

Hemiarthroplasty for Hip Fractures: Posterior or Direct Lateral Approach? Advantages and Disadvantages

Gilad Rotem MD^{1,2}, Jordan Lachnish MD^{1,2}, Tomer Gazit MD^{1,2}, Gal Barkay MD^{1,2}, Dan Prat MD^{1,2}, and Gil Fichman MD^{1,2}

¹Department of Orthopedic Surgery, Sheba Medical Center, Tel Hashomer, Israel

²Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv, Israel

ABSTRACT

Background: Several approaches are used to access the hip joint; most common are the direct lateral and posterior. Little consensus exists on which to use when treating hip fractures.

Objectives: To compare short-term complications, postoperative ambulation, and patient-reported outcome measures (PROMS) of direct lateral vs. posterior approaches in hemiarthroplasty for acute hip fractures.

Methods: We conducted a retrospective clinical trial with 260 patients who underwent bipolar hemiarthroplasty in the direct lateral or posterior approach (166 and 94, respectively) between January 2017 and December 2018. The clinical data included short-term complications: prosthetic dislocation, periprosthetic fractures, and infection. Postoperative ambulation was collected 6 weeks postoperatively; PROMS were collected for 173 patients at 2 years follow-up.

Results: There were six dislocations overall, average time to dislocation was 22 days postoperative (range 4–34). Five dislocations were after the posterior approach (5.3%) and one after direct lateral (0.6%) ($P = 0.01$). At 6 weeks follow-up, inability to walk was found in 16.9% of the direct lateral group and 6.4% of the posterior approach group ($P = 0.02$). In the posterior approach group, 76% could walk more than 20 meters; only half of the direct lateral group could ($P = 0.0002$). At 2 years follow-up, PROMS did not show a statistically significant difference between the groups.

Conclusions: Posterior approach for hemiarthroplasty following femoral neck fractures allows superior ambulation to the direct lateral approach only for the short-term. However, no long-term clinical advantage was found. This short-term benefit does not justify the increased dislocation rate in the posterior approach.

IMAJ 2023; 25: 91–95

KEY WORDS: direct lateral approach hip, femoral neck fracture, hemiarthroplasty, posterior approach hip, patient-reported outcome measures (PROMS)

Hemiarthroplasty is a common treatment for acute hip fractures and one of the most conducted procedures in orthopedics [1]. Several surgical approaches are used, including direct anterior, direct lateral, and posterior approaches. The latter two are the most used [2–4].

It has been reported that the posterior approach results in better regain of function [5,6] as the hip abductor muscles are spared, while the anterior and lateral approaches have a lower risk of dislocation [3,6–8]. However, not all authors agree [9]. The anterior approach, which has gained popularity for total hip replacement in the osteoarthritic hip due to a faster recovery and a decrease in muscular damage, does not share the same results for hemiarthroplasty in femoral neck fractures [10].

At our institution, the practice has shifted from the direct lateral approach to the posterior and direct anterior approaches in primary hip arthroplasty due to the gluteal sparing and rapid return to ambulation [9,11]. The shift away from the direct lateral approach in primary hip arthroplasty has stimulated a transition in the surgical approach performed during hemiarthroplasty for the treatment of femoral neck fractures from the direct lateral to the posterior approach. The direct anterior approach, which is used in primary hip arthroplasty at our institution, was not performed in hemiarthroplasties due to the limited experience of some surgeons with this approach and the increased risk for intraoperative fractures [10,12,13].

We compared the short- and long-term clinical outcomes of the direct lateral and posterior approaches in hemiarthroplasty for the treatment of acute femoral neck fractures.

PATIENTS AND METHODS

PATIENTS

The study was a retrospective clinical trial of 260 consecutive patients who underwent a bipolar hemiarthroplasty for the treatment of an acute displaced intracapsular hip fracture in either the direct lateral or the posterior approach between 1 January 2017 and 31 December 2018 at a tertiary medical center.

