

Quality of Life in Patients Submitted to Arthroplasty Total Hip Resurfacing

ORIGINAL

Abstract

Background: Total hip arthroplasty involves replacing the hip joint with a prosthesis. This procedure aims to restore the function and relief in painful hip joint of patients with hip disorders who have failed in the nonoperative treatment (conservative). The surgery has dramatically improved the quality of life and independence of people who have disorders in the hip. With technological advances, new techniques and materials emerge and gradually improve the success of this intervention on quality of life of patients. Among the models used to perform total hip arthroplasty, one can cite the resurfacing method, suitable for young people and adults which uses a femoral head prosthesis on the surface for the preservation of the head and neck of the femur and a component of type acetabular prosthesis monoblock, similar to conventional total hip prosthesis

Objective: To describe the quality of life and functionality of patients undergoing arthroplasty surgery Hip Resurfacing.

Methods: We conducted a cross-sectional study of 30 patients hospitalized in the Hospital Estadual Mário Covas and undergoing surgery for total hip arthroplasty during the period 2008 to 2010. The patients were evaluated pre-surgery and at 12 and 48 months postoperatively by means of two questionnaires, the Harris Hip Score and SF-36.

Results: The sample consisted of 30 individuals with an average age of 46.83. The findings were significant $p < 0.001$ compared to pre Harris Hip Score (average 53.86 confidence interval 95% CI: 50.43 to 57.3) and postoperative (89.7 average confidence interval 95%, CI: 88.13 to 91.26), and found a higher score in the postoperative time. Moreover, a correlation between age and pain areas ($r = -0.436$ $p < 0.015$) was observed and functional capacity ($r = -0.46$ $p < 0.009$) SF36.

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Conclusion: In the short term, this overall assessment of patients manifested improvement in pain, function (gait and physical activity), mobility and initial deformity. Individuals also reported improved quality of life in the postoperative follow-up to arthroplasty hip resurfacing.

Keywords

Arthroplasty, Replacement, Hip, Quality of life.

Introduction

Total hip arthroplasty (THA) is the replacement of the hip joint by a femoral acetabular component and one artificial part. This procedure aims to restore function and relieve painful hip joints of patients with hip disorders who have failed to heal with nonsurgical treatment [1, 2].

THA surgery is among the types of orthopedic surgeries with high success rate in recent years. This procedure has dramatically improved the quality of life and independence of people with disorders of the hip [3-5].

It is estimated that, one million operations are carried out in the world per year, and it is believed that the number of surgeries can reach six million in 2050 because of population increases due to extended life expectancy, which generates a higher prevalence in degenerative diseases and complications in the joints, and in the number of fractures caused by falls [6].

With technological advances, new techniques and materials emerge and gradually improve the success of this intervention and on the quality of life for patients [3].

Among the models used to perform total hip arthroplasty, the resurfacing method is cited as suitable for young people and adults. The intervention uses a superficial femoral head prosthesis on the surface to preserve the head and neck of the femur and a component-type monoblock acetabular prosthesis, like a denture conventional hip. The femoral component therefore increases bone preservation of the hip portion together with improving

the biomechanics of the hip, properly maintained over the length of the member [7-9].

Some studies show that even though this method of hip replacement is not considered the gold standard, it gives good results, such as reduced production of particles (debris) resulting from metal-on-metal friction, high survival rate for the implant, and an improved quality of life for most active patients [10, 11].

Complications are seen in all models of total hip arthroplasty, especially in active young adults. Currently, side effects on systemic and local reactions at the hip, such as "pseudotumors" or Aseptic lymphocyte dominate vasculitis associated lesions (ALVAL) has been discussed [12-15].

The resurfacing type of hip arthroplasty is considered technically more complicated when compared to conventional hip arthroplasty techniques, so understanding the evolution of the therapy and its complications in patients is greatly important to improve this technique and its demystification as its difficulty and results [9].

Objective

Thus, the objective of this study is to describe the quality of life and functionality of patients undergoing surgery for arthroplasty hip resurfacing.

