

## Quality of life evaluation in patients affected by osteoarthritis secondary to congenital hip dysplasia after total hip replacement

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### Abstract

**Background** The aim of the study was to evaluate the quality of life (QoL) in patients affected by osteoarthritis (OA) secondary to congenital hip dysplasia (CHD) and treated by hip arthroplasty.

**Methods** We prospectively treated 40 patients admitted to our hospital between 2001 and 2006. Each patient was asked to answer to two questionnaires: WOMAC and MOS SF-36. Patients were evaluated four months before surgery and once they had achieved postoperative rehabilitation. Pre- and postoperative results were analyzed and compared with the international literature on patients affected by OA and also with a healthy population.

**Results** Pre- and post-operative results: WOMAC: pain 14.06–0.84; stiffness 4.26–0.52; function 42.68–5.39. SF-36: physical function 18.55–84.52; role physical 28.33–87.10; body pain 23.26–83.39; general health 55.19–81.74; vitality 32.74–72.10; social function 43.55–84.66; role emotional 68.82–93.55; mental health 48.77–79.35. All results were statistically significant.

**Conclusions** The study reports an important QoL improvement in patients affected by arthritis secondary to CHD that underwent hip surgery, and underlines differences with respect to primary OA. QoL evaluation cannot

replace either clinical and instrumental evaluation or the physician's experience, but it can give weight to the patient's expectations, and may be considered an efficient test for medical and surgical treatments.

**Keywords** Hip · Arthritis · Total hip replacement · Congenital hip dysplasia

### Introduction

Quality of life (QoL) has been defined by the World Health Organization (WHO) as a “multidimensional” model which includes physical, material, social and emotional wellbeing, as well as individual development and daily activity [1]. The complexity of this concept makes it challenging to create validated instrumentation for the evaluation of QoL after treatment.

Clinical and functional characteristics of patients treated with total hip replacement (THR) for congenital hip dysplasia (CHD) differ from those treated for primary hip osteoarthritis (OA), in part due to the lower mean age of those affected by CHD. The primary aim of this study was to assess quality of life after total hip replacement in patients with CHD, using one general and one specific validated QoL indicator. We compare our results to the published literature on QoL in OA patients, and assess the relative validity of these instruments in the CHD population.

### Materials and methods

Study approval was obtained from the ethical committee of our institution, in full compliance with the Declaration of

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Helsinki. All patients gave their consent to participate in this study prior to case review.

Between June 2001 and January 2006, we identified patients who underwent total hip arthroplasties (THA) performed by the senior author. The inclusion criterion was diagnosis of OA secondary to CHD (Crowe's classification type I or II). The exclusion criterion was revision hip surgery.

Each patient was asked to answer two questionnaires by phone, the Short-Form 36 (SF-36) and the Western Ontario and MacMaster University Osteoarthritis Index (WOMAC). The SF-36 is a generic measure of QoL with 36 questions. It consists of an eight-scale profile of functional health and well-being, as well as psychometrically based physical and mental health summary measures. The SF-36 is often used as point of reference for other tests [2, 3]. Final score is proportional to individual well-being [4, 5]. The WOMAC is a validated instrument designed specifically for the assessment of lower extremity pain and function. Usually self-administered, the WOMAC assesses pain, disability and joint stiffness in knee and hip osteoarthritis using a battery of 24 questions. It is useful for the clinical evaluation of disease treatment, specifically for short-term investigations [6–8]. Final score is proportional to individual disability.

The questionnaires were administered pre-operatively, and at a minimum of four months after rehabilitation was completed. The questionnaires were scored per their respective operating manuals [9, 10]. All results were compared with the published literature, and SF-36 results were also compared with those of healthy Italian populations aged 45–54 years, corresponding to the study cohort's mean age [4, 5, 8, 11, 13–18].

The standard deviation (SD) and effect size (a measure of the strength of the difference between two groups) was calculated for each survey item pre- and post-operatively [11]. Each item was also analyzed for normality (Kolmogorov–Smirnov test). The Student *t*-test was used for paired comparisons when the data was normally

distributed, and the Wilcoxon signed-ranks test for non-parametric data. Significance was set at 0.05. Data analysis was carried out using SPSS (Chicago, IL, USA).

