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Prospective Study of Venous Thromboembolism in Patients Submitted to Total Bilateral Arthroplasty

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Abstract

Objective: To evaluate the incidence of venous thromboembolism in patients submitted to Bilateral Total Hip Arthroplasty (THA) in a single time.

Methods: A prospective study, carried out in 2017, consisted of 37 patients with THA; being 8 bilateral and 29 unilateral patients. In the immediate postoperative period, aspirin, oral administration, use of elastic compression socks and early ambulation were initiated. Doppler flowmetry was performed on the 6th day and 6th postoperative week to evaluate the presence of venous thromboembolism.

Results: On the 6th day after the procedure, the incidence of thrombus was 21.7% in patients submitted to unilateral THA, compared to 25.0% in patients submitted to bilateral THA. In the 6th week there was a reduction to 6.9% and 12.5% in the respective groups. The comparative independence test was not significant (p-value = 1.00), demonstrating the incidence of thrombus in the two groups was similar.

Conclusion: There was no statistically significant difference, related to venous thromboembolism, in patients submitted to bilateral arthroplasty of hip in single time, when compared to patients submitted to unilateral arthroplasty.

Keywords: Anticoagulation; Bilateral; Deep Venous Thrombosis**;** Hip Arthroplasty; Thromboembolism; Total Hip Arthroplasty.

Background

Patients with advanced degenerative arthritis of the hip often present bilateral disease, however, the indication of one-stage or two-stage surgery is still controversial. Though in the past morbidity and mortality was showed to have no statistical difference between the two groups, the risk of thrombosis and its complications has never been questioned.

Setting

A prospective study with 37 patients who underwent total hip arthroplasty bilateral or unilateral compared the prevalence of thrombus formation on the 6th day and on the 6th week post-surgery.

Results

The highest prevalence of thrombus in the postoperative period was in the group who underwent bilateral surgery (25.0%), when compared to the unilateral surgery group (21.7%), but the independence was not significant (p-value = 1.00).

Conclusion

There was no statistically significant difference related to venous thromboembolism between the groups of patients.

Introduction

Total Hip Arthroplasty (THA) is becoming the standard treatment for patients with high-grade degenerative arthritis, improving the quality of life of patients with this disease. It is estimated that in the United States 350,000 procedures of this type are performed annually. [1,2] In the United Kingdom,

approximately 70,000 joint reconstruction surgeries are performed with prostheses [3].

Among the most feared complications of arthroplasty are Thromboembolic Disorders (TED), such as Deep Venous Thrombosis (DVT) and Pulmonary Thromboembolism (PTE). Before the routine application of TED prophylaxis was employed, the incidence ranged from 40% to 60% asymptomatic distal DVT (below the popliteal vein) 15-20% proximal lower limb thrombosis and 0.5-2% pulmonary thromboembolism. [1,4,5] The use of drugs such as low molecular weight heparin, vitamin K inhibitors and the newest factor Xa inhibitors, led to a significant decrease in the incidence of asymptomatic distal DVT to approximately 20 % and symptomatic for 1-3%. [3,6,7]

Currently, the consensus regarding prophylaxis for TEDs in patients undergoing arthroplasty is it should be routinely employed. Even though the classes of drugs and their period of use, as well as the protocols of association with mechanical prophylaxis, are not yet established, it should not prevent their use [1,4,8,9]. The lack of multicenter studies, the variety of protocols and the risk factors for different TEDs among patients hamper universal standardization on ideal prophylaxis [6,10]. Methods of prophylaxis can be divided into either chemical or mechanical. Chemical prophylaxis such as vitamin K antagonists, aspirin, low molecular weight heparin, factor Xa inhibitors, among others, may be used solely or in combination with Mechanical Prophylaxis (MP). MP is translated using pneumatic compression systems in the postoperative period, elastic compression stockings and early ambulation in the first 24 hours [2,4].

Considering the postoperative complications of patients undergoing simultaneous bilateral arthroplasty, such as venous thromboembolism, some studies have shown low risk when undergoing single-stage procedures. This outcome is supported mainly by the studies of Garland et al. [11] and Rodrigues and Al. [12] who did not report significant differences in complications between one- and two-stage surgeries. Still, for patients older than 75 years or with significant comorbidities, there is no evidence to support the safety of simultaneous surgery or reasons to expect an increased risk with higher mortality demonstrated in the regulation of bilateral surgery. [12]

Methods and Type of Study

A prospective analytical study conducted in the period from March to June 2017, in which 40 patients were selected for THA with a cardiovascular risk between 1 and 2 according to the criteria of Goldman et al. Patients with risk III and IV, gastrointestinal hemorrhage, recent infarction, and who were using antiplatelet agents were excluded. One patient was excluded because of an intraoperative complication (an acetabular fracture) and two other patients for nonadherence to the proposed prophylactic scheme. Thirty-seven patients with THA were assessed for primary or secondary arthrosis, all of them with substantial risk for thromboembolic events according to the criteria recommended by Caiafa et al. [13,14].

Eight patients underwent bilateral THA in the same operative procedure. The prophylaxis established consisted of the use of aspirin at a dose of 650 mg daily, divided into two 325 mg doses with a 12-hour interval for 30 days, and started 12 hours after the procedure. Patients after surgery used elastic compression stockings on the lower limbs, in the post-anesthetic recovery room. Subsequently, they were instructed to ambulate on the first postoperative day, assisted by the physiotherapy team. Inclusion norms for the selection of patients framed those classified as cardiovascular risk between 1 and 2 by Goldman criteria and at high risk for thromboembolic diseases according to the criteria of Caiafa et al. [13,14].

