DIRECT LATERAL AND POSTEROLATERAL APPROACHES FOR TOTAL HIP ARTHROPLASTY: COMPARISON OF POSTOPERATIVE GAIT FUNCTION

MARCO ANTONIO ROCHA AFONSO[1], JOSÉ SÉRGIO FRANCO[2], FERNANDO JOSÉ PINA CABRAL[3], MARIO DONATO D'ANGELO[4], FRANCISCO ROBSON VASCONCELOS ALVES[5]

SUMMARY

With the overwhelming development of surgical materials and the longer life expectancy of the world population, total hip arthroplasty procedures have been increasingly frequent. Although surgical techniques have greatly improved in recent years, some controversies are still unsolved. In this study, the author compared the gait function in 33 patients submitted to total hip arthroplasty through lateral and posterolateral ap¬proaches. Gait analysis was used to quantify kinematics data and detect the presence of Trendelenburg sign on patients with at least one year of follow-up. In the study, there were no significant differences between both surgical approaches concerning the studied parameters.

Keywords: *Arthroplasty; Replacement, Hip; Gait; Comparative study*

Citation: *Afonso MAR, Franco JS, Cabral FJP, D'Angelo MD, Alves FRV. Direct lateral and posterolateral approaches for total hip arthroplasty: comparison of postoperative gait function. Acta Ortop Bras. [serial on the Internet]. 2008; 16(2):74-81. Available from URL: http://www.scielo.br/aob.*

INTRODUCTION

With the increased life expectancy and the resultant higher number of aged people living active and independent lives, joint replacement surgeries are procedures that have increasingly been performed intending to improve quality of life for the population living with orthopaedic conditions. Despite the strong advancements seen on total hip replacement surgery over the last decades, the selection of the best surgical approach is still controversial in literature, being so determined by individual preferences of the surgeon. Many approaches have been described for total hip arthroplasties. However, the most frequently used and studied are the following:
the transtrochanteric approach, the anterolateral approach, and the direct lateral and posterolateral approaches. The latter are the object of the present study. The direct lateral approach was described by Hardinge[1] in 1982. Also referred to as lateral, Hardinge's or transgluteal approach, this is a modified Bauer's approach[2]. It provides an excellent acetabular cavity and femoral proximal end exposure, enabling an easy insertion of the components of hip prosthesis. Additionally, posterior hip structures are preserved, thus turning postoperative prosthesis dislocation difficult. It may be performed with the patient lying on his/her back or chest, thus enabling an easier anesthetic procedure. Its bigger disadvantage is the release of the anterior third of the gluteus muscle tendon on the great trochanter, which ultimately can lead to the development of limping by abduction failure. The posterolateral approach resulted from the combination of Langenbeck's and Kocher's approaches[3]. The first was described in 1873 for treating infectious complications associated to gun shots. The second – which is a modification of the first – was employed to provide a better access to the acetabulum when treating hip tuberculous arthritis. Today, it is known as Kocher-Lan-genbeck and it is used as an access to the edge and posterior spine on acetabular fractures. In 1950, Gibson[4] modified the Kocher-Langenbeck's approach by making a lateral surgical incision, a transgluteal approach and the tenotomy of the medium and minimum gluteus muscles of the great trochanter. Although it allowed for a wider access to the hip, it was little employed because abductor tendons' tenotomy led to gluteus muscle failure. To avoid this problem, in 1954, Marcy and Fletcher[5] described a modification of the Gibson's approach for inserting partial prostheses. They dislocated the posterior hip after releasing posterior structures, without performing abductors' tenotomy. This approach is widely employed, because it enables hip dislocation with no great trochanter osteotomy and gluteus muscle injuries. However, the weakening of hip's posterior structures may lead to a higher dislocation rate. In this study, we sought to identify potential

Study conducted at the National Institute of Trauma and Orthopaedics – INTO – HTO of the Ministry of Health, Rio de Janeiro, RJ
Correspondences to: Rua Nunes Valente 1660/1902, Fortaleza, CE, CEP: 60.125-070 - E-mail: marafonso@terra.com.br

