Coll. Antropol. **36** (2012) 1: 207–212
Original scientific paper

Measuring Improvement Following Total Hip and Knee Arthroplasty Using the SF-36 Health Survey

Veljko Šantić[1], Dalen Legović[1], Branko Šestan[1], Hari Jurdana[1] and Marin Marinović[2]

[1] University of Rijeka, School of Medicine, »Lovran« Clinic for Orthopaedic Surgery, Lovran, Croatia
[2] University of Rijeka, School of Medicine, Rijeka University Hospital Center, Department of Traumatology, Rijeka, Croatia

A B S T R A C T

The aim of this study was to evaluate the impact of total hip or knee arthroplasty upon quality of life in elderly patients. The study was carried out at the Clinic for Orthopaedic Surgery Lovran on 74 total hip arthroplasty and 70 total knee arthroplasty patients. All patients had completed the Medical Outcomes Study 36-Item Short Form in the week having preceded their surgery and then again postoperatively, 2 years after. The data obtained were statistically processed at the level of physical function, role limitations due to physical problems, role limitations due to emotional problems, social function, mental health, energy or vitality, pain and general health perception, and change in health. The primary total hip arthroplasty patients showed significant improvement at all levels measured. Similarly, the primary total knee arthroplasty patients expressed significant improvement according to all the parameters but the mental health assessment. Comparison of outcomes between the two assessment groups of patients resulted in slightly superior quality of life outcomes in total hip arthroplasty patients. It can be concluded that total hip or knee arthroplasty significantly enhances the health related quality of life in elderly patients.

Key words: *hip, knee, arthroplasty, quality of life*

Introduction

The assessment of patients' health condition and patient outcomes is at the core of clinical research. A various survey methods have been developed for the assessment of hip and knee surgical treatment efficiency. The Harris hip score, the Charnley modified D'Aubigne-Postel scale, the Hospital for Special Surgery knee score and the Knee Society knee score are some of the widely accepted survey methods[1–4]. These health care outcome surveys make it possible for our surgical treatment results to be presented in an objectively comparable format. They actually represent a standard format of information interchange between surgeons on their own evaluation of treatment efficiency not including significant patient-derived assessments of health care outcomes in respect of quality of life.

During the past decades, interest in patient-derived assessment of health care has grown significantly. At the same time, patients' interests in surgical treatment options are directed toward preserving and/or enhancing their quality of life. This is why patient based measures in orthopaedic clinical outcome studies are now commonly accepted and they even represent a requirement for publication in many journals. Generic outcome measures, however, offer the opportunity to determine treatment efficacy, compare treatment options, and guide patient selection when a variety of different procedures are available from which to choose[5]. The Medical Outcomes Study 36-Item Short Form (SF-36) is accepted method for assessment of health related quality of life (HRQOL) in orthopaedics[6]. It has been identified as a reliable and valid generic measure of functional status, well being and general health perception. Because of its generic nature, it can be used to compare the relative value of diverse surgical intervention[7,8].

The purpose of this study was to apply a generic health outcome measure SF-36 to elderly patients to evaluate relative efficacy of the primary total hip and knee arthroplasty on the basis on their self-assessed health care outcomes.

Received for publication December 23, 2011

Patients and Methods

The study has included 144 patients with total either hip or knee cement endoprosthesis applied at the Clinic for Orthopaedic Surgery Lovran. Operations were performed by highly experienced surgeons using standard surgical procedures under identical working conditions. Indications for surgery were severe and intolerable pain and dysfunction for the patients with arthritis of the hip and knee. Patients with second joint arthroplasty applied during the study period were excluded. In their post-operational period, the patients were prescribed the appropriate physical therapy programme. In the primary total hip arthroplasty group of 74 cases, the preoperative diagnosis was osteoarthritis in 67, posttraumatic arthritis in 4, avascular necrosis in 2 cases, and rheumatoid arthritis in 1 case. In the primary total knee arthroplasty group of 70 cases, the preoperative diagnosis was osteoarthritis in 65, posttraumatic arthritis in 3, and rheumatoid arthritis in 2 cases.