SURGICAL MANAGEMENT

Infection prophylaxis (cephalexin 2 gram) was given routinely within 30 minutes before skin incision and once postoperatively.

The patients were placed in a lateral decubitus position. For both approaches, the joint capsule was opened with a T-incision. A bipolar head with either a cementless or cemented Corail stem (Depuy, Warsaw, Indiana, USA) was used. After the insertion of the prosthesis, the joint capsule was sutured. In the posterior approach, the short rotators were reinserted into the posterior trochanteric edge using either tendon-to-tendon or tendon-to-bone sutures. In the direct lateral approach, the anterior one-third of the gluteus medius muscle was released and reinserted after the implantation of the prosthesis with either tendon-to-tendon or tendon-to-bone sutures. The patients in both groups were allowed full weight-bearing postoperatively.

The patients were scheduled for a follow-up in the outpatient clinic after 6 weeks. Complications, morbidity, and degree of regained ambulation were recorded in the outpatient clinic and rehabilitation center.

The degree of regained ambulation was determined according to the physical exam within the outpatient clinic or according to the physiotherapy records, which reported the best or longest walking distance within 6 weeks of the operation. At 2 years follow-up, we collected the following patient-reported outcome measures (PROMS): Patient-Reported Outcomes Measurement Information System Global-10 (PROMIS 10) physical and mental, a global health assessment tool; Hip disability and Osteoarthritis Outcome Score–Physical Function Shortform (HOOS-PS); European Quality of Life 5 Dimension 3 Levels (EQ-5D-3L); and EuroQol-visual analog scales (EQ-VAS). Of the 260 patients, we were able to reach 173. Sixty patients died and 27 were lost to follow-up (89% response rate) [Figure 1]. The baseline characteristics of the 173 patients who participated in PROMS (110 direct lateral approach, 63 posterior approach) were like the 87 patients who died or were lost to the follow-up.

PRIMARY AND SECONDARY OUTCOMES

The primary outcomes were dislocations, periprosthetic fractures, revision surgery, and surgical site infections within 90 days postoperative. The secondary outcomes included postoperative hemoglobin drop, packed red blood cells transfusions, and postoperative ambulation within 6 weeks. At 2 years follow-up we collected the following PROMS: PROMIS 10, HOOS-PS, EQ-5D-3L, and EQ-VAS.

STATISTICS

Statistical analysis was performed using Fisher's exact tests for categorical data and Student's *t*-tests for scaled variables. Statistical analyses were performed using IBM Statistical Package for the Social Sciences statistics software, version 21 (SPSS, IBM Corp, Armonk, NY, USA). *P* < 0.05 was considered statistically significant.