1. Master in Medical Sciences by the Federal University of Rio de Janeiro; Orthopaedic Doctor at Instituto Dr. José Frota – IJF-CE, Assistant Professor, University of Fortaleza – UNIFOR – CE
2. Associate Professor, Ph.D., Department of Orthopaedics and Traumatology, Federal University of Rio de Janeiro
3. Head of the Hip Surgery Service, National Institute of Trauma and Orthopaedics, Ministry of Health – INTO – HTO – RJ.
4. Associate Professor, Ph.D., Department of Physical Activity Biosciences, Federal University of Rio de Janeiro.
5. Orthopaedic Doctor, Instituto Dr. José Frota – IJF-CE

Received in: 11/28/06; approved in: 03/23/07

gait changes when two approach techniques in hip surgery are employed. The objective of the study was to establish, comparatively, the degree of functional compromise associated to the surgical approach on total hip arthroplasty. Kinematic parameters and the presence of Trendelenburg sign were compared on the gait of patients submitted to this kind of surgery through posterolateral and direct lateral approaches.

CASE SERIES AND METHODS

Research subjects

Between January 1998 and May 1999, 262 total arthroplasties were performed on 172 patients at the Ministry of Health´s National Institute of Trauma and Orthopaedics (INTO) Hospital (HTO) in Rio de Janeiro. For this study, 72 medical files were initially selected from patients meeting the following inclusion criteria: had been submitted to primary arthroplasty, more than one postoperative year, younger than 75 years old, showing unilateral involvement of the hip, previously operated by INTO medical staff, and submitted to the same physical therapeutic treatment plan, i.e., by frequently attending physical therapy sessions provided by the medical staff at HTO facilities. Then, of those 72 patients, 29 were excluded from the study, consistently to the following exclusion criteria: history of previous inflammatory or neurologic conditions (12 patients), any concomitantly compromised joint of the lower limbs (9 patients) or those presenting with clinical complications during postoperative follow-up, such as surgical wound infections, bruises, or thromboembolic events (8 patients). Also, previously to the gait study, X-ray images captured 1 year postoperatively were examined. In addition, all patients presenting with any sign of loose or unfixated prosthesis (3 patients), any involvement of the contralateral hip as shown on X-ray images (1 patient) or failure on great trochanter´s rotation center or position recovery compared to contralateral hip (6 patients) were excluded, thus totaling 39 exclusions. The potential alteration of the results due to the use of different prosthesis models was not considered for the study, since the rotation centers have been reestablished. It is worthy to highlight that the 33 selected patients (Tables 1 and 2) signed an informed consent term approved by the Committee of Ethics in Medical Research.

Patients	Direct lateral approach	Posterolateral approach	Total
Total	14	19	33
Males	10	7	17
Females	4	12	16
Minimum age[1]	28	28	-
Maximum age[1]	74	75	-
Mean age[1]	54.9	56.1	-
Minimum Postoperative time[2]	13.6	12.9	-
Maximum postoperative time[2]	27.6	28.4	-
Mean postoperative time[2]	20.2	20.0	-

Source: HTO/INTO, 2000. -1 in years - 2 in months

***Table 1** – Characteristics of the patients selected for the analysis*

Pat.	Gender*	Age	Side†	Diagnosis	Approach‡	Time#
01	F	48	L	coxartrosis	Post.	25.0
02	F	76	R	coxartrosis	Post.	23.5
03	M	40	R	coxartrosis	Post.	13.1
04	M	70	L	avascular necrosis	Post.	27.9
05	M	37	L	coxartrosis	Post.	28.4
06	F	61	L	coxartrosis	Post.	21.1
07	F	62	L	avascular necrosis	Post.	16.0
08	F	50	R	coxartrosis	Post.	21.7
09	F	45	R	coxartrosis	Post.	22.6
10	F	68	L	avascular necrosis	Post.	23.3
11	F	51	R	neck fracture	Post.	14.7
12	M	71	R	coxartrosis	Post.	16.6
13	M	58	R	coxartrosis	Post.	16.5
14	F	64	R	coxartrosis	Post.	19.8
15	F	51	R	coxartrosis	Post.	12.9
16	F	67	R	coxartrosis	Post.	27.9
17	F	72	L	coxartrosis	Post.	19.4
18	M	50	R	coxartrosis	Post.	16.3
19	M	48	L	coxartrosis	Post.	13.0
20	M	56	R	coxartrosis	Lat.	27.2
21	F	54	L	coxartrosis	Lat.	19.5
22	M	52	R	avascular necrosis	Lat.	27.6
23	F	68	L	coxartrosis	Lat.	16.6
24	M	71	L	coxartrosis	Lat.	20.1
25	F	71	L	coxartrosis	Lat.	20.1
26	M	50	R	coxartrosis	Lat.	19.1
27	M	50	L	coxartrosis	Lat.	22.8
28	M	73	R	coxartrosis	Lat.	14.3
29	M	70	L	coxartrosis	Lat.	18.0
30	F	42	R	avascular necrosis	Lat.	17.7
31	M	52	L	coxartrosis	Lat.	25.8
32	M	68	L	neck fracture	Lat.	13.6
33	M	65	L	coxartrosis	Lat.	20.5

