

Original Article

Comparison of surgical complications following hip hemiarthroplasty between the posterolateral and lateral approaches

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Abstract: Introduction: Femur neck fractures are common fractures among the elderly. Hemiarthroplasty is a surgical choice for femur neck fractures in patients older than 70 years. This surgery is performed using two main methods: Posterolateral and Direct lateral. Here in this study, we aimed to evaluate and compare surgical and post-surgical complications of these two methods. Materials and methods: This retrospective study was performed on 154 patients with femur neck fractures between 2017-2021. All patients with femur neck fractures who had been under hemiarthroplasty entered this study. Data regarding complications such as dislocation, mortality, cause of mortality, repeated surgery and incidence of deep vein thrombosis (DVT) in both Posterolateral and Direct lateral surgical approaches were collected and analyzed. Results: We indicated that there is no significant difference between the two surgical approaches regarding dislocation ($P=0.06$), mortality ($P=0.598$) and repeated operation ($P=0.550$). Conclusion: Taken together there are no significant differences between the two surgical approaches and we suggest that clinicians could decide based on their experiences and the clinical condition of patients.

Keywords: Hemiarthroplasty, dislocation, mortality, complication

Introduction

Femur fracture is accounted as one of the most common fractures among elderly individuals [1]. Previous reports show that the prevalence of femur fractures is rising in populations due to an increased quality of life and life expectancy and increase in the population of the elderly [2, 3]. Femur fractures are mainly divided into intertrochanteric and femur neck fractures. Based on clinical data, almost 20% of performed surgeries by orthopedists are due to femur fractures and almost 50% of femur fractures are femur neck fractures [4, 5]. It has been anticipated that with increased life expectancy, the number of femur neck fractures would rise from 1.66 million in 1990 to 6.26 million in 2050 [6, 7]. Morbidities and mortalities following femur fractures put a heavy bur-

den on societies and require huge economic and financial resources [8, 9]. Different surgical methods are nowadays performed for treatments of femur neck fractures regarding the age and activity of patients and fracture characteristics such as displaced or non-displaced fractures [10, 11]. These methods include open reduction internal fixation (ORIF) [12], total hip arthroplasty (THA) which is mostly performed for displaced fractures in patients under 60 years of age or elderlies with high physical activities [13], hip hemiarthroplasty (HHA) which is performed for patients older than 70 years [14, 15]. The goal of treatments for non-displaced femoral neck fractures in the elderly is that patients could have a low-grade physical activity by performing a minimally invasive surgical method that brings the least complications and minimal hospitalization [16]. HHA is

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the surgical choice in elderly patients with displaced femoral neck fractures who also have a low-grade physical activity [17]. This surgical method has some known advantages and fewer morbidity and mortality rates. It is known to be a minimally invasive method that brings the ability of weight-bearing shortly after surgery and a low risk of infection and less hospitalization. HHA has been utilized vastly in the past decades for elderly patients with displaced femoral neck fracture [18].

HHA is used as a primary operation in elderly patients with femoral neck fractures or as a secondary operation in those patients with failed ORIF treatments [19]. HHA is mainly performed using two surgical methods: Posterolateral and Direct lateral [20, 21]. Dislocation is one of the most common complications of HHA [22]. Prevalence of dislocation following HHA is reported in different studies between 1 to 22% [23, 24]. Some studies believe that the posterolateral approach causes more dislocation compared to the direct lateral approach [25]. Some other studies have reported similar dislocation rates between the two approaches and report no significant superiority among them [26]. Taken together, there are much to discuss not only the dislocation rate but also other post-surgical complications of posterolateral and direct lateral approaches of HHA. As a result, we decided to have a survey on complications of the two mentioned surgical approaches including dislocation rate, repeated operation, surgical site infection, and mortality rate and thromboembolic accidents and compare them.

Methods and materials

Study design

This is a retrospective study that was performed on 154 patients with femoral neck fractures who had been under HHA in Imam Khomeini and Arya hospitals in Abadan and Ahvaz, Iran. The current study is approved ethically by the ethical committee of Abadan University of Medical Sciences (Code: IR.ABADANUMS.REC.1391.193).

Inclusion and exclusion criteria

Our inclusion criteria were: age of more than 60 years, non-pathological femoral neck fractures, having primary HHA, proper cooperation to par-

ticipate in this study and signing the written informed consent to participate in this study. Our exclusion criteria were also: defective documents, lack of sufficient cooperation of patients or their families and lack of access to patients. The primary list of patients included 195 but 41 patients were excluded during the study due to a lack of sufficient and complete information.

Primary data gathering

Our information was collected by smart search of documents using hospital information system (HIS) and picture archiving and communication system (PCAS), calling patients or selected visits and gathering documents from families of patients.