Medical outcomes study 36-item short form

All patients had completed a Croatian version of the SF-36 questionnaire, licensed to the »Andrija Štampar« School of Public Health, within one week before their surgery and then again postoperatively, 2 years after[9,10]. Preoperatively, the questionnaires had been either self-administered by the patients or by in-person interviewers, whereas postoperatively the data were provided by them to an interviewer either during an office visit or by telephone. The questionnaire typically takes 15 to 20 minutes to complete. The SF-36 is a multi-purpose, short-form health survey that consists of 36 question measures comprising three aspects of health: functional ability, well-being and overall health. In an attempt to quantify these aspects, the SF-36 assesses eight domains of quality of life: physical function, role limitations due to physical problems, role limitations due to emotional problems, social function, mental health, energy or vitality, pain and general health perception. A single item also assesses the patient's perception of changes in health. The total result is most often shown in the form of the profile defined with eight points that represent the measure of individual aspects of health transformed into a unique scale whose theoretical minimum is a score of 0 and the maximum a score 100. On all scales, higher results indicate better subjective health[11].

Statistical analysis

Due to non-normal data distribution nonparametric statistical procedures were used in data analysis. Difference in HRQOL between groups was tested with Mann-Whitney U-test, and difference in results before and after the surgery were tested with Wilcoxon Signed Ranks Test. Statistical analysis was performed by statistical software Statistica, ver.7.1 (StatSoft, Inc., 2005). Statistical significance was set at $p<0.05$.

Results

Among 74 patients with total hip arthroplasty, there were 21 men and 53 women with a mean of 70.8±2.5 years. Among 70 patients with total knee arthroplasty, there were 26 men and 44 women whose mean age was 72.03±3.2 years. All the patients had a normal course of operation and their postoperative physical therapy was completed against the scheduled programme.

The survey of the impact of the primary total hip arthroplasty upon patients' overall health perception resulted in their significantly improved postoperative HRQOL. Statistically significant improvement was measured at all levels: physical function, role limitations due to physi-

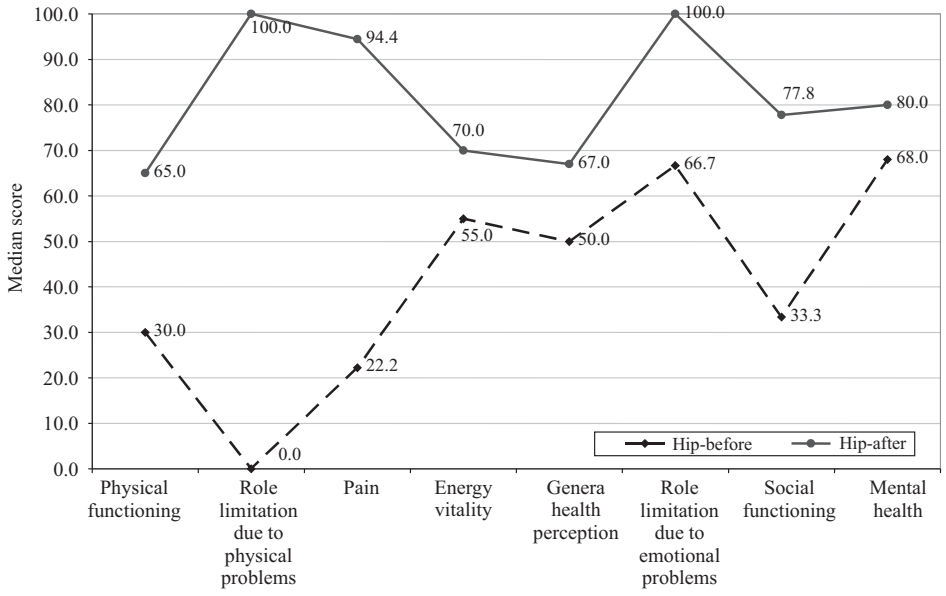

Fig. 1. Total hip arthroplasty SF-36 scores before and after surgery.

