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Active rehabilitation importance in patients with primary total hip replacement

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Abstract. Primary arthroplasties represent an important option for the patients that sustain pain and disabilities produced by the arthroses with particular hip or knee localizations. Even if we can obtain pain relief and effort minimization by surgery, a rehabilitation program is required for a fast mobility and functionality recovery; thus, limping will be diminished or abolished and the patient will recover an independent life style. Thus, all indices of life quality could be restored, mainly due to active assisted recovery program. *Material and method:* We have performed this pilot retrospective study on a group of 30 patients investigated and operated between 1st of January- 31 December 2011 in the Orthopaedic Clinic in the Rehabilitation Hospital in Iasi, Romania. To evaluate preoperative and postoperative life quality at 3 and 9 months, we have used Harris questionnaire and scoring system. *Results:* We have observed a good correlation among the general Harris scores applied pre and postoperatively at 3 and 9 months. The Harris score evolution showed a progressive linear improvement at 3 and 9 months postoperatively. All items have improved, except absence of deformity item, which remained quasi constant, with only a slight improvement. A special mention is to be performed for the pain item which score have dramatically improved in postoperative steps. Also walking scores were considerably improved, probably due to active exercise recovery in a consistent well organized schedule.
Key words*: total hip replacement, Harris score, life quality.*

Introduction

Primary arthroplasties represent an important option for the patients that sustain pain and disabilities produced by the arthrosis with particular hip or knee localizations (1). Endoprosthesis arthoplasty can be defined as a surgical reconstructive intervention associated to bone loss and prosthetic replacement for the articular elements (2).

This intervention approaches reestablishment of the articular mobility and normal functionality for he muscles, ligaments and all periarticular structures that participate to articulation movements and control.

Prosthetic hip surgery should always be performed as a consultative decision between the surgeon and the patient, justifying this radical technique as an elective therapeutic method (3).

This decision is supported mainly by clinical and functional reasons (pain and painful active and passive mobility limitation) resulting in a major functional impairment.

Other elements to be considered are: patient age, weight, sex, etiology, preexistent or associated diseases, patient requirements, social status.

The main purposes of total hip arthroplasty include (4, 5): pain alleviation, mobility recovery and articular stability, correcting the present deformities.

Total hip arthroplasty efficiency depends on: the quality of articular reconstruction and artificial hip biomechanics; integrity and biomechanical balance for periarticular muscles.

To attend this double purpose, two elements are being required (6): access path to the articulation with respect to muscular system and which will be able to reestablish articular balance; an optimal prosthetic system.

There is no unanimously accepted recovery program (7). Even if we can obtain pain relief and effort minimization by surgery, a rehabilitation program is required for a fast mobility and functionality recovery; thus, limping will be diminished or abolished and the patient will recover an independent life style. Thus, all indices of life quality could be restored, mainly due to active assisted recovery program (8).

Material and Methods

We have performed this pilot retrospective study on a group of 30 patients investigated and operated between 1st of January - 31 December 2011 in the Orthopaedic Clinic in the Rehabilitation Hospital in Iasi, Romania. To evaluate preoperative and postoperative life quality at 3 and 9 months, we have used Harris questionnaire and scoring system. The mean patient age was of 62.36 years. Most patients were incoming from rural areas (68.23%).

The mean body mass index in our study group was of 26.8, indicating that most of the patients were overweighed. The body mass index may represent an essential indicator even in preoperative evaluation and also immediate or late postoperative evaluation.

Statistical analysis was performed by SPSS17 software. Statistical analysis was based on the total numerical score of each parameter and not on the clinical stadialization. We have performed a descriptive statistical analysis together with a correlation study in order to evaluate the ratio between preoperative Harris scores and the Harris scores at 3 and 9 months following surgery.

Harris scoring system (HSS) represents a method to assess the results of hip surgery. Its purpose is to evaluate different hip impairments and methods of treatment (9). Originally published in 1969, it was conceived to cover related domains as pain, function, absence of deformity, and range of motion (ROM). Pain evaluation is required to observe pain severity and its effect on usual activities; it is also required to modulate pain medication. Function item refers to daily activities (stair climbing, public transportation usage, sitting position, and managing shoes and/or socks) and walking (limp, requirements for mechanical support, and walking distance). Deformity item is considering hip flexion, adduction, internal rotation, and extremity length discrepancy. ROM is measuring hip flexion, abduction, external and internal rotation, and adduction.

