



Original Article

Efficacy evaluation of a protocol for safe hip surgery (total hip arthroplasty)[☆]



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ABSTRACT

Objective: To propose a multidisciplinary protocol to standardize the care of patients undergoing total hip arthroplasty (THA) and evaluate its effectiveness after implementation.

Methods: Retrospective evaluation of 95 consecutive patients undergoing THA divided into two groups, one group of 47 patients operated before the protocol implementation and 48 after.

Results: Assessing the re-admission rate, among 47 patients evaluated prior to implementation of the protocol, seven (14.9%) were re-admitted, and when observing the 48 patients evaluated after implementation, one (2.1%) was re-admitted, showing statistical significance ($p < 0.05$). The chance of re-admission before the protocol was eight times the chance of hospitalization after implementation (95% CI: 1.01 to 377.7). By comparing the clinical complications among the groups, it was observed that there was a lower rate of complications following implementation of the protocol ($p = 0.006$).

Conclusion: The introduction of a multidisciplinary protocol to standardize the management of patients undergoing THA decreased the rates of rehospitalization and clinical complications after the procedure.

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Avaliação da eficácia do protocolo para cirurgia segura do quadril (artroplastia total)

RESUMO

Objetivo: Propor um protocolo multidisciplinar para padronização do cuidado dos pacientes que serão submetidos a artroplastia total do quadril (ATQ) e avaliar sua eficácia após a implantação.

Métodos: Avaliação retrospectiva dos resultados de 95 pacientes consecutivos submetidos a ATQ divididos em dois grupos, um com 47 operados antes da implantação do protocolo e 48 após.

Palavras-chave:

Artroplastia de quadril

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[☆] Study conducted at Hospital Madre Teresa, Belo Horizonte, MG, Brazil.

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Resultados: Na avaliação da taxa de reinternação, tem-se que entre os 47 pacientes avaliados antes da implantação do protocolo, sete (14,9%) foram reinternados e dos 48 avaliados depois da implantação, um (2,1%) foi reinternado, mostrou-se significância estatística ($p < 0,05$). A chance de reinternação antes da implantação foi oito vezes maior do que a chance de internação após a implantação (IC 95%: 1,01 a 377,7). Ao comparar as complicações clínicas entre os grupos observou-se que houve menor taxa de complicações após a implantação do protocolo ($p = 0,006$).

Conclusão: A introdução de um protocolo multidisciplinar para padronização do manejo do paciente submetido a ATQ diminuiu as taxas de reinternação e de complicações clínicas após o procedimento.

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Introduction

For roughly 50 years, total hip arthroplasty (THA) has been one of the most effective orthopedic interventions from a functional and economic standpoint.¹⁻⁴ It is an elective procedure when treating hip arthrosis, and it is performed after careful preoperative evaluation to minimize risks. Advances in tribology, surgical, anesthetic, and rehabilitation techniques have improved the end result. This evolution has led to an increase in surgical indications and in the safety of the procedure,¹ with an overall complication rate of less than 4% and overall 90-day mortality of less than 1%.⁵⁻⁷

Despite these advances, patients undergoing this type of procedure are subject to complications such as infection, implant dislocation, deep venous thrombosis (DVT), and pulmonary embolism (PE), among others,⁵ resulting in increased hospital length of stay and rates of rehospitalization.⁸

Identifying the risk factors for complications as well as applying scientifically effective methods for their prevention are important steps in the strategy to reduce such events, reducing risks to the surgeon and patient, as well as hospital costs.^{5,9}

Considering the need to cover all these aspects, the creation of a protocol that encompasses pre-, peri-, and post-operative measures is a valid strategy to standardize care and increase the safety of the procedure. The present study aimed to propose a multidisciplinary protocol to standardize the care of patients undergoing THA and to evaluate the effectiveness of the protocol after its implantation.

Material and methods

An institutional protocol was created for the management of patients undergoing THA. This protocol is divided into pre-, peri-, and post-operative measures and includes medical, nursing, and physiotherapy professionals.

It begins with the request of preoperative exams in order to identify possible risk factors and infection sites (urinary and airway), and a cardiologist and anesthesiologist evaluation; when necessary, blood components and the intensive care unit bed (ICU) are reserved. The patient is advised to shower

preoperatively using chlorhexidine detergent, and to purchase elastic compression stockings for postoperative use.