TABLE 1
COMPARISION OF HIP AND KNEE GROUP SF-36 SCORES BEFORE SURGERY

Dimension	Hip	Knee	p
	Median (interquartile range)		
Physical functioning	30.0 (20.0–35.0)	30.0 (25.0–35.0)	0.006
Role limitation due to physical problems	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.330
Role limitation due to emotional problems	66.7 (66.7–100)	100.0 (66.7–100)	0.000
Social functioning	33.3 (22.2–44.4)	33.3 (33.3–44.4)	0.108
Mental health	68.0 (60.0–76.0)	72.0 (64.0–80.0)	0.034
Energy vitality	55.0 (55.0–60.0)	55.0 (55.0–60.0)	0.068
Pain	22.2 (22.2–33.3)	33.3 (33.3–55.6)	<0.001
General health perception	50.0 (45.0–57.0)	42.0 (40.0–52.0)	<0.001

cal problems, social function, mental health, energy or vitality, pain, general health perception ($p<0.001$) and role limitation due to emotional problems ($p<0.003$, Figure 1).

The survey of the impact of the primary total knee arthroplasty upon patients' overall health perception also resulted in enhanced HRQOL following the surgery. Statistically significant improvement ($p<0.001$) was measured at the level of physical function, role limitations due to physical problems, social function, energy or vitality, pain, general health perception and role limitation due to emotional problems ($p<0.003$). At the level of mental health assessment there were recorded no statistically significant differences ($p=0.517$, Figure 2).

Comparative HRQOL results preceding and following patients' hip and knee arthroplasty are shown in Tables 1 and 2. Statistically significant difference appeared preoperatively at the level of physical function, role limitation due to emotional problems, mental health, pain and general health perception. Postoperatively, statistically significant HRQOL improvement was measured after hip arthroplasty at the level of physical function, social function, mental health, pain and general health perception, as compared to knee arthroplasty. Regarding the perception of change in health relative to one year ago, enhancement was confirmed in both assessment groups, as presented in Table 3.

Discussion and Conclusion

Total hip and total knee arthroplasties are well accepted as reliable and suitable procedures to return patients to function. These operations are performed where the knee or hip joints have reached the limit not allowing either for conservative treatment methods or any other operative treatment to provide improvement in patient's health condition. In such patients, clinical status show reduced joint function, pain and shorter aided or non-aided ambulation[12]. In diagnostic terms, we are most