Methods

The project was approved by the Research Ethics Committee, Faculty of Medicine of ABC (FMABC) in São Paulo, Brazil with the protocol number, 377 223.

A study was conducted with 35 patients with a diagnosis of osteoarthritis or osteonecrosis of the femoral head, who were admitted to the State Hospital Mário Covas (HEMC-FMABC) and underwent surgery for total hip arthroplasty during the period 2008 to 2010.

Surgeons used the direct lateral approach of Hardinge and followed the technique for hip preparation and deployment of components according to Amstutz [9]. The patients remained 24 hours in the semi-intensive care unit in the postoperative period and then transferred to the ward until their discharge. The length of stay was an average of 72 hours. Prior to surgery, antibiotic therapy comprised 2 g of sodium cephalothin by anesthesia induction and another 2 g during surgery lasting up to two hours. The 24-hour maintenance for sodium cephalothin 2 g occurs every 6 hours until hospital discharge. To protect against chemoprophylaxis of deep vein thrombosis and pulmonary embolism thrombus, sodium enoxaparin 40 mg was started 10 hours after completion of surgery and for 30 days after surgery.

The rehabilitation was also initiated in the hospital ward, respecting the hospital's physiotherapy protocol for total arthroplasty of the hip. patients received a suction drain.

Inclusion criteria were male patients aged 18-65 years, whose reason for hospitalization was for primary hip replacement surgery, including the protocol arthroplasty of the Hip FMABC Group.

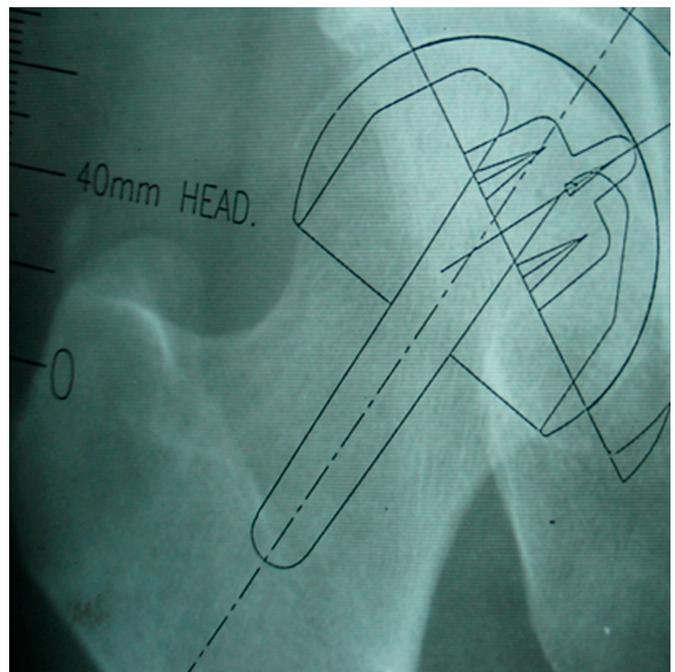
Exclusion criteria were patients with a history of metal sensitivity (to bracelets, earrings, rings), who were obese (with a BMI ≥ 25) [16], historically or currently in renal failure, who gave incomplete or incorrect information, discontinued postoperative follow-up, showed radiographic changes in the femoral head and femoral neck ratio (less than 1.5 times), had cysts in the femoral head larger than 1 cm [9], or who were planned to receive a femoral prosthesis component smaller than 44 mm.

Patients with intraoperative injury of the femoral head (either typed erosion or geode) or who com-

Figure 1: Direct lateral approach.



Figure 2: Surgeries using templates (Templates).



mitted more than 30% of it during its preparation were excluded from the realization of HRA [17]

In the postoperative, 5 patients with charts containing incomplete or incorrect information and discontinued outpatient treatment were excluded from this study.

Functional evaluation and quality of life data were followed from 12 (minimum) to 48 (maximum) months after surgery.