Source: HTO/INTO, 2000. - * M, Male; F, Female - † R, right hip operated; L, left hip operated -‡ Lat., Direct Lateral approach; Post., Direct Posterolateral approach- - #, postoperative time (in months).

***Table 2** – List of studied patients, sorted by approach employed*

Test at gait laboratory

The 33 selected patients were submitted to gait analysis at the INTO´s Human Movement Research Laboratory (LPDH). The patients performed the test wearing light and comfortable clothes, allowing a wide exposure of the acetabulum and limbs. Bathing suits for men and bikinis for women were the attires designed for the test. Kinematic parameters were obtained by a computer-based three-dimensional system *Vicon 140®*, with three infrared rays emitting and captivation cameras at 60 Hz. Infrared reflex marks were placed at the key anatomical points of the involved joints. Gait was videotaped using a digital video camera to record body´s movements at frontal and sagittal planes, with one gait for each plane. One take was recorded at orthostatic position at frontal plane in order to capture the zeros in alignment. Subsequently, each patient was asked to walk as naturally as possible, at a comfortable pace. During gait cycles, data concerning angular and linear kinematics of each patient´s gait were obtained by means of three-dimensional automated movement tracking. The angular kinematic data employed were the following: hips´ range of motion at maximum flexion-extension and abduction-adduction. Measured as degrees, the averages were calculated for each approach, which were compared to each other. Of the linear kinematics data, the employed ones were as follows: time of support for each limb, time of double support, length of step for each limb, footage, gait speed and pace. The units employed were seconds for time, millimeters for distance, and number of steps by minute for pace. From these data, the averages for each parameter were also compared and then statistically compared to each other. Upon the completion of all tests, the videotapes were assessed. On the visual analysis of the gait by means of videotaped images, the existence of the Trendelenburg sign was randomly checked, with the investigator blinded to the operated side or surgical approach used. Data obtained during the visual analysis of the gait on videotape were characterized as positive or negative to Trendelenburg sign. A positive result was assigned to any patient showing drop or absence of lifting of the contralateral pelvis to the operated side when in the support phase of the gait.

Statistical analysis

The results concerning the presence of Trendelenburg sign were compared and validated by using the Chi-squared test, with a significance level of 5% ($\alpha = 0.05$), with the null hypothesis (H0) being regarded as the absence of the sign and the alternative hypothesis (H1) as its presence. Results concerned to angular and linear kinematic analysis were submitted to comparison by the Student's t-test (*t*). The averages and variances were calculated for each studied parameter, and then calculating the absolute t value. Absolute *t* values were compared to *t* values on a proper table and considered as significant results when $\alpha < 0.05$.

RESULTS

Visual assessment by videoimage

Of the 14 patients operated with the direct lateral approach, 3 were had positive results (21.42%). Concerning the 19 cases operated using the posterior approach, 3 positive results (15.79%) were found (Table 3). The statistical analysis by Chi-squared test showed no difference between the approaches for the number of cases studied.

Angular kinematic analysis of gait

By applying the Student´s t-test, the averages for range of motion at flexion-extension and abduction-adduction (Table 4) were compared, taken at frontal and sagittal planes, as seen on Graph 1. The differences found were 0.46 degrees for range of motion at flexion-extension, and 0.60 degrees for range of motion at abduction-adduction, showing no statistically significant differences.