ETHICS APPROVAL

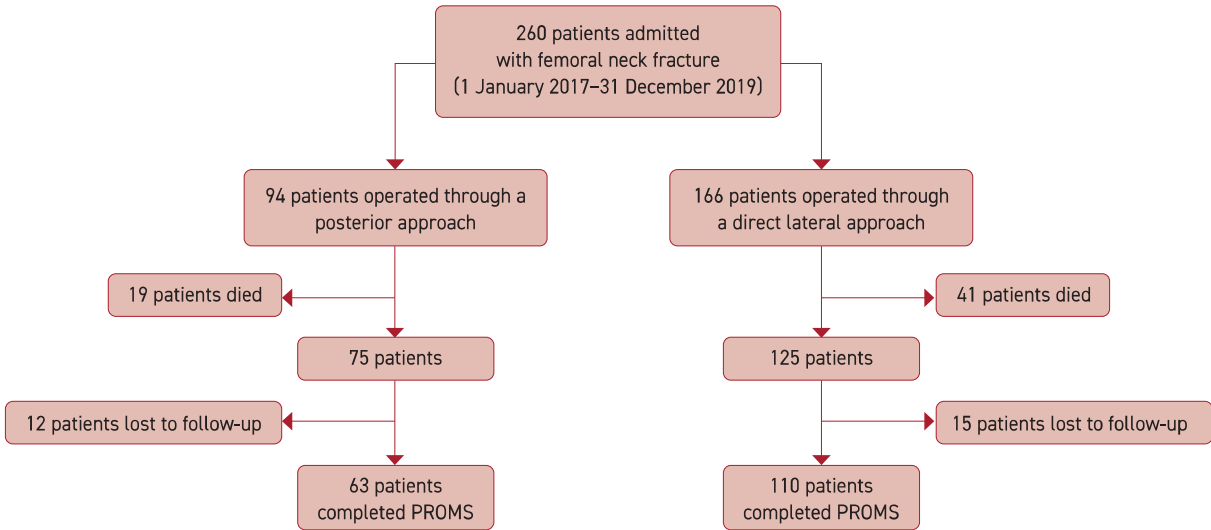
This study contains patient data and was approved by the institutional research committee and conducted under the 1964 Helsinki declaration and its later amendments, approval reference number: 5116-18-SMC. Each patient who participated in the PROMS questionnaire gave approval to participate in the study and publication.

RESULTS

PATIENT CHARACTERISTICS

A total of 260 patients who underwent hemiarthroplasty for the treatment of acute intracapsular hip fractures in the years 2017 and 2018 were included in the study. The mean age was 83.4 ±

Figure 1. Surgical approach and patient-reported outcome measures (PROMS)



8.5 years, 60.4% were female, and the mean body mass index (BMI) was 24.2 ± 3.7 . Of 260 hemiarthroplasties, 94 were performed via the posterior approach (36%), while 166 (64%) were performed using the direct lateral approach.

Baseline patient characteristics, including age, sex, BMI, and pre-fracture ambulation were similar between the groups [Table 1].

SHORT-TERM COMPLICATIONS

There were six dislocations overall. The average time to dislocation was 22 days postoperative (range 4–34). Five dislocations were in the posterior approach group (5.3%) and one in the direct lateral group (0.6%) ($P = 0.01$) [Table 2]. Three patients in the posterior approach group underwent revision, while the remaining three were treated with a closed reduction.

Eight patients presented with a periprosthetic fracture: six from the direct lateral approach group (4 were intraoperative, 2 were postoperative) and two from the posterior approach group (1 was intraoperative, 1 was postoperative) ($P = 0.5$). Six cases of infection in the direct lateral group, of which three required revisions. Two in the posterior approach group required revision ($P = 0.5$). Six revisions were conducted in the posterior approach group (6.4%) due to two cases of infection, one postoperative fracture, and three cases of dislocation. Four revisions were needed in the direct lateral group due to three cases of infection and one postoperative fracture.

The postoperative hemoglobin drop was similar in both groups (2.5 g/dl). There was no difference in the amount of packed red blood cell units that were given (0.19 vs. 0.24, $P = 0.55$).

Table 1. Patient characteristics before the fracture

	Overall	Direct lateral approach group	Posterior approach group	P-value
Patients, n (%)	260	166 (64%)	94 (36%)	
Age, average in years		83.2	83.7	0.64
Female, n (%)	157	101 (60.8%)	56 (59.6%)	0.90
Body mass index, kg/m ²		24.3 ± 3.85	23.9 ± 3.5	0.37
Status of pre-fracture ambulation				
No aid, n (%)	124	73 (43.9%)	51 (54.3%)	0.12
Cane, n (%)	52	35 (21.1%)	17 (18.1%)	0.63
Walker, n (%)	75	30.7 (18.5%)	24 (25.5%)	0.4
Wheelchair, n (%)	8	6 (3.6%)	2 (2.1%)	0.71
Bedridden, n (%)	1	1 (0.6%)	0 (0%)	1

SHORT-TERM POSTOPERATIVE AMBULATION

At 6 weeks follow-up, 16.9% of the patients in the direct lateral group did not regain any degree of ambulation, whereas only 6.4% in the posterior approach ($P = 0.02$) did not walk. In the posterior approach group, 76.6% were able to walk more than 20 meters, in contrast to 50% of the patients in the direct lateral group ($P = 0.0002$) [Table 3].