The patients completed two questionnaires, the Harris Hip Score (HHS) in the time before and after surgery and, postoperatively, the Medical Outcomes Study (SF-36) only. The SF-36 is a scale with eight domains, which evaluates the functional, physical, and mental health. An individual score for each domain that can vary from 0 to 100 and the final value symbolizes the well-being of the individual [18].

The Harris Hip Score (HHS) is a questionnaire specific for the THA procedure and used for comparing the results of surgery. HHS consists of a scale with a maximum score of 100 points. It is divided between items: pain has greater weight (44 and 47 points), function is divided into activity of daily living (14 points) and travel (33 points), mobility (5 points) and deformity (4 points). The results are evaluated by totaling the domain scores, totals less than 70 is considered bad, reasonable 70-80, 80-90 good and 90-100 excellent [19].

The results are presented as means at 95% confidence interval and minimum and maximum value. A Shapiro-Wilk test verified the normality of the data. To assess correlation between variables, we used the Spearman test. For comparing the patients' pre- and postoperative states on the HHS, we applied the Wilcoxon test. The program used for analysis was BioStat, adopting the significance level $p < 0.05$

Figure 3: Postoperative HRA, RX pelvis AP.



Figure 4: Postoperative HRA, RX hip Profile.



Results

The final sample consisted of 30 individuals. **Table 1** presents the descriptive data of pre- and postoperative HHS questionnaires by age and follow-up period in months.

Table 2 shows the classification of the evaluated results, according to the total Harris Hip Score (HHS) in absolute and relative frequency. In the preoperative period, 30 patients (100%) had an insufficient score. In the postoperative period, most

Table 1. Descriptive analysis of Harris Hip Score, Follow-up period and Age.

	Mean (CI95%)	Min	Max
HHS pre	53.86 (50.43-57.3)	32	68
HHS post	89.7 (88.13-91.26)	82	96
Follow-up (months)	30.27 (27.05-33.34)	12	48
Age (Year old)	46.83 (42.94-50.72)	23	61

Table 2. Absolute and relative frequency of Harris Hip Score questionnaire results.

	HHS preoperative n (%)	HHS postoperative n (%)
Excellent (90-100)	0	16 (53.33)
Good (80-89)	0	14 (46.67)
Moderate (70-79)	0	0
Insufficient (<70)	30 (100)	0

Table 3. Analysis of pre- and postoperative Harris Hip Score and correlation between postoperative HHS, age and follow-up period.

	HHS postoperative	
	R	P
HHS preoperative	-	< 0.001*
Segment (months)	-0.227	0.227
Age	-0.157	0.404

*Significance p<0.05

Table 4. Descriptive analysis for postoperative SF-36

	Mean (CI95%)	Minimum	Maximum
Functional Capacity	83.83 (78.47- 87.85)	65	100
Physical Aspects	95.83 (92.29-99.37)	75	100
Pain	85.46 (81.87-89.05)	74	100
General Platform	92.37 (90.57- 94.69)	77	100
Vitality	61.5 (60.10-62.89)	55	65
Social Aspects	91.55 (88.32-95.34)	75	100
Emotional Aspects	93.36 (87.35-99.38)	100	33
Mental Health	79.86 (77.22-82.51)	68	88

patients presented an excellent score as demonstrated below.

In **Table 3**, the Wilcoxon test was used for paired-sample nonparametrics between HHS reviews, which showed a significant relationship. Then the Spearman test was applied to find the correlations between patients' HHS postoperative results: No significant difference between age, follow-up period and a score of postoperative HHS were observed.

Regarding the SF-36 quality of life questionnaire, descriptive data were presented in **Table 4**, in which the Vitality domain presented the lowest mean score (61.5) while the Physical Appearance domain showed the highest (95.1).

Table 5 shows the correlation between the domains of the SF-36 and age, presenting a significant correlation between the Functional Ability and Pain domains.

