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Comparative analysis of level of functional dependence of elderly submitted to hip arthroplasty

Análise comparativa do nível de dependência funcional de idosos submetidos a artroplastia de quadril: estudo transversal

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RESUMO | INTRODUÇÃO: A Artoplastia de Quadril (AQ) é um procedimento cirúrgico realizado em casos de fratura de colo do fêmur (FF) e osteoartrose de quadril (OQ), e é responsável por causar danos funcionais aumentando o nível de dependência funcional do idivíduo idoso. **OBJETIVO:** comparar o nível de dependência funcional no pré e pós-operatório de idosos submetidos a AQ com diagnóstico de FF e OA. **MÉTODOS:** indivíduos idosos internados na enfermaria traumato-ortopédica do Hospital Universitário da Universidade Federal do Maranhão (HU-UFMA) foram avaliados quanto ao seu nível de dependência funcional através da Medida de Independência Funcional (MIF) e quanto ao nível de dor por meio da Escala Visual Analógica (EVA), tanto no pré quanto no pós-operatório de AQ. Os voluntários foram divididos em grupo A, com diagnóstico de OQ, e grupo B, com diagnóstico de FF. O teste Wilcoxon não pareado foi utilizado para comparar os resultados no pré e pós-operatório, adotando-se nível de significância p<0,05. **RESULTADOS:** um total de 46 idosos compuseram a amostra, 17 (37%) do sexo masculino e 29 (63%) do sexo feminino. O grupo A apresentou menor nível de dependência funcional no pré-operatório em comparação aos sujeitos do grupo B, porém, a avaliação da dor revelou índices maiores para o grupo A no pré-operatório. A análise comparativa dos resultados da EVA no pré e pós-operatório se mostrou estatisticamente significante para ambos os grupos. Os resultados da MIF para o grupo A não foram estatisticamente significantes, para o grupo B, porém, os domínios autocuidados, mobilidade, locomoção e total apresentaram valores estatisticamente significantes. **CONCLUSÃO:** O grupo A apresentou maiores médias na EVA no pré-operatório e menor nível de dependência funcional pela MIF em comparação ao grupo B, este apresentou as maiores médias de idade e maior presença de co-morbidades.

PALAVRAS-CHAVE: Idoso. Artroplastia. Quadril. Funcionalidade.

ABSTRACT | INTRODUCTION: Hip Arthroplasty (HA) is a surgical procedure performed in cases of femoral neck fracture (FF) and hip osteoarthrosis (HO), and is responsible for causing functional damage by increasing the level of functional dependence of the elderly individual. **OBJECTIVE:** compare the level of functional dependence in the pre and postoperative period of elderly patients submitted to HA with FF and HO diagnosis. **METHODS:** elderly subjects hospitalized at the trauma-orthopedic ward of the University Hospital of the Federal University of Maranhão (HU-UFMA) were evaluated for their level of functional dependence through the Functional Independence Measure (FIM) and the level of pain through Visual Analogue Scale (VAS), both in the pre and postoperative periods. The volunteers were divided into group A, with HO, and group B, with diagnosis of FF. The Wilcoxon test was used to compare the results in the pre and postoperative period, adopting a significance level of p <0.05. **RESULTS:** A total of 46 elderly individuals comprised the sample, 17 (37%) males and 29 (63%) females, group A presented a lower level of functional dependence in the preoperative period compared to the subjects in group B, however, the evaluation of pain revealed larger indices for group A in the preoperative period. The comparative analysis of the VAS results in the pre and postoperative periods was statistically significant for both groups. The FIM results for group A were not statistically significant for group B, but the self-care domains, mobility, locomotion and total domains presented statistically significant values. **CONCLUSION:** Group A had higher mean values in the preoperative VAS and lower level of functional dependence for the FIM compared to group B, which had the highest mean age and greater presence of comorbidities.

KEYWORDS: Elderly. Arthroplasty. Hip. Functionality.

Introduction

The increase in life expectancy increased in the elderly population. In 2010 the number of elderly people in Brazil was 20,590,599, corresponding to 10,8% of the total popuation. It is estimated that there are currently 26 million elderly people in Brazil with the expectation that this number will increase to 37.9 million in 2027. The state of Maranhão according to the 2010 census had a total of 568,681 elderly[1,2].

The elderly are subject to losses in the most varied systems, neurological, endocrine, musculoskeletal, cardiovascular, among others. The combination of these defcits reduces the functional mobility of the elderly and contributes negatively to the worsening of the inherent conditions of the natural aging process[3].