LONG-TERM CLINICAL OUTCOME

No statistically significant differences were found between the groups in PROMS, including PROMIS 10 physical and mental, HOOS-PS, EQ-5D-3L, and EQ-VAS [Table 3].

DISCUSSION

We concluded that the posterior approach group provides superior postoperative ambulation in the short-term compared with the direct lateral approach. However, at 2 years follow-up there was no difference in clinical outcome between the groups in all PROMS. It is questionable whether the short-term advantage of the posterior approach justifies the increased rate of dislocations.

There is no consensus regarding the superior surgical approach for hemiarthroplasty for the treatment of acute displaced intracapsular hip fractures.

The increased dislocation rate in the posterior approach compared with the direct lateral approach is in accordance with several studies that reported up to an eight-fold increased risk of dislocation with the posterior approach group [13–17].

Table 2. Short-term complications post hemiarthroplasty for treatment of a femoral neck fracture

	Overall	Direct lateral approach group	Posterior approach group	P-value
Patients, n	260	166	94	
Dislocations, n (%)	6	1 (0.6%)	5 (5.3%)	0.01
Periprosthetic fracture, n (%)	8	6 (3.6%)	2 (2.1%)	0.50
Intraoperative	5	4 (2.4%)	1 (1%)	0.45
Postoperative	3	2 (1.2%)	1 (1%)	0.92
Infection, n (%)	8	6 (3.6%)	2 (2.1%)	0.50
Deep	5	3 (1.8%)	2 (2.1%)	0.86
Superficial	3	3 (1.8%)	0 (0%)	0.56
Revisions, n (%)	10	4 (2.4%)	6 (6.4%)	0.11
Average hemoglobin drop (g/dl)		2.5	2.52	0.94
Red blood packed cells, n		0.24	0.19	0.54

Bold signifies significance

Table 3. Postoperative ambulation within 6 weeks and PROMS at 2 years follow-up

		Overall	Direct lateral approach group	Posterior approach group	P-value
Postoperative ambulation	Patients, n	260	166	94	
	Not walking	34	28 (16.9%)	6 (6.4%)	0.02
	Walking < 20 meters	66	50 (30.1%)	16 (17%)	0.02
	Walking > 20 meters	160	88 (53%)	72 (76.6%)	0.0002
PROMS	Patients [n]	173	110	63	
	PROMIS 10 physical		19.52	22.74	0.56
	PROMIS 10 mental		23.12	34.70	0.09
	HOOS-PS		42.83	42.27	0.93
	EQ-5D-3L		2.09	1.96	0.23
	EQ-VAS		49.40	51.88	0.69

Bold signifies significance

PROMS = patient-reported outcome measures, PROMIS 10 = patient-reported outcomes measurement information system global-10, HOOS-PS = Hip Disability and Osteoarthritis Outcome Score–Physical Function Shortform, EQ-5D-3L = European Quality of Life 5 Dimension 3 Levels, EQ-VAS = EuroQol-visual analog scales

Regarding PROMS, Kristensen and colleagues [6] found less pain and better quality of life in the patients operated on using the posterior approach but did not specifically recommend the posterior approach over the direct lateral approach. Like our findings, Leonardsson and co-authors [18] found no differences in patient-reported outcomes (HRQoL, pain, and satisfaction) and recommended that the surgical approach should be based on the risk of dislocation, which was twice as common in the posterior approach in their study.