Table 5. Analysis of the correlation between SF36 domains and age

	Age	
	R	P
Functional Capacity	-0.46	0.009*
Physical Aspects	0.06	0.744
Pain	-0.436	0.015*
General Platform	-0.242	0.196
Vitality	-0.031	0.869
Social Aspects	-0.093	0.621
Emotional Aspects	0.045	0.812
Mental Health	-0.163	0.386

r = Spearman correlation coefficient
*Significance p<0.05

Discussion

The objective of this study was to describe the quality of life and functionality of patients undergoing hip resurfacing arthroplasty (HRA). The findings were significant upon comparing Harris Hip Scores (HHS) before and after surgery, and higher scores were noted in the postoperative time period. In

addition, a correlation between age and the bodily pain and functional capacity domains of the SF-36 questionnaire was observed.

Total hip arthroplasty is considered an effective treatment method in patients with severe hip disorders. Results are usually expressed by assessing postoperative complications and wear of the prosthesis, which proved non-existent for purposes of this work, but analyses of quality of life and functionality within the quantitative framework have also been widely used among researchers [18, 20, 21].

An improvement of patients with respect to functionality was measured through the HHS questionnaire on which the patients scored a mean of 53.86 (insufficient) preoperatively and 89.7 (good) postoperatively with a significance level of $p < 0.0001$. In Table 2, it is possible to observe this evolution with the absolute and relative frequency, according to the HHS score. All 30 patients (100%) were initially classified as "insufficient" in the preoperative period. In the postoperative period, as the score increased, 16 (53.33%) of the patients were classified as "excellent". The other 14 patients (46.67%) were categorized as "good".

The functional improvement in patients found in our study is in agreement with the literature, where the resurfacing technique has a good short term output (two to five years), providing good functionality [22, 23].

Changes in postoperative values of HHS and SF-36 were not observed. The same was found by Amstutz et al [9], where other surgical approaches were used as the posterolateral. Thus, it is believed that the surgical approach is not a limiting factor in the results of HRA. A study of 136 patients by Vail et al. [24], who compared resurfacing surgery with THA, showed that patients undergoing HRA achieved a mean preoperative score on the HHS of 48, compared to 98 postoperatively.

Nevertheless, the maximum HHS in the control group, i.e., who underwent conventional THA, was

a score of 93 in the postoperative period. These results show the efficiency of total hip arthroplasty surgeries; however, the resurfacing method shows greater effectiveness compared to conventional THA [24]. Possibly, the group that underwent HRA has individuals with higher predispositions to early rehabilitation and greater desire to perform physical activities, as noted by Le Duff et al. [9] in their work.

Issa et al. 2013 [18] presented similar data in a study of male patients, which showed a mean preoperative HHS score of 47 versus 96 in the postoperative period. But the THA group scored 41 points preoperatively versus 94 in the postoperative period [23]. In our study, the HHS assessment for HRA varied from 32 preoperatively to 96 in the postoperative period, similar to the literature.

Despite the good results shown by the HRA procedure, the same comparisons with conventional THA or other techniques that arise in the literature with similar groups of individuals show that the short term outlook does not observe many differences in functional outcomes and quality of life among the procedures, but divergences in the literature do exist between the techniques regarding the duration and wear of the prosthesis [6, 25-27].

Although some complications of the resurfacing type of arthroplasty (HRA) are similar to conventional THA, inflammation and allergic reactions and related adverse complications, such as "pseudotumors" or ALVAL (employed by Willert in 2005) [12], have been cited in the literature. Three types of local tissue reactions to product debris (ALTR) are described by Schmalzried: no fluids or masses, fluid or secondary masses debris, and allergy and sensitivity without debris [12-15]. Any changes that suggest such complications were observed and did not modify the follow-up period. Although the follow-up period was short, it is believed that the criteria for sample selection, by means of an auspicious inclusion and exclusion protocol for metal-metal THA as well as for HRA, has brought compelling results.

