

THE INFLUENCE OF THE SURGICAL APPROACH CONCERNING DISLOCATION IN TOTAL HIP ARTHROPLASTY

José Ricardo Negreiros Vicente¹, André Fernandes Pires², Bruno Takasaki Lee², Marcos Camargo Leonhardt⁴, Leandro Ejnisman⁵, Alberto Tesconi Croci⁶

ABSTRACT

Objectives: Our primary aim was to evaluate the occurrence of dislocation of non-cemented total hip arthroplasty, when using the posterior and the direct lateral approaches. **Methods:** We performed a comparative retrospective study with 232 patients submitted to non-cemented total hip arthroplasty, due to the diagnosis of primary or secondary osteoarthritis. The posterior approach was used in 105 patients while direct lateral approach was used in 127 patients. There was only one prosthesis model and the same rehabilitation program and post-operative care was used for all patients. We checked the occurrence of dislocation,

the acetabular positioning and also the size of the components. **Results:** There was only one case of dislocation, treated with closed reduction successfully. This was a 47 year-old female, submitted to direct lateral approach. The mean follow-up time for both groups was 23.7 months, ranging from six to 42 months. **Conclusion:** The authors conclude that the prevalence of total hip arthroplasty dislocation is similar for both approaches, and educational measures besides the use of a higher femoral offset seem to reduce the risk of this complication.

Keywords – *Hip; Arthroplasty; Hip dislocation*

INTRODUCTION

Total hip replacement is a surgical technique that aims to relieve joint pain and restore function, and has been used widely since the 1960s after it was disclosed by Sir John Charnley⁽¹⁾.

Among the complications of the technique, dislocation can be considered a complication peculiar to this type of surgery, whereas other complications are common to all types of surgery. Besides the suffering it causes the patient with the possibility of further

surgery, we must also consider the socioeconomic cost, potentially increasing the normal cost by 50%⁽²⁾.

The prevalence of dislocation in total hip arthroplasty is variable, with reports ranging from 0.43% to 6.9%^(3,4). Surgical approach is one of the main factors attributed to the prevalence of this complication. The oldest studies considered the posterior approach to be more unstable than the lateral approach⁽⁵⁾. However, recent studies involving greater clinical evidence through systematic review have been inconclusive regarding the influence of the surgical approach on dislocations⁽⁶⁾.

1 – Associate Professor, USP School of Medicine, Hip and Arthroplasty Group Assistant, Institute of Orthopedics and Traumatology, HC/FMUSP.

2 – Resident of the Institute of Orthopedics and Traumatology, HC/FMUSP.

3 – Hip and Arthroplasty Group Volunteer Assistant, Institute of Orthopedics and Traumatology, HC/FMUSP.

4 – Doctor of Specialized Complementary Medicine, Hip and Arthroplasty Group, Institute of Orthopedics and Traumatology, HC/FMUSP.

5 – Associate Professor, USP School of Medicine, Head of the Hip and Arthroplasty Group, Institute of Orthopedics and Traumatology, HC/FMUSP.

Study conducted at the Institute of Orthopedics and Traumatology, HC/FMUSP.

Correspondence: Rua Afonso de Freitas, 488, ap. 22 – 04006-052 – Sao Paulo, SP. E-mail: emegreiros@gmail.com

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The central objective of our study was to evaluate the occurrence of dislocation in total hip arthroplasty, comparing the posterior approach and the direct lateral approach, using a single model of cementless prosthesis.

METHODS

We conducted a comparative retrospective study with 232 patients undergoing uncemented total hip replacement at the Institute of Orthopedics and Traumatology, Hospital das Clinicas, USP School of Medicine, between January 2006 and December 2008, comparing direct lateral approach and posterior approach. This is a two-tailed study, with our null hypothesis (H0) being an equal incidence of prosthetic dislocation between the two groups of patients and our alternative hypothesis (H1) that there was a difference of incidence.

The study included all patients operated during this period with a diagnosis of primary or secondary osteoarthritis, in which a single model of prosthesis was used in all cases. The group who underwent posterior approach totaled 105 patients and were operated on by a single surgeon (JRN), and the group undergoing the direct lateral approach totaled 127 patients, and were operated on by three different surgeons.

Patients who met the following criteria were not included in the study:

- Diagnosis of femoral neck fracture
- Patients with Crowe type II, III, or IV hip dysplasia
- Patients undergoing revision of hip arthroplasty
- Bilateral hip arthroplasty
- Using a different cementless prosthesis model
- Infection with subsequent septic loosening of the components
- Cemented type or hybrid type total hip replacement
- Minimally invasive approach
- Loss to follow-up prior to our horizontal analysis, which occurred in June 2009

All patients underwent total hip arthroplasty with an acetabular MBA (Lepine®, France) component composed of titanium alloy with a hydroxyapatite covering, and a Targos femoral component (Lepine®, France) with taperloc geometry and a hydroxyapatite covering. All modular heads had a diameter of 28mm and were made of steel. The smallest amount of femoral offset is 44.05mm and the largest is 52.09mm, with progressive variation according to the size of the femoral component.

The posterior approach was performed in the lateral position according to the technique described by Moore⁽⁷⁾, reinserting the tendons of the external rotators (gemelli, piriformis, and obturator internus) with a tendon suture in the tendon of the gluteus medius muscle 'in x' using Vicryl 0® sutures. The direct lateral approach was performed according to the technique described by Hardinge⁽⁸⁾, but with the patient positioned in lateral recumbency.

Anti-infective prophylaxis was performed with 1.5 g intravenous cefuroxime every 12 hours for 48 hours, and mechanical and medical antithrombotic prophylaxis was maintained with low molecular weight heparin until 30 days postoperatively. Active assisted physiotherapy was started on the first day after surgery, avoiding flexion over 90 degrees, adduction less than 10 degrees to the central axis, or any rotational movement of the operated limb. Gait training and chair-to-bed transfer training was conducted before discharge, which occurred on the fifth day after surgery.