HHS includes 10 items and the maximal score is of 100 points (best possible outcome). This maximal score includes: pain (1 item, 0–44 points), function (7 items, 0–47 points), absence of deformity (1 item, 4 points), and range of motion (2 items, 5 points). HHS is an evaluation system that must be administered by a qualified health care professional (physician or kinetotherapist).

All items in the Harris scale correspond to a specific numerical value and are equivalent to answering options from the patient. Each item has a specific number of response options, and each response option has a specific amount of points. ROM consists in 6 motions graded according on the arc of possible motion. The total Harris score is performed by the summation of the scores obtained in the 4 mentioned domains. In order to evaluate the answers to this scoring system, one should be advised that the maximum score is of 100 points. This score is composed from 44 points accorded to pain, 47 points accorded to function, 5 points accorded to the ROM, and 4 points for deformity. Function includes daily activities (with 0-14 points) and walking abilities (with 0-33 points). The best HHS means no dysfunction. A poor operative result scores for 70 points; the range 70–80 points is considered as fair, while a range between 80–90 points is considered as good, and 90–100 an excellent result (10).

Results

We have explored and interpreted general Harris scores for all considered patients, preoperative, and postoperatively at 3 and 9 months.

For the pain item correlations we have obtained a Pearson correlation coefficient of 0.809 between preoperative and 3 months postoperative and of 0.431 between preoperative and 9 months postoperative. This suggests a strong correlation between pain variability in the questionnaire, preoperative and at 3 months, and a moderate correlation between preoperative pain and at 9 months postoperatively.

At the same time, pain scoring at 3 months postoperatively is highly correlated (Pearson index 0.514) with the same score at 9 months ($p=0.004$).

Sig. value close to 0.000 shows a significant correlation coefficient at 0.01 meaning that we have less than 1% error possibilities if we affirm that between the two variables there is a significant correlation. Thus we may consider the presence of a strong correlation between preoperative pain and postoperative pain at 3 months. However, the correlation between preoperative pain and the postoperative pain at 9 months becomes moderate, while the recovery and rehabilitation program improved a lot the scoring for this item.

For the walking abilities item correlations we have obtained a Pearson correlation coefficient of 0.636 between preoperative and 3 months postoperative; no significant correlation was

observed among preoperative and postoperative at 9 months score, indicating a very subjective interpretation of this item and also probably a very good recovery but inconstant with preoperative data. There is no correlation among scores for walking abilities at 3 and 8 months postoperatively.

Table I. Pearson correlations between preoperative, 3 and 9 months postoperative Harris scores regarding pain, in the study group

		Preoperative pain	After 3 months	After 9 months
Preoperative pain	Pearson Correlation	1	.809**	.431*
	Sig. (2-tailed)		.000	.017
Pain at 3 months	Pearson Correlation	.809**	1	.514**
	Sig. (2-tailed)	.000		.004
	N	30	30	30
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

Table II. Pearson correlations between preoperative, 3 and 9 months postoperative Harris scores regarding walking abilities, in the study group

		Preoperative	After 3 months	After 9 months
Preop. walking	Pearson Correlation	1	.636**	-.158
	Sig. (2-tailed)		.000	.403
Walking at 3 months	Pearson Correlation	.636**	1	.206
	Sig. (2-tailed)	.000		.276
	N	30	30	30
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

Table III. Pearson correlations between preoperative, 3 and 9 months postoperative Harris scores regarding daily activities, in the study group

		Preoperative	After 3 months	After 9 months
Preop. daily activities	Pearson Correlation	1	.849**	.751**
	Sig. (2-tailed)		.000	.000
Daily activities at 3 months	Pearson Correlation	.849**	1	.936**
	Sig. (2-tailed)	.000		.000
	N	30	30	30
**. Correlation is significant at the 0.01 level (2-tailed).				

For the daily activities item correlations we have obtained a Pearson correlation coefficient of 0.849 between preoperative and 3 months postoperative and of 0.751 between preoperative and 9 months postoperative. This suggests a strong correlation between daily activities variability in the questionnaire, preoperative, at 3 months, and at 9 months postoperatively. At the same time, daily activities scoring at 3 months postoperatively is highly correlated (Pearson index 0.936) with the same score at 9 months ($p<0.001$).

For the absence of deformity item correlations we have obtained no Pearson correlation between preoperative and 3 months postoperative or at 9 months postoperative. At the same time, absence of deformities scoring at 3 months postoperatively is highly correlated (Pearson index 0.940) with the same score at 9 months ($p<0.001$).