After the preoperative procedures are concluded, the patient is admitted on the day of surgery; the recommendations from the World Health Organization (WHO) manual for safe surgery are followed.¹⁰ In the operating room, up to 60 minutes before the incision is made, antibiotic prophylaxis is administered; shaving is performed only if necessary. After surgery, elastic compression stockings are placed, followed by the final control X-ray. Antibiotic prophylaxis is maintained for 24 h, and thromboprophylaxis is initiated with 40 mg enoxaparin daily until discharge.

Once the patient is in the room, the internal medicine staff initiates monitoring. Gait training is initiated on the first postoperative day (POD) by the attending physician, and a blood count is requested. The dressing is changed after 48 h, and the discharge is planned for up to 96 h. At hospital discharge, the patient is advised on the use of the anticoagulant for five weeks after surgery, analgesia according to the pain, gait with a walker and always with an assistant, home physiotherapy, identification of risk signs that require reevaluation, and measures to prevent prosthesis dislocation. This protocol was implemented in May 2012.

The charts of patients who underwent elective THA for hip arthrosis treatment were retrospectively evaluated. A database was created in Microsoft Excel. Initially, information on 100 patients operated in 2011 and 2012 was entered into the database; 50 patients had been operated on before protocol implantation and 50, after. This sample included patients with previous hip surgeries, those with advanced deformities, and those with hip infection sequelae. Three patients who were operated on before implantation of the multidisciplinary protocol were excluded (two were submitted to THA due to femoral neck fracture and the necessary information was not available for the third patient), as well as two who were operated on after protocol implantation (in both cases, surgery was due to fracture). Thus, 95 patients were evaluated, 47 of whom were operated before and 48 after protocol implantation.

The studied variables were: infection, dislocation, DVT, 90-day clinical complications, length of hospital stay, emergency room (ER) visits, re-admission for any reason, and 90-day mortality. Clinical complication was defined as any alteration not

related to the musculoskeletal system that occurred during the hospitalization period (e.g., acute myocardial infarction, acute pulmonary edema, pneumonia, renal failure, or urinary tract infection). The study was approved by the hospital's Research Ethics Committee.

The variables evaluated were compared before and after the protocol implantation. The qualitative variables were compared using Pearson's chi-squared test or Fisher's exact test (for cases with an expected frequency of less than 5). The associations were quantified by calculating the odds ratio (OR) and 95% confidence interval (95% CI). The quantitative variables were compared using Student's t-test when the usual assumptions (normality and homoscedasticity) were met, and using Mann-Whitney's test when they were not. Normality was assessed using the Shapiro-Wilk test and homoscedasticity (constant variance) by the Levene test. R version 3.2.0 and MINITAB were used for the statistical analyses.

Results

Mean patient age was 68 years (26-97); 51 (53.7%) were female and 44 (46.3%) were male. On average, patients presented one comorbidity (approximately), with a standard deviation of 1.2. The studied groups were homogeneous regarding gender, age, and presence of comorbidities (Table 1).

Regarding the re-hospitalization variable, among the 47 patients evaluated before the implantation of the protocol, seven (14.9%) were re-admitted; of the 48 evaluated after the implantation, one (2.1%) was re-admitted, and this difference was statistically significant ($p < 0.05$). The risk of rehospitalization before protocol implantation was eight times higher than after implantation (95% CI: 1.01-377.7) This wide confidence interval was due to the fact that only one patient was re-admitted after protocol implantation. When comparing the 90-day clinical complications between groups, it was observed that there was a lower rate of clinical complications after protocol implantation ($p = 0.006$; Table 2).

Regarding hospital stay, before protocol implantation patients were hospitalized for 6.3 days (± 4.7) and after implantation, for 5.1 days (± 2.9). The study did not assess whether the length of hospitalization was influenced by patients with complex cases such as previous hip surgeries, large deformities, or hip infection sequela. This difference was not statistically significant, but there was a trend toward

shorter hospital stay after the protocol was followed. In the present study, the difference in ER visits, DVT, infection, and dislocation was not statistically significant, but the group after protocol implantation presented fewer events.