Among the disorders that elderly individuals are subject to and that compromise their mobility, osteoarticular diseases such as hip osteoarthrosis (HO) and femoral neck fractures (FF) stand out. The first is a chronic degenerative disease marked by cartilage degradation, which results from the failure to repair deterioration in the face of the multiple aggressions and injuries suffered by the joint[4]. While FF responds to a high rate of morbidity and mortality and are usually the result of low energy traumas, among the main causes, it is highlighted the fall of the height itself[5].

Both conditions, HO and FF, are responsible for generating pain in individuals, which limit and restrict them from carrying out their activities satisfactorily[5,6]. Hip Arthroplasty (HA) is the alternative to treat such conditions when failure of conservative treatment occurs. HA is na orthopedic surgery that consists of the surgical replacement of the joint injured by a prosthesis made of artificial materials, such as metal, ceramic, titanium, polyethylene[7]. There are two types of HA, when replacement of only the compromised femoral component and preservation of the acetabulum occurs, surgery is called Partial Hip Arthroplasty (PHA), however, when both femoral and acetabular components are replaced by prostheses we have Total Hip Arthroplasty (THA)[8,9].

The elderly are subject to a greater number of hospitalizations and this process contributes in a negative way to accentuate their functional deficits[3]. The elderly individual, with a HO and/or FF, undergoing the HA procedure will present a certain level of functional dependence, either before or after the procedure[6,10]. Recognizing this level of functional dependence can support the professional physiotherapist as well as the multidisciplinary team, in the direction of measures and behaviors, in the intuition of the complete functional restoration of the elderly individual in the postoperative period of HA, besides providing guidelines for hospital discharge[11]. In view of the above, this article aimed to compare the level of functional dependence in the pre and postoperative period of elderly patients submitted to HA with FF and HO diagnosis.

Materials and methods

This was a cross-sectional, quantitative study, developed in the trauma-orthopedic ward of the University Hospital of the Federal University of Maranhão (HU-UFMA), in São Luís-MA. Data collection occurred between December 2016 and May 2017. The patients and / or their companions were informed of the objectives and risks of the study and confirmed their participation through the signing of the Informed Consent Form (ICF). When the patient was unable to sign, the person in charge would do so.

The inclusion criteria included elderly individuals with a diagnosis of HO and/or FF, who would undergo the primary HA surgical procedure. Exclusion criteria were: individuals who underwent HA revision, primary HA in the same contralateral joint, who presented dislocation of the prosthesis in the postoperative period during hospitalization and did not remain for a period of three postoperative days in the trauma-orthopedic ward.

The study was divided in two stages, in the first stage the volunteers were interviewed at the time of admission to the ward, still in the preoperative period. A previously trained researcher collected

information through a questionnaire that contained sociodemographic informations (age, sex, skin color, origin, income, level of schooling), nosological (medical diagnosis, presence of chronic noncommunicable diseases (CNCD), medications for continuous use, reason for which he was being submitted to the HA procedure, verified the presence of pain in the limb to be operated by means of the Visual Analogue Scale (VAS)[12], beyond to the application, by an interview, of the Functional Independence Measure (FIM), to recognize the functional dependency level[13].

While hospitalized at the HU-UFMA trauma-orthopedic unit, the patient received the care recommended by the team of physiotherapists in the sector in partnership with the multidisciplinary team.

The second stage of the study was performed three days after the surgical procedure, by the same researcher who had performed the first step. It consisted in checking the type of surgical procedure performed, whether PHA or THA, investigation of pain, using VAS, and reapplication of FIM, for pre- and postoperative comparative purposes.

After the data collection, the volunteers were divided into two groups: Group A, individuals with diagnosis of HO, and Group B, composed of those with a diagnosis of FF.

The data were tabulated in office Excel version 2015 and analyzed using the IBM© SPSS software version 24, Wilcoxon's test was used to compare the means of VAS and FIM of groups A and B in the pre- and postoperative period, adopting level of significance of 5% (p <0.05). The research was guided by Resolution 466/2012 of the Conselho Nacional de Saúde (CNS) and all procedures related to the collection and processing of data occurred after approval by the Research Ethics Committee of HU-UFMA, under protocol number 1,824,946 (CAAE 60389916.0.0000.5086).

Results

All the evaluated participants were included in the sample, a total of 46 patients participated in the study, none of whom presented with prosthesis dislocation in the postoperative period and were evaluated on the third postoperative day. Of these, 17 (37%) were males and 29 (63%) were females. Group A was composed of individuals with OA and group B by subjects with a diagnosis of FF, with 16 and 30 participants respectively. In group B, 28 (93.3%) elderly patients reported falling from their own height and this was the cause of the FF. Data regarding the sociodemographic characterization of the sample is shown in Table 01.