Linear kinematic analysis of gait

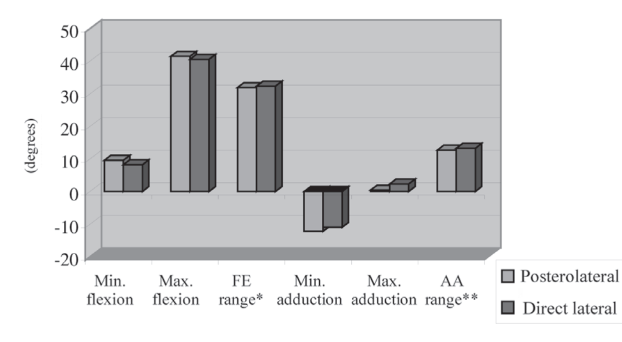
From the results of linear parameters measurements (Table 5), the averages for each parameter were calculated and compared to each other by employing the Student´s t-test (Table 6). No statistically significant differences were found for any of the parameters.

Surgical Approach	Minimum Flexion	Maximum Flexion	FE range*	Minimum adduction	Maximum adduction	AA range**
Direct lateral	8.21°	40.57°	32.38°	-11°	2.28°	13.28°
Postero-lateral	9.58°	41.47°	31.90°	-12.26°	0.42°	12.68°

Source: Vicon 140 System, LPMH, HTO/INTO, 2000 Note 1: Values expressed as degrees - Note 2: by convention, for calculation purposes, extension and abduction are negative, while flexion and adduction are positive. ¬

* Flexion-extension range - ** Abduction-adduction range

***Table 4 –** Averages for Sides Submitted to Surgery*



Sources: LPMH, HTO/INTO, 2000 - Note: By convention, for calculation purposes, extension and abduction are negative, while flexion and adduction are positive. -* flexion-extension range -** Abduction-adduction range

***Graph 1 –** Comparison between averages of angular kinematic data*

Case	Minimum flexion	Maximum flexion	FE range†	Minimum Adduction	Maximum Adduction	AA range‡	Surgical approach*	Tren**
01	0º	35º	35º	-14º	4º	18º	Post.	-
02	20º	50º	30º	-6º	2º	8º	Post.	-
03	10º	40º	30º	-15º	3º	18º	Post.	-
04	10º	50º	40º	-15º	5º	20º	Post.	-
05	10º	45º	35º	-17º	-3º	14º	Post.	-
06	23º	47º	24º	-2º	-8º	6º	Post.	-
07	5º	28º	23º	-2º	7º	9º	Post.	-
08	5º	37º	32º	-11º	0º	11º	Post.	-
09	20º	45º	25º	-15º	3º	18º	Post.	-
10	10º	51º	41º	-18º	-3º	15º	Post.	-
11	9º	33º	24º	-14º	-2º	12º	Post.	-
12	5º	47º	42º	-25º	-10º	15º	Post.	-
13	5º	47º	42º	-10º	5º	15º	Post.	+
14	20º	50º	30º	-4º	8º	12º	Post.	-
15	10º	23º	13º	-18º	-6º	12º	Post.	-
16	10º	50º	40º	-15º	3º	18º	Post.	+
17	-5º	35º	40º	-12º	-2º	10º	Post.	-
18	0º	35º	35º	-12º	-2º	10º	Post.	-
19	15º	40º	25º	-8º	4º	12º	Post.	+
20	14º	37º	23º	-8º	6º	14º	Lat.	+
21	2º	33º	31º	-8º	5º	13º	Lat.	-
22	0º	37º	37º	-7º	7º	14º	Lat.	-
23	-2º	40º	42º	-13º	3º	16º	Lat.	-
24	20º	55º	35º	-15º	0º	15º	Lat.	-
25	1º	40º	39º	-8º	3º	11º	Lat.	-
26	18º	38º	20º	-15º	0º	15º	Lat.	-
27	-3º	35º	38º	-4º	1º	5º	Lat.	-
28	20º	45º	25º	-16º	-6º	10º	Lat.	-
29	5º	35º	30º	-12º	-6º	6º	Lat.	+
30	18º	51º	33º	-10º	7º	17º	Lat.	-
31	0º	31º	31º	-12º	4º	16º	Lat.	-
32	15º	50º	35º	-10º	7º	17º	Lat.	+
33	5º	45º	40º	-15º	3º	18º	Lat.	-