Discussion

The ability of THA to improve pain, function, and quality of life is widely recognized.¹¹ However, as in any surgery, THA has risks, including death. Although the principles of hip arthroplasty have not changed in recent years, patient management has evolved in many respects over the past decade, improving postoperative recovery and patient satisfaction, while decreasing morbidity and period of hospital stay.⁶ In recent years, protocols for rapid recovery after THA have been introduced. Several studies have shown that these protocols have reduced the length of hospital stay, as well as complication and re-admission rates.⁸

The results of the present study indicate a lower rate of hospital readmission (2.1%) in a multidisciplinary and standardized patient management protocol. In the current literature, Mahomed *et al.*¹² observed a 90-day hospital readmission rate of 4.6% for patients undergoing THA. Another study by Zhan *et al.*,¹³ when assessing 230,000 primary THAs, observed that 8.9% of patients were re-admitted in that same post-operative period. Dowsey *et al.*¹⁴ also succeeded in reducing the rate of readmission after adopting a protocol for standardizing the management of patients undergoing THA.

Although the success of this type of procedure is well documented, complications occur; this rate is different among institutions with a specialized orthopedic center and general hospitals. Cram *et al.*¹⁵ reported a 90-day complications (death, sepsis, hemorrhage, pulmonary embolism, DVT, and surgical wound infection) rate of 2.8% in specialized centers and of 6.2% in non-specialized hospitals. In a study that assessed the clinical complications in 251,199 THAs from 2008 to 2010, a general rate of 2.7% was observed.¹⁶ In addition to performing the surgery in a specialized center, the present study demonstrated that standardization of pre-, peri-, and post-operative procedures can further reduce these complications. By assessing the risk factors associated with these conditions in a standardized way, a tendency toward reduction of these events was observed, making the procedure even safer.

Table 1 – Comparison of patients' gender, age, and number of comorbidities before and after protocol implementation.

Characteristics	Protocol implementation		p-value
	Before	After	
Gender, n (%)			0.467 ^a
Female	27 (57.5)	24 (50.0)	
Male	20 (42.5)	24 (50.0)	
Age (mean \pm SD [median])	69.7 \pm 16.1 (71.0)	66.7 \pm 14.2 (68.5)	0.329 ^b
No. of comorbidities (mean \pm SD [median])	0.6 \pm 1.1 (0.0)	0.9 \pm 1.3 (0.0)	0.130 ^b

SD, standard deviation.

^a Pearson's chi-squared test.

^b Student's t-test.

Table 2 – Comparison of hospital stay and other patients' characteristics before and after protocol implementation.

Characteristics	Protocol implementation		p-value
	Before	After	
Hospital stay in days (mean ± SD [median])	6.3 ± 4.7 (5.0)	5.1 ± 2.9 (5.0)	0.152 ^a
ER visits			0.125 ^b
Yes	9 (19.2)	4 (8.3)	
No	38 (80.8)	44 (91.7)	
Re-admission, n (%)			0.030 ^a
Yes	7 (14.9)	1 (2.1)	
No	40 (85.1)	47 (97.9)	
90-day mortality, n (%)			0.495 ^a
Yes	0 (0.0)	2 (4.2)	
No	47 (100.0)	46 (95.8)	
Thrombosis, n (%)			0.495 ^a
Yes	1 (2.1)	0 (0.0)	
No	46 (97.9)	48 (100.0)	
90-day clinical complications, n (%)			0.006 ^a
Yes	7 (14.9)	0 (0.0)	
No	40 (85.1)	48 (100.0)	
Infection, n (%)			0.242 ^a
Yes	2 (4.3)	0 (0.0)	
No	45 (95.7)	48 (100.0)	
Dislocation, n (%)			0.242 ^a
Yes	2 (4.3)	0 (0.0)	
No	45 (95.7)	48 (100.0)	

ER, emergency room.
^a Student's t-test.
^b Pearson's chi-squared test.

Longer hospital stays is directly associated with greater clinical and psychological complications, as well as with higher costs for institutions. Glassou *et al.*,¹⁷ in a cohort study that evaluated the length of hospital stay of patients submitted to arthroplasty in an orthopedic center, demonstrated that the mean period of hospital stay decreased from four to three days after the implantation of a protocol for the management of patients undergoing THA. After other orthopedic centers in Denmark implemented similar protocols, the national mean length of hospital stay reduced from six to three days from 2005 to 2011; 79,098 arthroplasties were assessed.

The present study had the limitation of evaluating only 95 patients; a larger sample is needed to demonstrate the true efficacy of such protocols. The positive points of the study include a homogeneous sample treated in a single institution by the same group of surgeons.

Conclusion

The introduction of a multidisciplinary protocol for the standardization of the management of patients submitted to TKA decreased the rates of rehospitalization and clinical complications after the procedure. With the continuing medical, social, and organizational advances in healthcare systems, this trend should persist.

Conflicts of interest

The authors declare no conflicts of interest.

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