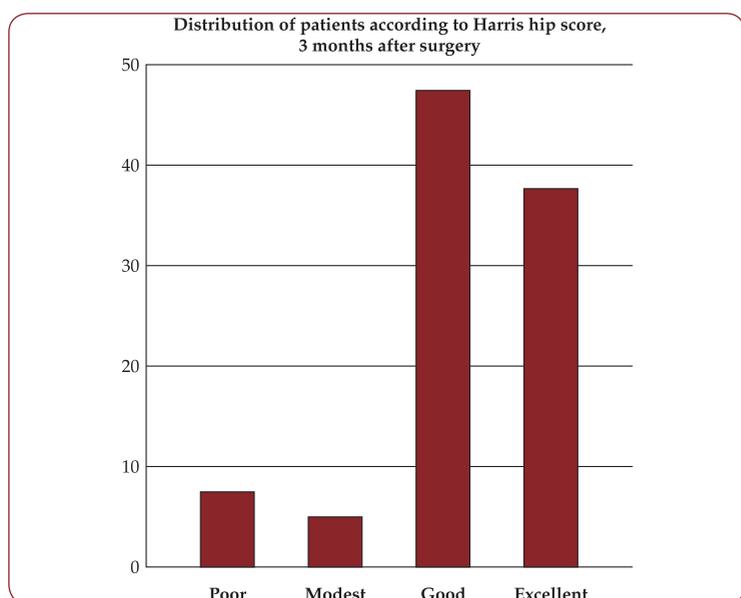


FIGURE 1. Distribution of patients according to Harris hip score, 3 months postoperatively.

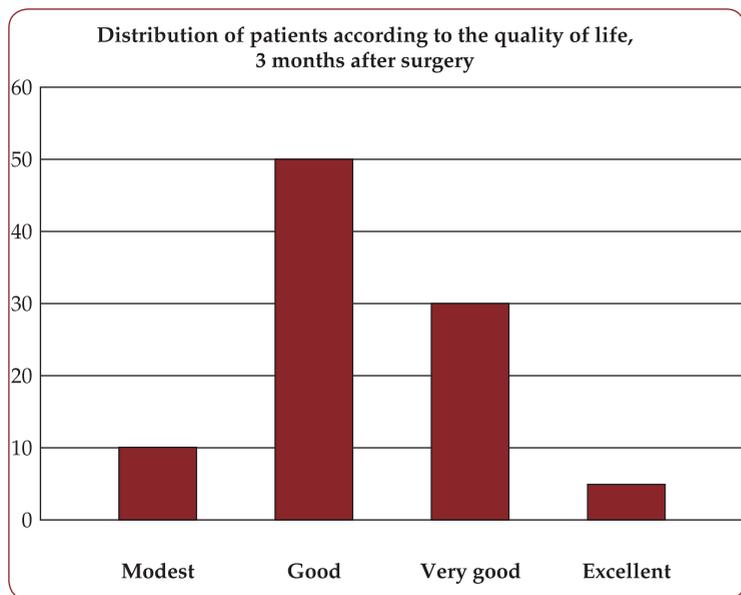


FIGURE 2. Quality of life 3 months after surgery.

DISCUSSIONS

Theoretically, the recovery program worked out in the Orthopaedics Clinic of Foisor Hospital includes a preoperative stage. This stage is extremely rarely fulfilled by patients who are hard to convince of its necessity, since the "saving" surgery is due to take place anyway. As a result thereof, our study is lacking in a group of patients supposed to have been submitted to physiotherapy preoperatively, as compared to a control group.

The postoperative recovery program, carried out in the Orthopaedics Clinic of Foisor Hospital after the primary total hip arthroplasty was oriented towards the integrative aspect of a progressive and individualized rehabilitation of the operated patient, in order to carry out activities of daily living without difficulty, as independently as possible. It goes without saying that, among the means used to this purpose,

the physical exercise meant to restore the amplitude of motion and then to restore the hip strength and motion had an important role, but the focus was on regaining/relearning current activities of daily life. We think that both aspects (synthetic and analytical) of the recovery process are necessary, so that we did not overlook physical exercise by focusing only on walk training, as suggested by a number of authors (17,18), even if we gave priority to regaining the ability to walk as well as to regaining functionality and independence.