Source: Vicon 140 System, LPMH, HTO/INTO, 2000. - Note: by convention, for calculation purposes, extension and abduction are negative, while flexion and adduction are positive.
† Flexion-extension range, ‡ Abduction-adduction range - * Post., posterolateral; Lat., Direct lateral - ** Trendelenburg gait, +, positive; -, negative

***Table 3 –** Results obtained from Vicon 140 and from videotape*

Case	Normal side		Operated side		Double support time (s)	Footage (mm)	Pace (steps/min)	Average speed (mm/sec)	Approach
	Support time (s)	Step (mm)	Support time (s)	Step (mm)					
01	1.0	500.0	0.9	535.0	0.1	1111.0	92.3	900.4	Post.
02	0.7	426.4	0.7	581.8	0.2	1035.0	72.7	646.2	Post.
03	0.9	509.8	1.0	476.7	0.0	1008.0	92.3	829.7	Post.
04	0.7	539.2	0.7	460.6	0.1	1092.0	107.4	1130.0	Post.
05	0.7	497.8	0.7	515.2	0.1	972.8	79.1	694.4	Post.
06	0.9	400.0	0.9	425.8	0.2	983.9	84.9	503.8	Post.
07	1.3	319.6	1.3	296.0	0.1	971.2	80.0	716.8	Post.
08	0.9	367.9	0.9	367.0	0.1	986.5	96.7	592.4	Post.
09	0.8	486.6	0.8	501.6	0.1	999.8	92.3	902.3	Post.
10	0.7	647.2	0.8	527.4	0.1	898.5	88.9	743.4	Post.
11	0.7	586.3	0.7	568.3	0.1	1013.0	91.1	793.2	Post.
12	0.7	578.8	0.7	532.6	0.1	825.8	71.3	489.0	Post.
13	0.8	542.3	0.8	457.8	0.1	1054.9	86.3	802.3	Post.
14	0.8	478.6	0.8	492.2	0.1	934.9	78.6	436.5	Post.
15	1.1	546.6	1.0	337.2	0.1	988.2	79.1	690.0	Post.
16	0.8	458.3	0.8	512.9	0.1	1175.0	90.0	869.7	Post.
17	0.7	512.4	0.7	386.1	0.1	1188.0	90.0	994.7	Post.
18	0.7	575.6	0.7	612.8	0.1	1155.0	88.9	851.3	Post.
19	0.6	682.4	0.7	405.4	0.1	1088.0	101.4	971.6	Post.
20	1.0	256.1	1.1	298.4	0.2	601.9	64.9	377.3	Lat.
21	0.7	873.8	0.6	467.3	0.1	879.1	98.5	287.4	Lat.
22	0.8	570.4	0.7	542.0	0.1	1046.0	106.5	841.7	Lat.
23	0.7	675.8	0.7	580.8	0.1	910.2	91.1	683.5	Lat.
24	0.6	495.9	0.8	488.8	0.1	1136.0	93.5	973.5	Lat.
25	1.0	280.6	0.7	503.9	0.0	1194.0	82.8	874.0	Lat.
26	0.7	442.9	0.7	506.2	0.1	1067.0	84.7	786.7	Lat.
27	0.6	593.8	0.8	437.0	0.1	1058.0	84.7	810.8	Lat.
28	0.8	613.4	0.5	662.0	0.1	1251.0	83.7	936.8	Lat.
29	0.8	569.2	1.1	345.7	0.0	1159.0	86.8	918.3	Lat.
30	0.7	654.7	0.8	472.6	0.1	1038.0	104.3	999.9	Lat.
31	0.9	606.1	0.8	496.2	0.1	1112.0	88.3	715.4	Lat.
32	0.8	461.3	0.8	575.4	0.1	898.2	81.8	629.7	Lat.
33	0.6	567.8	0.6	542.0	0.0	1230.0	109.1	1168.0	Lat.