However, conflicting reports have also been published by Parker [19], who conducted a randomized controlled trial comparing the posterior with the direct lateral approach for hemiarthroplasty of the hip and found no differences between the groups concerning pain and mobility. The dislocation rate was 2% in the lateral approach group and 1% in the posterior approach group. Furthermore, no statistically significant difference was found when comparing the surgical complications and operative details, other than the surgeon's subjective assessment of the difficulty of surgery, as more difficult in the posterior approach [19].

Surgical technique and experience are regarded as dominant factors in the risk of prosthetic hip dislocation. Enocson et al. [14] reported that reattachment of the short external rotators and the posterior joint capsule in the posterior approach reduced the risk for dislocation, but not to the same low rate as in patients operated using the direct lateral approach. Surgical technique may help explain the superior results in Parker's study [19], in which the piriformis tendon was not cut to increase stability and all surgeries were performed or supervised by the same expert surgeon [19].

STRENGTHS AND WEAKNESSES

We only reported the short-term surgical complications in the present study. The fact that the surgeries were performed by the team on call, may be seen as a strength of the study because it resembles a common clinical practice in many hospitals.

CONCLUSIONS

The posterior approach allows superior postoperative ambulation in the short-term. However, at 2 years of follow-up, there is no difference in clinical outcome compared with the direct lateral approach group. This short-term advantage of the posterior approach comes at the price of an increased rate of dislocations.

Correspondence

Dr. G. Rotem

Dept. of Orthopedic Surgery, Sheba Medical Center, Tel Hashomer 5262000, Israel

Phone: (972-3) 530-2623

Fax: (972-3) 530-2523

Email: gilad.rotem@sheba.health.gov.il

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Capsule

Tracing T-independent responses

T-independent (TI) B cell responses develop without T cell help and are mostly directed against repetitive structures such as surface polysaccharides derived from encapsulated bacteria. Using high-throughput B cell receptor repertoire sequencing, **Weller** and colleagues studied the B cell subsets contributing to human TI responses in healthy individuals vaccinated with the pneumococcal polysaccharide vaccine Pneumovax. The most expanded plasma cells were clonally related to previously mutated peripheral blood B cell precursors,

including marginal zone B cells, and these cells remained stable without acquiring further mutations up to 2 months after vaccination. Antibodies specific to bacterial capsular polysaccharides isolated from vaccine-elicited plasma cells cross-reacted with gut bacterial antigens, supporting a model in which human TI responses mobilize marginal zone B cells that are prediversified in gut-associated lymphoid tissues.

Sci Immunol 2023; 8: ade1413
Eitan Israeli

Capsule

VV116 versus nirmatrelvir-ritonavir for oral treatment of COVID-19

Cao et al. conducted a phase 3, noninferiority, observer-blinded, randomized trial during the outbreak caused by the B.1.1.529 (omicron) variant of SARS-CoV-2. Symptomatic adults with mild-to-moderate COVID-19 with a high risk of progression were assigned to receive a 5-day course of either VV116 or nirmatrelvir-ritonavir. A total of 822 participants underwent randomization, and 771 received VV116 (384 participants) or nirmatrelvir-ritonavir (387 participants). The noninferiority of VV116 to nirmatrelvir-ritonavir with respect to the time to sustained clinical recovery was established in the primary analysis (hazard ratio 1.17, 95% confidence interval [95%CI] 1.01–1.35) and was maintained in the final analysis

(median, 4 days with VV116 and 5 days with nirmatrelvir-ritonavir; hazard ratio 1.17; 95%CI 1.02–1.36). In the final analysis, the time to sustained symptom resolution (score of 0 for each of the 11 COVID-19-related target symptoms for 2 consecutive days) and to a first negative SARS-CoV-2 test did not differ substantially between the two groups. No participants in either group had died or had had progression to severe COVID-19 by day 28. The incidence of adverse events was lower in the VV116 group than in the nirmatrelvir-ritonavir group (67.4% vs. 77.3%).

N Engl J Med 2023; 388: 406
Eitan Israeli