The results obtained in all age groups were good, the average value of the postoperative Harris hip score being more than twice the preoperative average (85.89 after 3 months, as against 40.06 preoperatively), 96 patients earning more than 20 functional points. Patients assessed the quality of their life (according to the questionnaire) as being good in 51% of all cases and very good in 31% of them. 82% of the patients were pleased with the results obtained. The extreme cases were represented by 7% of patients who assessed the quality of their life as excellent and by 11% who assessed it as modest. We may conclude that the results were satisfactory for the patients in 89% of cases.

The average preoperative Harris hip score in the age group over 75 was statistically significantly lower than the average value for other age groups. A coxarthrosis occurring at an older age (in our case over 75 years), causes a more severe deterioration of the overall functionality, against the background of a more labile functional balance, of weaker muscles and of a long period of sedentary life, which was reflected in the value of the Harris hip score (the average value of the preoperative Harris hip score in patients aged over 75 was of 34.36, with limits between 18 and 43, as compared to the average of the whole sample, which was of 40.06, while the highest level reached a value of 60). Three months after the prosthesis implantation, there were no statistically significant differences in the average Harris hip scores among the patient groups differentiated by age, not even for the patients aged over 75. Although the average Harris hip score for this age was maintained below the overall average (81.65 as against 85.89, both assessed as good results), the difference was not statistically significant. The average Harris hip score of 81.65, for patients aged over 75, ranged between 35.50 and 91.45. The average quality of life

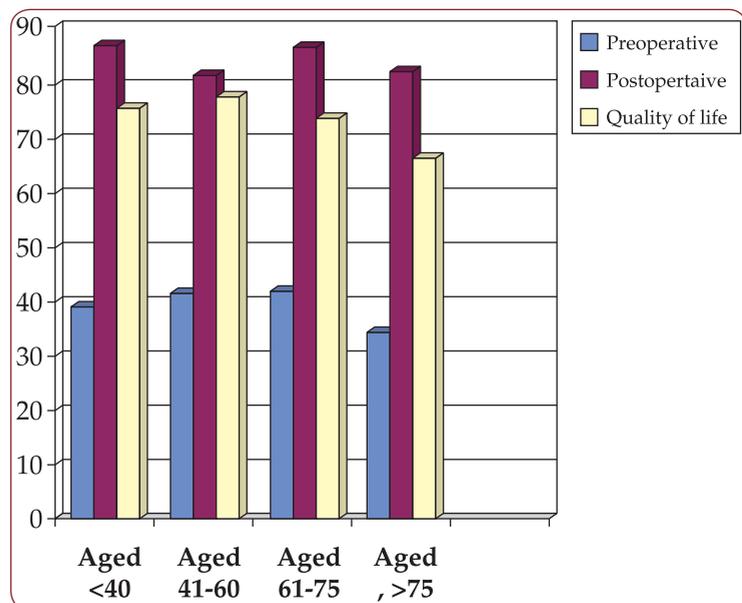


FIGURE 3. Preoperative and postoperative average Harris hip score and Quality of life average values in the 4 age groups.

assessments belonging to these old patients was of 66.45, being classified as a good quality, but much below the overall average (74.88) in terms of value. Ratings given by patients aged over 75 regarding the quality of life ranged from 2 for an excellent quality to none for a very good one, to 6 for a good quality and to 3 for a modest one.

We did not expect this homogeneity of the recovery results 3 months after the total hip prosthesis implantation. We consider that this is due to the early initiation of physiotherapy, to its holistic approach, focusing on regaining overall functionality and independence, as well as to its individualization according to each age

Age	Results of Harris hip score			
	Poor	Modest	Good	Excellent
<40	1	0	4	4
41-60	3	5	14	14
61-75	3	1	23	17
>75	1	1	6	3

TABLE 1. Results of the postoperative Harris score based on age.