The patients underwent THA, under spinal anesthesia, by postero-lateral access and in the contralateral decubitus position on the operated side. Then, in the post-anesthetic recovery room, elastic stockings of medium compression were placed, and after 12 hours aspirin 650 mg was orally started in two oral doses of 325 mg for 30 days. The physiotherapy team supervised ambulation on the first postoperative day, and gait load was tolerated according to the patient's pain.

On the 6th postoperative day, the patients underwent venous Doppler Ultrasonography (Doppler USG) to verify venous thromboembolism below the popliteal vein and were examined for any sign or symptom of TED. Two radiologists conducted imaging examinations with experience in Doppler ultrasonography, and both confirmed each case.

Considering the peak period of incidence of TEDs in orthopedic surgeries between the 6th and 28th day, [15,22] the patients underwent a new Doppler USG examination in the sixth week by the same radiologists using the same protocol.

For the evaluation of TEDs, the qualitative variable was the presence of thrombus in the venous system below the popliteal vein in one or both limbs, symptomatic or not, confirmed by the two radiologists participating in the study.

To analyze the data, a Microsoft Excel spreadsheet was built, which was transported to SPSS software, version 18, where the analysis was performed. To assess the patients' profiles who underwent study, the percentage frequencies of the studied variables were calculated, and the respective frequency distributions were constructed. For the quantitative variables, the minimum, maximum, mean and standard deviation statistics were calculated. The chi-square test was applied for comparison of proportion to compare the percentages found in the independent variables.

In the comparison of the incidence of thrombus, the contingency Table 1 and Table 2 are constructed, and Fisher's Exact test was applied. All conclusions were drawn considering the level of significance of 5%.

Results

Factor	n	%	p-value[1]
Gender			
Male	18	48,6	0,869
Female	19	51,4	
Age			
≤ 59	26	70,3	0,014
≥60	11	29,7	
Minimum-Maximum	18-71		-
Mean ± Standard deviation	49,2 ± 14,7		-
[1]p-value for Chi-squared test to compare proportions (if p-value< 0.05, the level percentages for the evaluated characteristic differ significantly).			

Table 1: Patients distribution based on gender and age.

The age varied from 18 to 71 with mean ± standard deviation (49,2 ±14,7). The majority is female19 (51,4%) with age up to 59 years old, mean of 26 (70,3%). The proportion comparison test was significant for the age factor (p-value= 0,014), indicating that the proportion of genders are similar.

Bilateral	Thrombus on the 6th day		Thrombus on the 6th week	
	Yes	No	Yes	No
No	6(21,7%)	23(78,3%)	2(6,9%)	27(93,1%)
Yes	2(25,0%)	6(75,0%)	1(12,5%)	7(87,5%)
p-value[1]	1,000		0,530	
[1]p-value from Fisher's exact test (if p < 0,05 the prevalence of thrombus is different between the bilateral or unilateral groups).				

Table 2: Distribution of the occurrence of thrombus in the 6th day and 6th postoperative week.

It was observed that the highest prevalence of thrombus in the postoperative period was in the group of patients who underwent bilateral surgery (25.0%), when compared to the unilateral surgery group (21.7%), but the independence was not significant (p-value=1.00), demonstrating that the prevalence of thrombus in the two groups evaluated are similar.

Discussion

A large proportion of patients submitted to unilateral total hip arthroplasty also need to perform treatment for the contralateral hip [16-18]. Ritter and Randolph, in 1976, performed a detailed study to evaluate the functional outcome of single-time bilateral CTA and since then, there has been an ongoing attempt to demonstrate the benefits and disadvantages of single-time bilateral arthroplasty [19]. Several articles report advantages of concurrent operations, or at least similar results from single-stage versus two-stage procedures. [16,17] Despite this, the implementation of simultaneous bilateral procedures has grown in recent years, arguing that it is a procedure with advantages potentials, such as cost reduction [16,19], shorter rehabilitation time [20,21], and shorter hospital stay [20], without presenting an increased risk of complications such as venous thrombosis.

Garland et al. [12] and Rodrigues and Al. [13] carried out a study on the safety and efficacy of bilateral total hip arthroplasty in relation to adverse outcomes, as well as venous thromboembolism, and, as well as the present study, did not demonstrate an effect of statistical significance in the rate of Pulmonary Embolism or DVT between those treated with unilateral surgery and those who underwent bilateral single-time arthroplasty. Despite this, none of the studies approached the ideal sample size to be able to detect statistically significant differences in these results. The diagnostic approach varied among the several studies analyzed (Doppler, phlebography, ventilation/perfusion scintigraphy, patient report) and, in most cases, was not described.

Thromboembolic disorders have known risk factors and treatment may influence their incidence. Consequently, it is desirable to adjust for these variables to detect without confusion the effect of stage surgeries on this complication. The non-standardization of multicentric studies and the heterogeneity of the groups studied, and the various options of chemical and mechanical prophylaxis are factors that contribute to the lack of consensus on the ideal and universal prophylaxis for patients undergoing hip arthroplasty. Besides, the little casuistry and the lack of a control group are limiting factors of the study. However, we sought to make the group homogeneous regarding variables related to the epidemiological profile of the patients studied.

Conclusion

The study demonstrated that there was no statistically significant difference related to venous thromboembolism between groups of patients submitted to single-time bilateral total arthroplasty and unilateral arthroplasty when the patients were submitted to the same postoperative protocol.

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