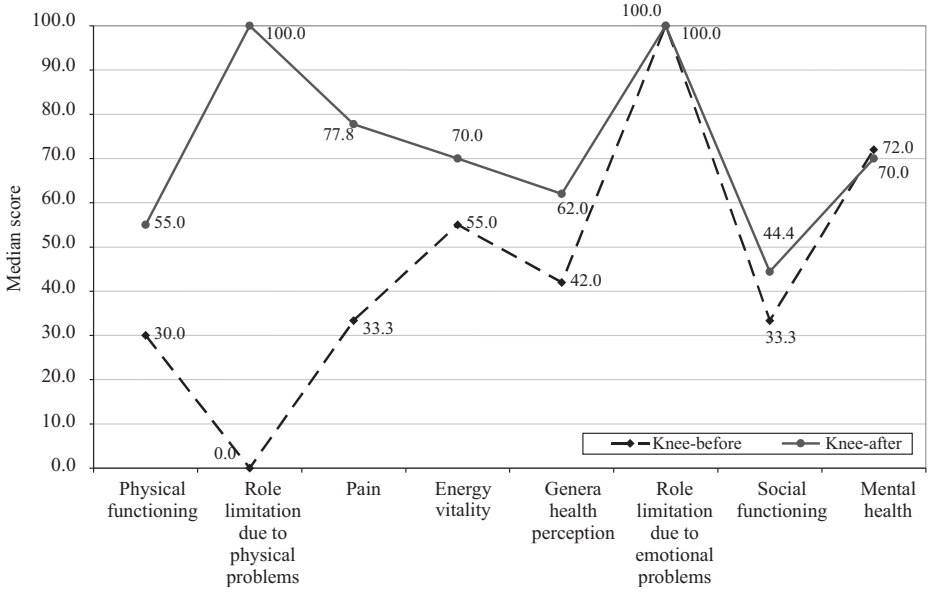

Fig. 2. Total knee arthroplasty SF-36 scores before and after surgery.

TABLE 2
COMPARISION OF HIP AND KNEE GROUP SF-36 SCORES AFTER SURGERY

Dimension	Hip	Knee	p
	Median (interquartile range)		
Physical functioning	65.0 (60.0–65.0)	55.0 (55.0–60.0)	<0.001
Role limitation due to physical problems	100.0 (75.0–100)	100.0 (75.0–100)	0.232
Role limitation due to emotional problems	100.0 (100–100)	100.0 (100–100)	0.060
Social functioning	77.8 (66.7–77.8)	44.4 (44.4–66.7)	<0.001
Mental health	80.0 (76.0–84.0)	70.0 (68.7–80.0)	<0.001
Energy vitality	70.0 (65.0–70.0)	70.0 (65.0–70.0)	0.662
Pain	94.4 (88.9–100)	77.8 (66.7–77.8)	<0.001
General health perception	67.0 (62.0–72.0)	62.0 (57.0–67.0)	<0.001

TABLE 3
PATIENT'S PERCEPTION OF CHANGE IN HEALTH RELATIVE TO ONE YEAR AGO

Group		Health relative to one year ago			
		Much better	Somewhat better	About the same	Somewhat worse
Hip	Count	5	32	34	3
	% within group	6.8%	43.2%	45.9%	4.1%
Knee	Count	8	48	6	8
	% within group	11.4%	68.6%	8.6%	11.4%
Total	Count	13	80	40	11
	% within group	9.0%	55.6%	27.8%	7.6%

frequently dealing with either primary or secondary osteoarthritis or with rheumatoid arthritis of a joint.

Hip and knee endoprostheses implemented today are the result of several decades long experience deriving from treatment practices and technological improvements. The size of bone resection and the choice of endoprothetic material required have undergone changes as well. Distinction should be thus made between standard and resurfacing endoprostheses, which can be made either completely or partly of metal, ceramics or polyethylene. There is a vast variety of types and manufacturers of joint endoprostheses available on the market. Whereas any type of endoprosthesis may offer some specific features, they can be basically divided into cement and uncement ones according to the implementation method[13,14]. Arthroplasty has been followed up by the development of surgical approaches or implementation techniques. Their development has been directed toward a more precise, faster and easier implementation of joint endoprosthesis and as little damage to the surrounding tissue as possible.

In numerous studies, hip and knee arthroplasties efficacy have been followed by various methods of assessment directed toward local functional status of the joint and patients' mobility, while setting aside their impact on HRQOL[1–4]. Today, as patients become increasingly well-informed on surgical procedures, apart from the expected recovery their concern also addresses the impact such treatment is expected to produce upon their daily habits, working and social commitments and hobbies. This fact has encouraged the development of health outcome survey methods based on the assessment of improvement in the HRQOL[15,16]. Health outcome surveys can be broadly divided into two categories: general and condition-specific ones[17]. General health questionnaires measure overall health through a wide breadth of questions covering multiple aspects of health. Condition-specifics surveys focus on the functional impact and symptoms of a given condition. Both general and condition-specific outcome tools are widely reported and can be implemented together. General health surveys, however, allow for comparison among patients with the same condition and between patients with different conditions. Additionally, general health surveys may detect unintended side effects of treatment.