For the ROM item correlations we have obtained a Pearson correlation coefficient of 0.712 between preoperative and 3 months postoperative and of 0.471 between preoperative and 9 months postoperative. This suggests a strong correlation between ROM variability in the questionnaire, preoperative, at 3 months, and at 9 months postoperatively. At the same time, daily activities scoring at 3 months postoperatively is highly correlated (Pearson index 0.936) with the same score at 9 months ($p<0.001$).

Table IV. Pearson correlations between preoperative, 3 and 9 months postoperative Harris scores regarding absence of deformity, in the study group

		Preoperative	After 3 months	After 9 months
Preop Abs.Dif.	Pearson Correlation	1	.263	.263
	Sig. (2-tailed)		.161	.161
Abs.Dif. at 3 months	Pearson Correlation	.263	1	0.940**
	Sig. (2-tailed)	.161		.000
	N	30	30	30
**Correlation is significant at the 0.01 level (2-tailed).				

Table V. Pearson correlations between preoperative, 3 and 9 months postoperative Harris scores regarding range of motion (ROM), in the study group

		Preoperative	After 3 months	After 9 months
Preop ROM.	Pearson Correlation	1	.712**	.471**
	Sig. (2-tailed)		.000	.009
ROM at 3 months	Pearson Correlation	.712**	1	.405*
	Sig. (2-tailed)	.000		.027
	N	30	30	30
**. Correlation is significant at the 0.01 level (2-tailed).				

Table VI. Pearson correlations between preoperative, 3 and 9 months postoperative total Harris scores in the study group

		Preoperative	After 3 months	After 9 months
Preop. Harris	Pearson Correlation	1	.732**	.550**
	Sig. (2-tailed)		.000	.002
Harris at 3 months	Pearson Correlation	.732**	1	.675**
	Sig. (2-tailed)	.000		.000
	N	30	30	30
**. Correlation is significant at the 0.01 level (2-tailed).				
*. Correlation is significant at the 0.05 level (2-tailed).				

For the total Harris score correlations we have obtained a Pearson correlation coefficient of 0.732 between preoperative and 3 months postoperative and of 0.550 between preoperative and 9 months postoperative.

This suggests a strong correlation between Harris scores variability in the questionnaire, preoperative, at 3 months, and at 9 months postoperatively. At the same time, general Harris scoring at 3 months postoperatively is highly correlated (Pearson index 0.936) with the same score at 9 months ($p<0.001$).

The Harris score evolution showed a progressive linear improvement at 3 and 9 months postoperatively (figure 1). The mean Harris score preoperatively was of 42 while at 3 months the score has obviously improved (value=68 points). At 9 months, for the investigated group, the score has reached the value of 91.

The detailed per item evolution for the Harris scoring in the investigated group is showed in figure 2. All items have improved, except absence of deformity item, which remained quasi constant, with only a slight improvement.

A special mention is to be performed for the pain item which score have dramatically improved in postoperative steps.

Also walking scores were considerably improved, probably due to active exercise recovery in a consistent well organized schedule.