Age group	Quality of life			
	Modest	Good	Very good	Excellent
<40	1	4	4	0
41-60	3	17	12	4
61-75	4	24	15	1
>75	3	6	0	2

TABLE 2. Quality of life according to age groups.

group and, within each group, according to the particular features of the given patient.

The adjustment of the recovery program according to age refers in particular to patients aged over 60 and over 75, who have, from the very beginning, a shortage of muscle contraction strength. For this reason, the dosage of volume and intensity of physical exercise shall be made very cautiously, to prevent neuromuscular fatigue.

The progressive increase of the intensity and volume of daily exercise has to be done very carefully and only based on the results obtained by each patient. The literature data emphasize that progressive resistance exercises are also recommended to older patients, even if the fragility of the functional balance is not given only by the loss of volume and muscle strength. The progressive resistance exercises can reduce or even remove the fragility of the functional balance (19-22). Due to the poor functional state and to the high incidence of chronic diseases, there is no population segment that would benefit more from physiotherapy than older persons (23). Even if, in case of very elderly people, the expected performances in regaining overall functionality and independence are slower and harder to get, along the time they are equalized with the performances of the other groups of patients.

There are various theories with regard to the relationship between physical exercises, aiming at the local motor skills, muscle strength, amplitude of motion and functional activities, such as walking, going up and down the stairs etc. Hence, Fortina and his collaborators (24) present the results obtained after primary total hip arthroplasty in 365 patients, submitted to a medical examination after 3 months, based on the Harris hip score and on a satisfaction questionnaire. Mention is being made of the training during hospitalization and of the rehabilitation program that the patient must undertake by himself/herself at home.

Munin and his collaborators (25) insist on superior results, obtained immediately and on the occasion of the medical examination performed 4 months postoperatively, due to an early rehabilitation program. According to Stockton and Mengersen (26), the performance of two physiotherapy sessions everyday leads to a faster fulfilment of the functional rehabilitation purposes. Jesudason and Stiller (18) and also Smith and his collaborators (17) claim that

walking rehabilitation is superior to exercises performed in bed. □

CONCLUSIONS

Surgery represents only half of the difficult battle to obtain a new and functional hip joint, while functional rehabilitation represents the other half.

In the ideal case, recovery should begin preoperatively, in order to make familiar the patient with the exercises that he/she will have to perform progressively after surgery and with the precautions to be considered. Only a few patients accept this initial period, while most of them wait for the "saving" surgery.

The early initiation of recovery, the very first day after surgery, is essential to obtain a good final result.

The recovery program has to be individualized according to the age group, to the reasons that caused a prosthesis implantation, to the functional status of the opposite hip, to the body mass index, to the type of the implanted prosthesis and, within each category of patients, to the specific functional features of the given case.

The results obtained after 3 months for the 100 patients studied led to the assessment of the quality of life as being modest in 11% of cases, good in 51%, very good in 31% and excellent in 7% of cases. 89% of the patients were satisfied with the results obtained.

In order to assess the preoperative functional status as well as the status 3 months after the prosthesis implantation, we have chosen the Harris hip score that contains, apart from the assessment of hip pain and mobility, the assessment of some functional activities necessary to fulfil, with ease and convenience, the requirements of daily life.

The sole category of patients that had the average preoperative Harris hip score statistically significantly lower than the average score of the other age groups, was the age group of patients over 75. Three months after surgery and recovery, the average Harris hip score was no longer statistically significantly different from the one of the other age groups. Very elderly persons equally enjoy the benefits of prosthetic implants and of recovery.

The statistic analysis of the sample studied showed that the preoperative functional status, emphasized by the Harris hip score, is a predic-

tive factor, meant only for reference, for the final result of the surgery and recovery.

The statistic analysis showed that there is a good correlation between the Harris hip score registered 3 months after surgery and the quality of life, as assessed by the patients.

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