In the descriptive analysis of the SF-36 by domain, it was seen that Vitality had the lowest mean, with 61.5 (95% CI, 60.10 to 62.89), while the Physical Appearance domain demonstrated the highest mean – 95.83 (95% CI, 92.29 to 99.37). This was according to expected because the HRA aims to provide the patient with a quick and safe return to activity, differentiating itself from other surgical techniques [28, 29]. Because HRA is safer in relation to the luxation risk, as seen in larger femoral components, it promotes a faster return to daily activities, and is a model prescribed for and used by young adults, who find it safer and less painful.

When correlated with age, the SF-36 showed significant results with $p < 0.009$ and a weakly negative correlation, $r = -0.46$, in the domain of Functional Capacity, suggesting that younger patients have better functional capacity. This demonstrates that the HRA benefits younger patients. The reason for these results may be due to several factors, among them better bone integrity, which is expected in young adults and juveniles, or even because younger individuals expect to return to activities of daily living [26].

The correlation of the Pain domain to the age of patients was statistically significant with $p < 0.015$ and a negative and weak correlation with $r = -0.436$, suggesting that older patients feel more pain when compared with younger patients. This is because older individuals possess greater sensitivity to pain due to less adaptability, which gives them a slower recovery compared to young subjects [30, 31].

Increased activity exerted by younger patients might also be related to the positive results obtained. According to 2007 study by Naal et al., younger patients are more active, which facilitates recovery and pain relief [26, 28].

The results presented and discussed suggest that the success of HRA has become even more evident, especially when assessed in the short term, for patients chosen with appropriate selection criteria,

respecting the criteria for inclusion and exclusion of this study. Patients increased their overall HHS score, and showed relief of pain and improvement in physical function. Regarding the clinical performance our findings go against the literature and present similar results when compared with similar studies or with different surgical techniques [22].

Hence, the study suggests that the HRA surgery gives good results in male patients younger than 65 years and can be considered a good choice when surgery is indicated. Although widely discussed in the literature, it is known that there is no agreement on the indication for patients over 65 years and that has a lower expectation than 10 years after the intervention [29, 32]. Other factors to consider that influence complications of this procedure are biological, such as osteoporosis, compared femoral head and femoral neck ratio less than 1.5, and acetabular small size, which leads to femoral resurfacing component less than 44-46 mm.

The correct indication and application of HRA, avoiding the increasing complications in relation to metal-metal surface, widely discussed in the literature, were not observed in the study [33, 34]. Although patients with this type of arthroplasty should be followed like patients with conventional total hip arthroplasty when asymptomatic, there is a concern about the clinical course of patients. Chromium and cobalt ions were not measured, because we followed patients without any complications, as seen through the improvement in quality of life indicators for data collection [35].

Over the years, the profile of patients requiring THA intervention has been changing, and the demands of active young adults have become more frequent, requiring the development of new technologies of prosthetic components to supply their needs. [35] Therefore, to reduce the production of debris, the use of different tribological pair metal-polyethylene style, as popularized by Charnley, and other new hip arthroplasty surfaces, such as metal/metal, ceramic/ceramic,

ceramic/polyethylene and ceramic/metal have been tested and employed, aiming for durability of prosthetic reconstruction [36].

Despite technological developments, several discrepancies can be observed due to lack of knowledge and interpretation of joint movements on the installed prosthesis, making the perfect adaptation and reproduction of hip simulators used by the industry difficult for understanding the minucious relationship between mobility and tribology in vivo, thus making it difficult to identify the actual mechanism of prosthetic failure [35].

Although HRA results in the maintenance of nineteenth century ideas, improved in the twentieth century, where, to obtain better durability/re-establishment ratio of the joint, bone should be saved and biocompatible materials should be used, our study suggests that satisfactory results reported in the literature mixes up old and new solutions for the resurfacing model. When free from its current complications, it is the most attractive hip arthroplastic possibility, still, in the beginning of the 21st century.

Conclusion

According to this overall assessment of patients, in the short term there was indication of improvement in pain, increase in activities of daily living (gait, functional activity), improved mobility and minimization of the initial deformity. Subjects reported improved quality of life postoperatively, due to arthroplasty hip resurfacing.

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