Total hip or knee arthroplasties are surgical procedures requiring well experienced surgeons, good technical equipment, work organization and patient pre-operative preparation[18]. Apart from the cost of endoprosthesis itself, these are basically the reasons for elevated costs of treatment. In elderly patients, due to their poorer overall health condition, the risk to develop complications is even greater[19]. They require a wide-range pre-operative treatment, thus causing further growth in the total cost of treatment. The aim of the study was to evaluate the impact of these surgical procedures on HRQOL in elderly

patients and thus to evaluate their justification. The survey was carried out using the SF-36 patient-based measures which have been currently most commonly employed in orthopaedic clinical outcome studies.

The results obtained have shown significantly enhanced patients' HRQOL following total hip or knee arthroplasty. Significant improvement has been stated at all assessment levels, except for the mental health level, where knee arthroplasty is involved. This can be explained by an already elevated level of mental health results obtained preoperatively. We consider this significant improvement in both groups of patients to be most probably attributable to already known successful functional outcomes of such surgeries and also to highly motivated patients who choose surgical treatment. To provide patients with the possibility of painless movements means to have a direct impact on their independence, mental health and prevention of cardio-respiratory diseases[20]. Thus, the costs relating to these two surgical procedures are justifiable not only by the achievement but also by the preservation of better HRQOL. Comparison of outcomes between the two assessment groups of patients has resulted in significant difference between their preoperative and postoperative HRQOL. Preoperative outcomes have confirmed poorer HRQOL in these patients, but also inequality between groups at the quality level. Postoperative outcomes have shown significant improvement in both assessment groups, yet with slightly superior HRQOL outcomes in the total hip arthroplasty patients. Despite the difference between preoperative outcomes level, age mean, and numerical discrepancy between male and female patients within the two assessment groups, the results obtained are in correspondence with those published in similar studies by other authors[21,22]. The majority of patients have evaluated their health condition to be better than a year ago. The patients who have evaluated their health the same as a year ago, while operated two years ago, should be added to this evaluation as well. In our opinion this is considered to be a good outcome showing well preserved health level in elderly patients even two years after the surgery where maximum effects are expected after a couple of months.

SF-36 has proven to be a practical and good survey of the impact of these surgical procedures on HRQOL. We consider the structure of the SF-36 questionnaire to be appropriate for assessment of outcomes following these surgical procedures which are basically aimed at reducing pain and enabling better mobility of patients.

It can be concluded that total hip or knee arthroplasty in elderly patients significantly enhances their HRQOL. In total hip arthroplasty patients, the achieved HRQOL appears to be somewhat superior.