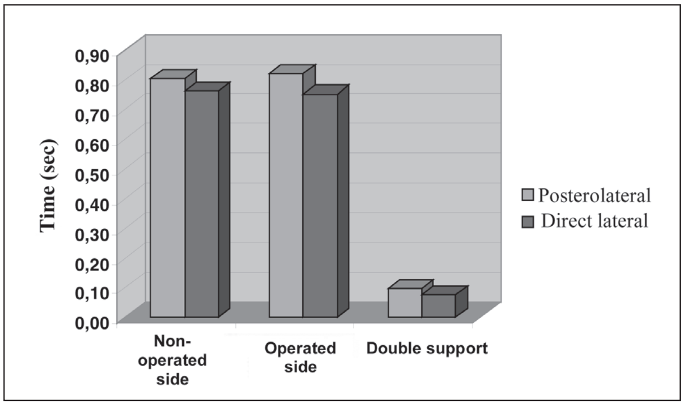
Source: Vicon 140 System, LPMH, HTO/INTO, 2000 - Post. = posterolateral approach; Lat. = direct lateral approach

***Table 5 –** Linear kinematic data captured by Vicon 140 System*

Surgical approach	Non-operated side		Operated side		Double support time	Footage	Pace	Average speed
	Support time	Step length	Support time	Step length				
Posterolateral	0.81	508.20	0.82	473.28	0.10	1025.34	87.54	766.19
Direct lateral	0.76	547.27	0.75	494.16	0.07	1041.46	90.05	785.93

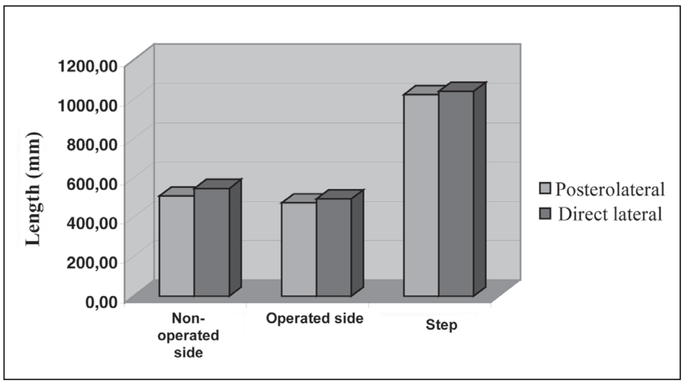
Source: Vicon 140 System, LPMH, HTO/INTO, 2000 - Length – in millimeters - Time – in seconds - Pace – steps per minute - Speed – millimeters per second