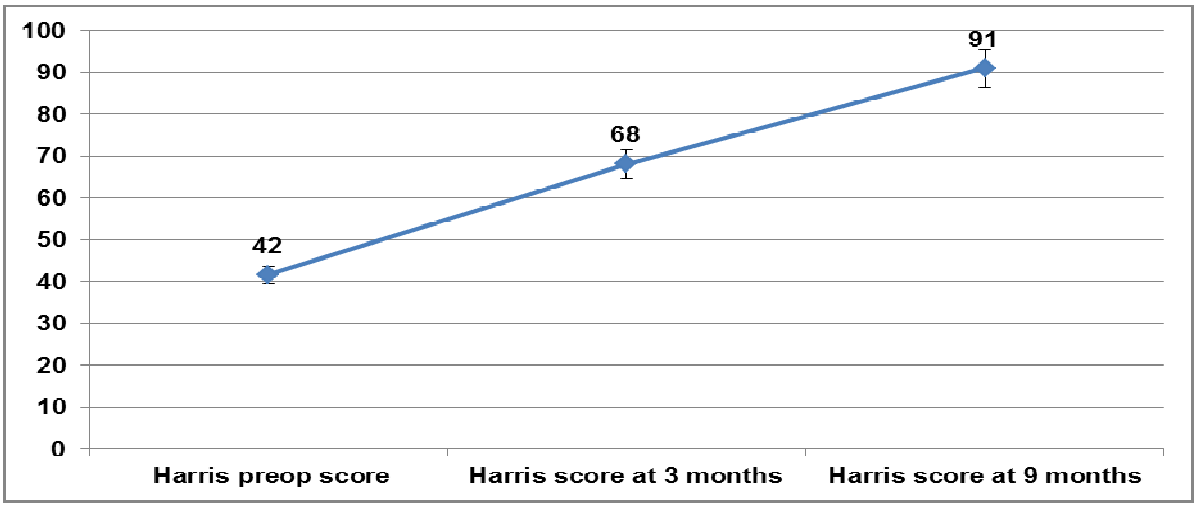

Figure 1. Harris score evolution, preoperative, at 3 and 9 months postoperatively. Error bars represent standard deviation from mean values.

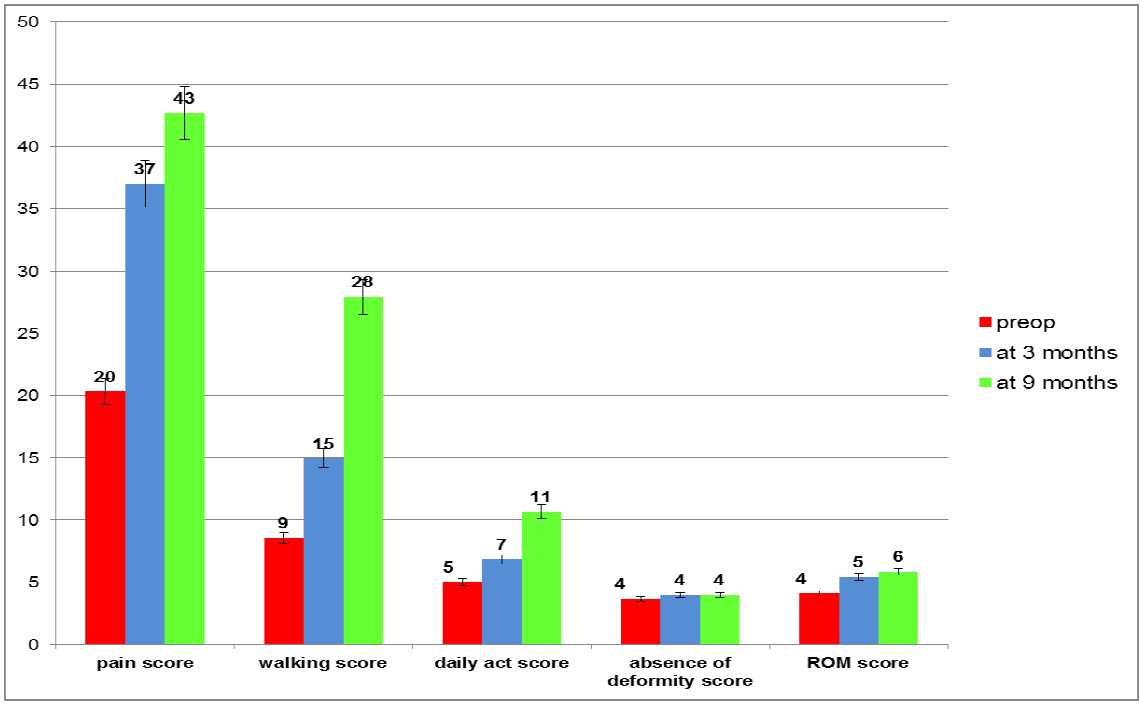

Figure 2. Harris score evolution, detailed per each item, preoperative, at 3 and 9 months postoperatively. Error bars represent standard deviation from mean values.

Conclusions

Controlled and scheduled physical exercise plays an important role not only for orthopaedic patient recovery following major surgery in total hip replacement but possible in other operative procedures as vascular and thoracic surgery, urological and gynecological surgery.

The concept of enhanced recovery, first described and promoted by Henrik Kehlet, impose multimodal rehabilitation program to reduce post-operative pain and accelerate rehabilitation. According to our study, life quality was considerably improved by a special conceived

rehabilitation program that starts even preoperatively by counseling the patient about his further condition and rehabilitation duration.
Further statistical investigations should better organize patient groups and should also include prospective and retrospective studies which will show flaws of classic scoring systems and will bring recommendations for improved scoring systems.

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