## Results

We identified 40 THAs in 40 consecutive patients performed by a single surgeon. Four patients were unavailable for survey completion. Three patients were excluded due to revision surgery, and two patients were excluded as they had not yet completed their rehabilitation. The study group was thus composed of 31 patients. There were 28 females and 3 males, with a mean age at surgery of 51 years (range 33–70). The mean follow-up time was 36 months (range 4–60). There were 13 patients with a Type I Crowe classification, and 18 patients with a type II classification. All cases utilized a Conus-type stem and a Fitmore-type cup (Zimmer GmbH, Winterthur, Switzerland).

Results from the SF-36 are collated in Table 1. Effect sizes of 0.2, 0.5 and 0.8 indicate small, medium and large differences, respectively. The effect size (ES) for physical functioning was  $ES = 3.72$ , ES for bodily pain = 2.45, and ES for role emotional = 0.61.

The percentage relative increase ranged from 36 to 356%. All values were statistically significant for  $P < 0.05$ .

Results from the WOMAC are collated in Table 2. As a reminder, the final score is proportional to individual disability, i.e., a patient with less pain/disability should have a lower score. Once again, the ES and percentage relative increase demonstrated statistically significant improvements between the patients' pre- and post-operative values.

## Discussion

In this study, 100% of all questionnaire items were obtained, which should be compared with the literature,

**Table 1** SF-36 results

Scale	Pre-operative mean value (SD)	Post-operative mean value (SD)	<i>P</i> value	Effect size	% Relative increase
Physical functioning	18.55 (17.71)	84.52 (12.67)	0.000	3.72	355.47
Role physical	28.33 (41.20)	87.10 (24.89)	0.000	1.43	207.45
Bodily pain	23.26 (24.59)	83.39 (19.67)	0.000	2.45	258.51
General health	55.19 (23.26)	81.74 (15.39)	0.000	1.14	48.11
Vitality	32.74 (28.78)	72.10 (17.78)	0.000	1.37	120.22
Social functioning	43.55 (29.73)	84.66 (18.17)	0.000	1.38	94.40
Role emotional	68.82 (40.31)	93.55 (20.04)	0.011	0.61	35.93
Mental health	48.77 (32.26)	79.35 (14.68)	0.000	0.95	62.70

**Table 2** WOMAC results

Scale	Pre-operative mean value (SD)	Post-operative mean value (SD)	P value	Effect size	% Relative increase
Pain	14.06 (5.05)	0.84 (1.83)	0.000	2.62	1,573.80
Stiffness	4.26 (2.62)	0.52 (0.99)	0.000	1.43	719.23
Function	42.68 (12.83)	5.39 (5.70)	0.000	2.91	691.84
Global	61 (17.35)	6.74 (7.41)	0.000	3.13	805.04

where up to 5.3% of all answers are missing, contradictory or multiple [12].

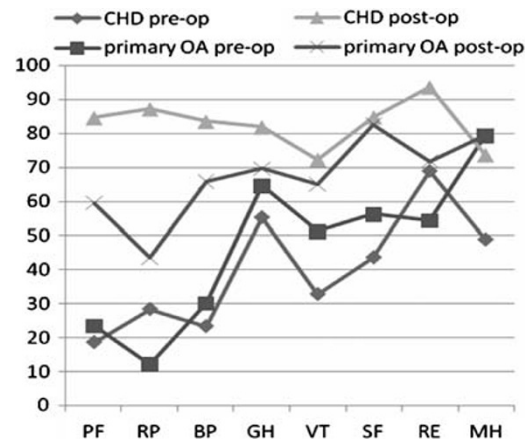
Patients in the THA literature generally have primary osteoarthritis [11, 13, 14]. Osteoarthritis secondary to CHD usually represents only 2–3% of all diagnoses [11, 14]. With respect to the SF-36 survey, our results were equivalent or better than studies where primary OA was the principal diagnosis (with higher patient mean ages) (Fig. 1).

Published role-physical preoperative values range from 19.5 to 27.05, and post-operative values from 52.41 to 66.6, while these values ranged from 18.55 to 84.52 in our patient cohort [11, 13, 14]. We noticed the same tendency for the bodily pain scale, with preoperative values ranging from 27.1 to 32.90 and post-operative values from 58.79 to 72.8 in the literature, versus a range of 23.26–83.39 in our study [11, 13, 14]. General health and vitality pre-operative values in our study were mainly lower than in the literature, and post-operative values were higher [11, 13, 14]. Role-emotional values were higher both pre- and post-operatively in our study [11, 13].