Table 01. Sociodemographic characterization of elderly patients submitted to hip arthroplasty at HU-UFMA, 2017 (to be continued)

		Group A - N = 16 (34.78%)	Group B - N = 30 (65.21%)	Total N = 46 (100%)	p value
Sex	Male	10 (62.5%)	7 (23.3%)	17 (36.95%)	0.009*
	Female	6 (37.5%)	23 (76.6%)	29 (63.04%)	
Average age		64 (±5.6)	77 (±8.8)	72,5 (±9.27)	<0.001***
Skin color	White	2 (12.5%)	9 (30%)	11 (23.91%)	
	Brown	10 (62.5%)	16 (53.3%)	26 (56.52%)	-****
	Black	4 (25%)	5 (16.6%)	9 (19.56%)	
Provenance	São Luís	6 (37.5%)	12 (40%)	18 (39.13%)	
	State interior	10 (62.5%)	18 (60%)	28 (60.86%)	-****
Income	1 salary	13 (81.25%)	25 (83.3%)	38 (82.60%)	
	2 salaries	3 (18.75%)	5 (16.6%)	8 (17.39%)	1.000**

		Group A - N = 16 (34.78%)	Group B - N = 30 (65.21%)	Total N = 46 (100%)	p value
Schooling	Illiterate	3 (18.75%)	11 (36.6%)	14 (30.43%)	-****
	Incomplete elementary school	10 (62.5%)	10 (33.33%)	20 (43.47%)	
	Complete elementary school.	0 (0%)	2 (6.66%)	2 (4.34%)	
	Incomplete high school	0 (0%)	1 (3.33%)	1 (2.17%)	
	Complete high school	3 (18.75%)	4 (13.3%)	7 (15.21%)	
	University graduate	0 (0%)	2 (6.66%)	2 (4.34%)	

*Chi-square test
**Fisher's exact test
*** T-test of independent samples
**** Not applicable

Table 02 contains data referring to the nosological profile of the volunteers, as well as the medications in use and the average length of hospital stay. When using the Mann Whitney U test, there was no statistically significant difference between groups A and B in relation to length of hospital stay, presenting p=0.362.
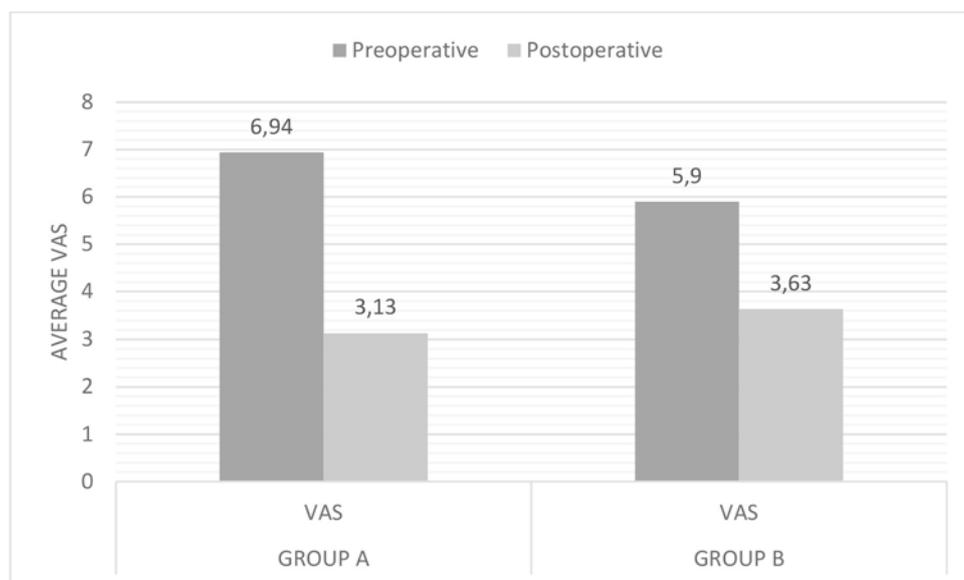
		Group A N = 16 (34.78%)	Group B N = 30 (65.21%)	Total N = 46 (100%)
Comorbidities	HAS	13 (81.25%)	15 (32.60%)	28 (60.86%)
	DM	2 (12.5%)	8 (17.39%)	11 (23.91%)
	Esquizofrenia	0 (0%)	1 (3.33%)	1 (2.17%)
	Parkinson	0 (0%)	1 (3.33%)	1 (2.17%)
Medicamentos	Anti Hipertensivo	13 (81.25%)	18 (60%)	31 (67.39%)
	Anti diabéticos	2 (12.5%)	8 (26.6%)	10 (21.73%)
	Neurolépticos	0 (0%)	1 (3.33%)	1 (2.17%)
	Anti depressivos	0 (0%)	3 (10%)	2 (4.34%)
	Anti psicóticos	0 (0%)	3 (10%)	2 (4.34%)
	Broncodilatador	0 (0%)	1 (3.33%)	1 (2.17%)
	Benzodiazépnicos	0 (0%)	2 (6.66%)	2 (4.34%)
	Diuréticos	5 (31.25%)	3 (10%)	8 (17.39%)
	Hormonais	7 (43.75%)	3 (10%)	10 (21.73%)
	Dopaminérgicos	1 (6.25%)	1 (3.33%)	2 (4.34%)
Surgical Procedure	PHA	0 (0%)	24 (80%)	24 (52.17%)
	THA	16 (100%)	6 (20%)	22 (47.82%)
Affected limb	Right	7 (43.75%)	13 (43.3%)	20 (43.47%)
	Left	9 (56.25%)	17 (56.6%)	26 (56.52%)
Average length of hospital stay (in days)		5 (±1.7)	4 (±3.6)	5 (±3.11)