***Table 6 –** Averages of linear kinematic data*



Source: Vicon 140 System, LPMH, HTO/INTO, 2000

***Graph 2 –** Comparison of the averages for support time*



Source: Vicon 140 System, LPMH, HTO/INTO, 2000

***Graph 3 –** Comparison of the averages for step length and footage.*

DISCUSSION

Clinical parameters that can be associated to the measurements performed in this study are, basically, the determination of gluteus muscle failure and qualitative assessment of postoperative ambulation function. Although the major cause for gluteus muscle failure is associated to preoperative hip conditions and to the poor positioning of the prosthesis components[6,7], we sought to determine which patients would present with this disorder simply as a result of injuries secondary to the surgical approach. In this case, the primary etiologic factor to be considered is suture dehiscence on medium gluteus muscle after its tenotomy, as reported by Svenson et al.[8]. They suggested that a > 2.5-cm dehiscence of the suture line on gluteus tendon on trochanter would be compatible to a Trendelenburg-type gait. To come to this conclusion, they used metal markers, enabling the determination of the degree of distance from one suture edge to the other on postoperative X-ray images. Another etiologic factor to be considered is the injury of the upper gluteus nerve compromising the innervations of the medium gluteus and tensor muscle of the fascia lata, as described by Ramesh et al[9].However, although injuries are more frequently reported after lateral approach, they are known to occur also with posterolateral approaches when the 5-cm cephalic limit to the great trochanter for deep dissection is not respected[10,11]. In the present study, the etiology of cases evolving with gluteus failure was not assessed. We have only reported its presence on the video image assessment. As no needle electrodes were available for a specific study of upper gluteus nerve injuries, the dynamic electromyography was not used. There were only surface electrodes available, which detected the activity of the whole muscle bundle of the gluteus region; therefore, they were unable to isolate the particular activities of the medium gluteus and tensor muscle of the fascia lata (both innervated by the upper gluteus nerve). The medium gluteus failure was clinically assessed by watching the typical limping during gait cycle. The purpose of the study was to make an analysis during gait by means of an arranged view from a videotape, which allows for a detailed and quite observation, providing a large number of repetitions without leading to patient fatigue. When comparing to literature, our results were consistent for the presence of limping during gait. Barber et al.[12] found similar results to the ones found here in this study. They compared the posterolateral and the direct lateral approaches, clinically assessed limping, Trendelenburg test and gain of range of motion in patients submitted to total hip arthroplasty two years earlier for treating coxarthrosis. No difference was found between the approaches, as occurred in the present study. Gore et al.[7] compared the posterior and Watson Jones´ anterolateral approaches in terms of isometric strength of hip abductors and adductors, either operated or non-operated. They concluded that the difference between the approaches was primarily due to the positioning of the components. They found a greater anteversion and a longer neck for patients submitted to posterior approach, and, as a result, strength closer to normal.

Robinson et al.[13] compared the posterior and lateral transtrochanteric approaches in total hip arthroplasties, but assessed different factors from the present study, such as prosthesis positioning, systemic and surgical wound complications. They did not find significant differences for these parameters. Baker and Bitounis[10], when comparing the Hardin´s direct lateral approach 1), the Dall-modified direct lateral approach[14] and the posterior approach, concluded that the direct lateral approach may lead to abductors weakening compared to posterior approach. They used as assessment parameters the electromyography and the Trendelenburg test, which was regarded as positive upon lost pelvic support with less than 30 seconds of single-foot support time. It is important to remember that, on the modification of the lateral approach proposed by Dall[14] no tenotomy of the medium gluteus muscle is performed, but a slice-kind osteotomy of the great trochanter. This is fixated again at the end of surgery, thus assuring synthesis through bone tissue. This synthesis has advantages over tenotomy, since it enables union at the region, offsetting the risk of tendinous suture dehiscence. Those authors performed the Trendelenburg test by placing the patient with non-operated lower limb suspended for 30 seconds. This maneuver results in a high demand to abductor muscles and may lead to positive results secondary to muscle fatigue. This particular test was not employed in the study, because when interpreting reflex marks on patients, the Vicon® system was unable to distinguish the patients who actually presented a negative Trendelenburg sign from those who offset it with the trunk to keep balance. The effect of the lateral approach after hip arthroplasties was also studied by Pai[15] when Hardinge´s, transtrochanteric, and Liverpool´s approaches were clinically been shown to present the same incidence of Trendelenburg gait, as well as functional level, range of motion and limping. Similarly to the present study, there was no functional difference between approaches, although only clinical parameters have been used on the latter. The study by Ritter et al.[16] also reported results similar to the present study when assessing the gait of patients after 1 year of postoperative evolution. The studied parameters included patient's functional status, presence of limping, and occurrence of postoperative dislocation. They found differences only for dislocations, which occurred more frequently in patients submitted to a posterolateral approach. Similarly to the present study, there was no difference in terms of incidence of limping. The anterolateral and the posterolateral approaches were compared by Macedo et al.[17,18] in 1999 and in 2002. When assessing postoperative complications, they found that the anterolateral approach demanded longer surgical times, increased intraoperative bleeding, and greater need for blood transfusion. However, the functional difference was not assessed postoperatively. The kinematic analysis in the study was employed for measuring patients´ performance during gait. The test transforms subjective observation into mathematic data. These do not depend on observer´s judgment and can be objectively compared. Furthermore, data captured by laboratory equipment provide high-precision values that can evidence subclinical gait changes. Thus, it is noticed that the similarity of results achieved with the approaches is of great significance, and that the performance on gait is no different in both approaches. From data achieved, we could not anticipate if any functional difference would be present with increased gait demands (accelerated speed or long distances), where muscular fatigue could show some differences between the approaches. Thus the study can easily be applied to patients with low functional demand; however, we cannot draw conclusions for activities of higher functional demand. In the study, ambulation differences with different kinds of prosthesis were not taken into account. Such observation was regarded as irrelevant in the short term, since different kinds of prosthesis basically differ in terms of the kind of fixation performed and endurance, causing gait cycle changes when these are loose or when extensively worn off. Of course, gait quality should not be the only aspect to be considered when selecting a particular surgical approach. Factors such as dislocation rates, patients´ position, intra- and postoperative clinical complications, and individual experience of the surgeon should also be considered.