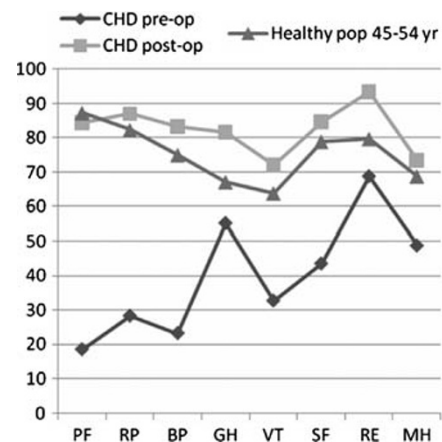
A lower mean age, with a resultant lower comorbidity disease burden, may explain why our patient cohort achieved higher final post-operative clinical SF-36 results than primary OA patients from the literature [19]. Patients in our cohort had lower pre-operative mental health scores than the published literature: younger patients may be less able to cope with functional limitations than their older peers. Post-operative scores were similar (79.4 vs. 79.4). This reasoning may equally apply to social functioning as well.

Interestingly, our patient cohort displayed better post-operative results on the SF-36 than healthy controls aged 45–54 years, except for the role-physical scale (Fig. 2). This could have been due to a recall bias: recently rehabilitated patients may have tended to overvalue their current physical condition when making a pre-operative comparison (when the clinical and psychological effects of their condition were presumably at their worst).

Comparison of our patients with the literature using the WOMAC was complicated by the diverse methods used to report results (raw score, percentage, visual analog scale) [8, 15–18]. We generally observed a greater score decrease (meaning improvement in QoL) among our cohort (Fig. 3). This was probably due to the relatively lower mean patient



**Fig. 1** SF-36 pre and post-operative results in CHD and primary hip OA [11, 13, 14]

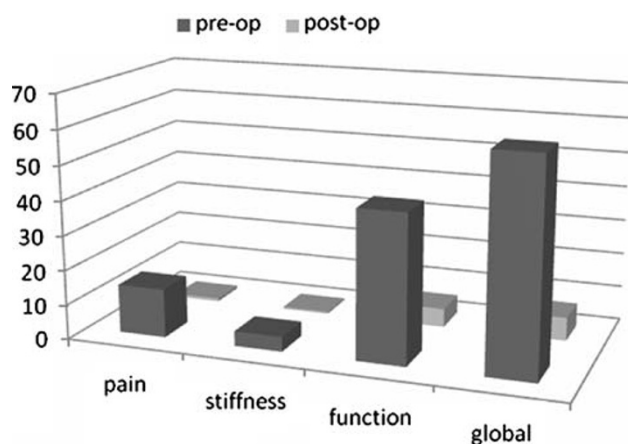


**Fig. 2** SF-36 pre- and post-operative results in CHD and healthy populations in the 45–54-year-old age group [4, 5]

age (51 vs. 65–68 years), and to clinical differences between CHD and primary OA [11, 13].

Considering that CHD essentially affects young women, social functioning and mental health evaluation is critical: it has been observed that females aged <65 years who are affected by chronic disease suffer more frequently from psychological disorders than men [14].

Our results indicate that both the SF-36 and WOMAC are valid and complementary evaluation instruments. The WOMAC assesses physical outcomes, while the SF-36 is



**Fig. 3** WOMAC pre- and post-operative results

mostly dedicated to the social and psychological arena [21]. Utilization of these QoL indicators alongside more traditional evaluation instruments, such as the Harris hip score, continues to increase in the literature [14, 20].

Orthopedic surgeons may wish to address clinical decision-making from not only physical and radiologic findings but also the context of QoL: the timing of an operation can, for example, be delayed until any attendant psychological or social concerns are addressed. That being said, quality of life evaluations should neither replace clinical and radiographic examination nor be used independently as the basis for a surgical indication [19]. Quality of life evaluation may help with the qualitative determination of the patient's motivations and expectations for joint replacement. QoL questionnaires can also be used for patient follow-up and satisfaction, either alone or in concert with other surveys [7, 8, 22–24].

**Conflict of interest statement** The authors had no competing interests, financial or otherwise, in the development of the study.

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