CNCD – Chronic Noncommunicable Diseases ;SAH – Systemic Arterial Hypertension;DM – Diabetes *Mellitus*;PHA – Partial Hip Arthroplasty;THA – Total Hip Arthroplasty

The comparison between pre and postoperative results in VAS for groups A and B was statistically significant, with Group A presenting p <0.0001 and Group B p <0.0003. In the comparison between groups A and B using the Man-Whitney U test the difference was not statistically significant, with p=0.326 and 0.270, respectively. Graph 01 shows the mean of the VAS obtained by Groups A and B for the pre and postoperative results.

Regarding the level of functional dependence, the statistical analysis showed that, when comparing the results of the FIM in the pre-and postoperative period, Group A did not present statistically significant results for any of the domains, whereas, Group B presented statistically significant results for self-care domains, mobility, locomotion and totality. The same was not observed for sphincter control, communication and cognition domains. Data on the functional dependency level values measured from the FIM in the pre and postoperative periods are shown in Table 03.

Table 03. Functional dependency level of elderly patients submitted to hip arthroplasty measured from FIM, 2017

	FIM DOMAIN	PREOPERATIVE MEAN	PREOPERATIVE SD	POSTOPERATIVE MEAN	POSTOPERATIVE SD	p value
		2017				
Group A	Self-care	3.,5	8.17	36.5	7.83	0.293
	Sphincter control	14	2.89	14	2.94	0.068
	Mobility(transfers)	17	4.66	17	2.09	0.440
	Locomotion	17	4.45	17.5	3.15	1.000
	Communication	14	0	14	0	1.000
	Cognition	21	0.8	21	0.7	0.655
	TOTAL	117	18.95	118	12.71	0.214
Group B	Self-care	15	6.19	26	6.68	<0.001
	Sphincter control	14	2.09	14	2.66	0.595
	Mobility(transfers)	3	2.79	12	3.85	<0.001
	Locomotion	3	2.34	12.5	4.59	<0.001
	Communication	14	1.51	14	1.38	0.267
	Cognition	21	2.02	21	1.98	0.131
	TOTAL	69.5	11.33	98.5	16.56	<0.001

SD – Standard deviation

Discussion

Elderly patients with HO and/or FF present reduced functionality due to the structural alterations to which the bone tissue is affected and the surgical procedure of HA aims to reduce these deficits[8]. The research of Guedes et al.[14] showed the impact of THA on the functionality of the elderly even after a 2-year period of surgery, while the study by Abreu & Oliveira[15] analyzed the repercussion of PHA on the quality of life of elderly patients who suffered femoral neck fractures. Both studies demonstrated that the elderly individual suffers losses with the surgical procedure, but they can recover part of their functionality and independence with the correct follow up of the treatment, besides the improvement in pain, with a positive repercussion on the quality of life of these individuals[16].

The elderly have a natural loss of functionality that increases their fragility and the risks of dependency and hospitalizations[14] and when affected by the HO and/or FF there is a greater decrease of this functionality[17]. Functional analysis using FIM allowed us to identify that group A volunteers presented a lower level of functional dependence in the preoperative period compared to group B, this fact demonstrates that the elderly with FF have a greater dependence and greater constraint to independently execute their activities[18]. The factor that may have caused this higher level of functional dependence is the fact that the FF is characterized as unstable before performing the surgical procedure and the lowest possible level of movement of the fractured hip is recommended until surgery and fracture stabilization through osteosynthesis is performed[19].