REFERENCES

1. HARRIS WH, J Bone Joint Surg Am, 51 (1969) 737. — 2. CHARNLEY J, J Bone Joint Surg Br, 54 (1972) 61. — 3. INSALL JN, RANAWAT CS, AGLIETTI P, SHINE J, J Bone Joint Surg Am, 58 (1976) 754. — 4. INSALL JN, DORR LD, SCOTT RD, SCOTT WN, Clin Orthop, 248 (1989) 13. — 5. LIANG MH, KATZ JN, PHILLIPS C, SLEDGE C, CATS BARIL W, J Bone Joint Surg Am, 73 (1991) 639. — 6. WARE JE, SNOW KK, KOSINSKI M, GANDEK B, SF-36 health survey manual and interpretation guide (The Health Institute, Boston, 1993). — 7. BEATON D, SCHEMITSCH E, Clin Orthop Relat Res, 413 (2003) 90. — 8. ALPESH AP, DEREK D, TODD A, J Am Acad Orthop Surg, 15 (2007) 126. — 9. BUTTANSHAW C, Proceedings of the 10th anniversary conference of the »Tipping the balance towards primary healthcare network« (The Nordic School of Public Health, Goeteborg, 1997). — 10. JUREŠA V, IVANKOVIĆ D, VULETIĆ G, BABIĆ-BANASZAK A, SRČEK I, MASTILICA M, BUDAK A, Coll Antropol, 24 (2000) 69. — 11. MASLIĆ-SERŠIĆ D, VULETIĆ G, Croat Med J, 47 (2006) 95. — 12. MANCUSO CA, RANAWAT CS, ESDAILE JM, CHARLSON ME, J Arthroplasty, 11 (1996) 34. — 13. MORSHED S, BOZIC KJ, RIES MD, MALCHAU H, COLFORD JM, Acta Orthop, 78 (2007) 315. — 14. GANDHI R, TSVETKOV D, DAVEY JR, MAHOMED NN, J Bone Joint Surg Br, 91 (2009) 889. — 15. LINGARD EA, KATZ JN, WRIGHT RJ, WRIGHT EA, SLEDGE CB, J Bone Joint Surg Am, 83 (2001) 1856. — 16. MARX RG, JONES EC, ATWAN NC, CLOSKEY RF, SALVATI EA, SCULCO TP, J Bone Joint Surg Am, 87 (2005) 1999. — 17. WRIGHT EW, J Am Acad Orthop Surg, 17 (2009) 31. — 18. CRAM P, VAUGHAN-SARRAZIN MS, WOLF B, KATZ JN, ROSENTHAL GE, J Bone Joint Surg Am, 89 (2007) 1675. — 19. SANTAGUIDA PL, HAWKER GA, HUDAK PL, GLAZIER R, MAHOMED NN, KREDER HJ, COYOTE PC, WRIGHT JG, Can J Surg, 51 (2008) 428. — 20. LEE IM, BUCHNER DM, Med Sci Sports Exerc, 40 (2008) 512. — 21. HOZACK WJ, ROTHMAN RH, ALBERT TJ, BALDERSTON RA, ENG K, Clin Orthop Relat Res, 344 (1997) 88. — 22. ETHGEN O, BRUYERE O, RICHY F, DARDENNES C, REGINSTER JY, J Bone Joint Surg Am, 86 (2004) 963.

V. Šantić

University of Rijeka, School of Medicine, »Lovran« Clinic for Orthopaedic Surgery, M.Tita 1, 51415 Lovran, Croatia
e-mail: veljko.santic@ri.t-com.hr

PRIMJENA ANKETE SF-36 RADI ISPITIVANJA STANJA BOLESNIKA NAKON UGRADNJE TOTALNE ENDOPROTEZE KUKA ILI KOLJENA

S A Ž E T A K

Cilj ovog rada bio je ispitati utjecaj ugradnje totalne endoproteze kuka ili koljena na razinu kvalitete života bolesnika starije životne dobi. Ispitivanje je provedeno u Klinici za ortopediju Lovran na 74 bolesnika sa ugrađenom totalnom endoprotezom kuka i 70 bolesnika sa totalnom endoprotezom koljena. Svi su bolesnici ispunili Medical Outcomes Study 36-Item Short Form upitnik u tjednu prije te dvije godine nakon operacijskog zahvata. Dobiveni su podaci statistički obrađeni na razini fizičkog funkcioniranja, ograničenja zbog fizičkih poteškoća, ograničenja zbog emocionalnih poteškoća, socijalnog funkcioniranja, psihičkog zdravlja, energije ili vitalnosti, bolova, percepcije općeg zdravlje te zasebno promjena u zdravlju. Rezultati bolesnika sa ugrađenom endoprotezom kuka pokazali su značajno poboljšanje na svim ispitivanim razinama. Kod bolesnika sa ugrađenom endoprotezom koljena također je došlo do poboljšanja na svim razinama osim kod ispitivanja psihičkog zdravlja. Usporedbom dobivenih rezultata ovih dviju grupa, bolesnici sa ugrađenom totalnom endoprotezom kuka dosegli su nešto veću razinu kvalitete života. Može se zaključiti da ugradnja totalne endoproteze kuka ili koljena dovodi do značajnog poboljšanja kvalitete života u bolesnika starije dobi.