Both groups were compared regarding gender, age, side operated, and initial diagnosis. Acetabular components were placed using press-fit stabilization and received additional fixing screws according to the surgeon's preference. The polyethylene component used has a 10 degree progressive flange, involving 90% of the length of the circumference of the component.

We searched for episodes of dislocation up to the sixth month after surgery, or any episode that occurred up to the cross-sectional analysis conducted in June 2009 for patients followed more than six months. Acetabular inclination and follow-up time were measured in addition to demographic data and episodes of dislocation. We considered the acetabulum poorly positioned if the abduction angle was less than 30 degrees or greater than 55 degrees, or if the acetabulum was missing coverage over more than 20% of the DeLee and Charnley zone 1.

Data with normal distribution were evaluated using parametric tests. The comparison between groups was performed by a two-tailed t-test, using a significance level of $p < 0.05$. Non-numerical qualitative data were organized in double-entry contingency tables and were analyzed with the chi-square or Fisher's exact test when necessary. A significance level of $p < 0.05$ was also used.

RESULTS

The demographics of both groups of patients are presented in Table 1.

Table 1 – Statistical analysis of the two groups of patients: posterior approach and direct lateral approach.

	Posterior approach group	Direct lateral approach group	p value
Gender, male/female	58/47	56/71	0.11
Side, right/left	54/51	60/67	0.61
Age (mean)	53.8	52.3	0.87
Diagnosis, primary/secondary osteoarthritis	31/74	48/79	0.23

The follow-up period of the two groups varied between six and 42 months, with an average of 23.7 months. We observed a single case of anterior dislocation of the prosthesis in the patient group undergoing the direct lateral approach (0.8%) versus 0% for the posterior approach group, without a significant difference ($p = 1$). Dislocation occurred in a 47-year-old female patient diagnosed with rheumatoid arthritis, who underwent hip arthroplasty with direct lateral approach after three weeks of surgery, and was treated with closed reduction, without recurrence of dislocation after three years and one month of follow-up.

The inclination of the acetabular component was not significantly different between groups, with 96.2% good positioning in the posterior approach group and 92.1% in the direct lateral approach group ($p = 0.27$).

We did not include two patients from the direct lateral approach group and one patient from the posterior approach group due to a diagnosis of deep infection requiring revision of the prosthetic components.

Table 2 presents a summary of the size of the prosthetic components.

Table 2 – Prosthesis components.

	Posterior approach group	Direct lateral approach group	p value
Largest/smallest acetabular component	45/60	47/80	0.44
Largest/smallest femoral component	72/33	90/37	0.81
Neck 28mm - 3.5 and 0mm/ + 3.5 and 7mm	95/10	85/42	< 0.001*

DISCUSSION

The study of the two patient samples showed no selection bias. As this is a retrospective study, there was no randomization, and the division of the two groups was due to the surgeon's personal choice as to which approach the surgeon was more accustomed to performing. However, we must point out the low average age of the patients in both groups.

This finding coincides with the high proportion of patients with secondary osteoarthritis who are usually younger, totaling 66% of cases. We believe that this is due to our clinic's search for more complex cases, due to the very structure of the Brazilian Public Health System^(9,10).

We had one case of dislocation in the group of patients undergoing the direct lateral approach and no cases in the posterior approach group, although without statistical significance. The prevalence in the total sample (232 patients) is 0.4%, which is lower than that of most authors reviewed⁽¹¹⁻¹³⁾. The main factors that we believe are responsible for this fact are the low average age of the entire sample population, the exclusion of patients with femoral neck fractures, the use of a prosthesis with two protective anti-dislocation features, and appropriate post-operation rehabilitation training and protocols.

In a previous series performed by the same group (22mm head diameter), using the anterolateral approach with Charnley-type prosthesis, we observed 3.4% dislocation in 115 arthroplasties, values that were also similar to those of other national authors^(14,15).

In our opinion, the exclusion of patients with a femoral neck fracture in the sample allows for more accurate statistics, because such patients are known to have a higher prevalence of dislocation in three regards, namely: joint range of motion greater than that of patients with osteoarthritis, older age, and less muscle strength. Such features generally increase the prevalence of values that may reach around 10%^(9,15). The prosthesis used in all patients has a greater than usual offset. The offset of the smallest femoral component is 44.05mm, a value comparable with the highest offsets of other manufacturers. Without a doubt, this indicates greater stability, however, one should be aware of the possible lengthening of the limb above the desirable level. This fact also explains why the two shortest neck sizes were the ones most used in both groups, although more frequently in the posterior approach.

Such variation may be due to a variation in surgeons in the direct lateral approach group, which indicates a bias in our study. However, the same type of prosthesis used in all patients is a scientifically enriching factor not observed in most works. Acetabular positioning did not differ between groups, however, we did not measure the extent of acetabular anteversion. It is believed that positioning is an important factor in the genesis of dislocations, especially in the posterior approach, where the surgeon – at the beginning of the learning curve – may tend toward acetabular retroversion⁽¹⁶⁾. Preventive training and education in the pre- and postoperative period are essential to prevent dislocations, and we believe that this was one of the reasons for our

low prevalence^(11,17).

We believe that the higher incidence of dislocation using the posterior approach which occurred in the past was due to errors in acetabular positioning with a tendency toward retroversion, as well as the non-insertion of external rotator tendons. This fact is confirmed by numerous recent studies presented in two meta-analyses^(3,6).

CONCLUSION

We observed a low prevalence of this complication in the two approaches studied due to adequate technique and educational measures in the postoperative period.

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