When the pain level of patients was evaluated by means of VAS, group A presented higher results in the preoperative period compared to group B, whereas the results in the postoperative group B were higher than those in group A, however, the difference between groups was not statistically significant. Pain is an important factor because a high level of postoperative pain is associated with a longer hospitalization time and interferes with the early mobilization of the operated limb[5]. Patients with HO, group A, presented a considerable preoperative pain level, the postoperative assessment revealed a decrease in the level of pain in the affected limb. This fact confirms findings from the literature, where it is common for patients with HO to report improvement in their pain after undergoing HA[14]. The pain restricts the patient and incapacitates him or her to perform their activities and to have independence, in the postoperative of HA the level of pain interferes in the recovery, in the early mobilization and in the discharge of weight for the gait training[20].

The early recovery of patients undergoing HA, either PHA and/or THA, has been proposed to promote functional independence, especially in the elderly to minimize the effects associated with the natural aging process[14]. Aiming for a reduction in the length of hospitalization of elderly patients submitted to HA, as well as their rapid functional recovery, the fast track protocol has been introduced, aiming the patient's rapid functional recovery through preoperative optimization, minimally invasive surgery and early mobilization. Patients are observed in the most diverse aspects in the preoperative period, seeking to identify factors that could potentially prolong their stay in the hospital after surgery, such as anemia, decompensated diabetes, malnutrition, low functional level, in order to work to improve them or even heal them. While in the postoperative period, after evaluation of the team, these patients are referred to physical therapy for early mobilization, early weight discharge and gait training[21].

Group B suffered a FF, which results mostly from low energy traumas, as the fall from the height itself and 93.3% of the participants reported that the fall of the height itself was the reason for the fracture. In group B the majority of the volunteers, N = 27, were female. The diagnosis of osteoporosis was not investigated, but 3 subjects from group B reported using medication to treat osteoporosis. Even though the diagnosis of osteoporosis was not investigated, it is suggested a relationship between the volunteers in group B and the presence of osteoporosis, due to a higher percentage of women in the group and a more advanced mean age[12,22]. Both groups had participants with diagnoses of SAH and DM, however, a systematic review[23] did not find strong relationships between the presence of comorbidities and the increase in hospital costs and the length of hospitalization of patients submitted to THA.

The level of functionality of the individuals has direct repercussions on quality of life[13]. A study developed in Manaus-AM investigated the quality of life of elderly patients who had undergone femoral neck fracture and were submitted to PHA using SF-36[15]. The evaluations occurred in the preoperative period and at three and six months postoperatively. The authors concluded that in the evaluation of each component of the SF-36, observing the preoperative periods and 3 months after surgery, there were no significant changes between the aspects: functional capacity, physical appearance, pain and emotional aspects, and the pain score presented a decrease of 17.8% in the postoperative period in the evaluation after 6 months.

Patrizzi et al.[24] performed a comparative analysis of the functional capacity and quality of life of patients with HO submitted to THA, the participants, with a mean age of 69.8 years, were evaluated in the pre and postoperative period by goniometry and the Harris Hip Score. The authors concluded that THA provides pain relief, as observed in this study, in addition to increased range of motion of the hip joint. However, the patients stated they did not feel completely safe to perform their activities independently.

Conclusion

The study demonstrated that the majority of the patients submitted to HA were females and had a diagnosis of FF, presenting a higher level of functional dependence in the preoperative period. The pain profile in subjects with OH was higher in comparison to individuals with FF. The research allowed to recognize important points of the functionality of patients submitted to HA, the comparative analysis between pre and postoperative allows to draw targets from before the surgical procedure aiming at complete reestablishment of the functional independence of the patient. The study had as limitations the application of the FIM in the form of an interview that in certain situations was difficult for the volunteer to understand due to the insufficient level of schooling, necessitating the use of words adapted by the evaluator. Future research is suggested in order to recognize the muscular compromises of patients undergoing HA surgery, and the evaluation of the level of functional dependence beyond the hospital phase.

Author contributions

Silva JCA participated in the study design, data collection, statistical analysis of the research data, interpretation of the results and writing of the scientific article. Cavalcante TB participated in the study design, statistical analysis of the research data and interpretation of the results. Dos Santos NMC participated in the study design and data collection of the research. Da Costa ACLF, Miranda JS and Nascimento RKG participated in the data collection of the research.

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