CONCLUSION

Direct lateral and posterolateral surgical approaches for total hip arthroplasties did not show statistically significant differences regarding: prevalence of Trendelenburg sign and kinematic analysis of motion during gait cycle in a short-term follow-up.

REFERENCES

1. Hardinge K. The direct lateral approach to the hip. J Bone Joint Surg Br. 1982; 64:17-19.
2. Bauer R. The Transgluteal approach to the hip joint. Arch Orthop Trauma. 1979; 95:47.
3. Hoppenfeld S, De Boer P. The hip. In: Surgical exposures in orthopaedics. Philadelphia: Lippincott-Haven; 1984. p.301–56.
4. Gibson A. Posterior exposure of the hip joint. J Bone Joint Surg Br. 1950; 32:183-6.
5. Marcy GH, Fletcher RS. Modification of the posterolateral approach to the hip for insertion of femoral head prosthesis. J Bone Joint Surg Am. 1954; 36: 142-3.
6. Kenny P, O□Brien CP, Synnot K, Walsh MG. Damage to the superior gluteal nerve after two different approaches to the hip. J Bone Joint Surg Br. 1999; 81:979-81.
7. Gore DR, Murray MP, Sepic SB, Gardner GM. Anterolateral compared to posterior approach in total hip arthroplasty. Clin Orthop Relat Res. 1982; 165:180-7.
8. Svenson O, Sköld S, Blomgen G. Integrity of the gluteus medium after the transgluteal approach in total hip arthroplasty. J Arthroplasty. 1990; 5:57-60.
9. Ramesh M, O`Byrne JM, McCarthy N, Jarvis A, Mahalinghan K, Cashman WF. Damage to the superior gluteal nerve after the Hardinge approach to the hip. J Bone Joint Surg Br. 1996; 78: 903-6.
10. Baker AS, Bitounis VC. Abductor function after total hip replacement. An eletromyographic and clinical review. J Bone Joint Surg Br. 1989; 71:47-50.
11. Abitbol JJ, Gendron D, Laurin CA, Beaulieu MA. Gluteal nerve damage following total hip arthroplasty: a prospective analysis. J Arthroplasty. 1990; 5:319-22.
12. Barber TC, Roger DL, Goodman SB, Schurman DJ. Early outcome of total hip arthroplasty using the direct lateral vs. the posterior surgical approach. Orthopaedics. 1996; 19:873-5.
13. Robinson RP, Robinson HJ, Salvati EA. Comparison of the transtrochanteric and posterior approaches for total hip replacement. Clin Orthop Relat Res. 1980; 147:143-7.
14. Dall D. Exposure of the hip by anterior osteotomy of the greater trochanter. J Bone Joint Surg Br. 1986; 30:382-6.
15. Pai VS. A comparison of three lateral approaches in primary total hip replacement. Int Orthop. 1997; 21:393-8.
16. Ritter MA, Harty LD, Keating ME, Faris PM, Meding JB. A clinical comparison of the anterolateral and posterolateral approaches to the hip. Clin Orthop Relat Res. 2001; 385:95-99.
17. Macedo CAS, Galia CR, Rosito R, Perea CEF, Müller LM, Verzoni GG et al. Comparación de abordajes Antero lateral y posterior em artroplastia total primaria de cadera. Rev Fac Cienc Méd Córdoba. 1999; 56: 91-96.
18. Macedo CAS, Galia CR, Rosito R, Perea CEF, Müller LM, Verzoni GG et al. Abordagem cirúrgica na artroplastia total primária de quadril: ântero-lateral ou posterior? Rev Bras Ortop. 2002; 37:387-91.