Data regarding age, sex, cause of the fracture and involved side were gathered from documents and history of patients. Operation reports of all patients were studied carefully and data regarding surgical approaches and spent time after fractures until surgeries were carried out. Garden type of the fractures and center edge angle (CEA) were gathered using PACS. Garden types were evaluated using AP radiology images of patients before surgeries based on Garden classification. CEA was also measured using AP radiology images of patients after surgeries using CEA guideline [27].

Data regarding to dislocations

The occurrence of dislocations was evaluated in the primary documents of patients and also in other hospitalizations using patient's names and codes. Such methods were used to evaluate the occurrence of infection in surgical sites. Data regarding dislocations and post-operation infections were also carried out by telephone calls to patients and their families. We also studied operation reports of any further hospitalizations of patients and any intervention on the involved joint which required anesthesia was considered as repeated surgery.

Further variables

Mortalities and their causes were also evaluated using patient's documents and telephone calls to their families. In those cases with mortalities in any other hospitals than Imam Khomeini and Arya, we asked the families for documents related to these mortalities. Other com-

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Table 1. Patients characteristics

Variable	Direct lateral method	Posterolateral method	P-value
Age (year) (mean \pm SD)	77.97 \pm 9.1	75.43 \pm 9.1	0.10
Sex			0.49
Male	40 (40.4%)	23 (41.8%)	
Female	59 (59.6%)	32 (58.2%)	
Follow up months (months \pm SD)	36.46 \pm 19.48	36.70 \pm 16.64	0.92
Involved side			0.28
Right	46 (46.4%)	29 (52.7%)	
Left	53 (53.6%)	26 (47.3%)	
CEA (degree \pm SD)	50.86 \pm 8.32	50.85 \pm 7.22	0.663
Days passed from fracture until surgery (mean \pm SD)	6.71 \pm 6.05	6.54 \pm 8.35	0.88
Garden type			0.27
1	0	1 (1.8%)	
2	9 (9.1%)	2 (3.6%)	
3	26 (26.3%)	12 (21.8%)	
4	64 (64.6%)	40 (72.7%)	
Causes of fractures			0.51
Falling	95 (96%)	55 (100%)	
Car to motor accident	1 (1%)	0	
Car to pedestrian accident	2 (2%)	0	
Car to car accident	1 (1%)	0	

CEA: Centre edge angle.

plications including thromboembolic accidents such as deep vein thrombosis (DVT) and pulmonary thromboembolism (PTE) were also evaluated using patient's documents. It should be also mentioned that during our telephone calls, any patient having intensive pain, Joint deformation or being bedridden was visited by expert orthopedics and examined. The follow-up duration of patients was calculated based on time passed from HHA and gathering information.

Data analysis

The obtained data were entered into the Statistical Package for Social Sciences (SPSS) version 24. We used Independent t-test and repeated measure tests to compare data. P-value <0.05 was considered as the significance threshold.

Results

Study population

Here in this study, we evaluated 195 patients who had been under HHA and during the study 41 patients were excluded due to defective data as below: 8 patients due to lack of appropriate imaging study in documents, 10 patients due to lack of cooperation to give information, 4 patients due to incomplete and defective operation reports and 19 patients because of

changed home address and telephone number. With the evaluation of 154 patients, it was indicated that 99 patients had been operated based on direct lateral technique and 55 patients based on the posterolateral method. Our study population consisted of 63 males and 91 females. During telephone calls, 12 patients were visited by expert orthopedics because of being bedridden (10 patients), joint deformation (1 patient) and having intensive pain (1 patient). During these visits, none of the patients had any findings suspicious of dislocation.

Demographic data

Our data analysis indicated that there was no significant difference between the two groups regarding age, sex, involved site, garden type, CEA, cause of fractures and delayed surgery. Data are summarized in **Table 1**.

Complications

Further analysis for surgical complications of the two techniques indicated that there is no significant difference regarding dislocations, repeated surgery, mortalities and their causes, frequencies of being bedridden, joint infection and thromboembolic accidents (P>0.05). In this study, 6 dislocations (6.1%) were reported in direct lateral approach and 1 multiple dislo-

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Table 2. Data regarding to surgical complications

Variable	Direct lateral method	Posterolateral method	P-value	
Dislocation	6 (6.1%)	0	0.06	
Multiple dislocation	0	1 (1.81%)	0.357	
Bedridden	5 (5.05%)	5 (9.1%)	0.25	
Mortality	34 (34.34%)	21 (38.18%)	0.598	
First year mortality	19 (19.19%)	9 (16.36%)	0.247	
Causes of mortalities	PTE	9 (26.47%)	6 (28.57%)	0.721
	MI	12 (35.29%)	7 (33.33%)	
	CVA	2 (5.88%)	1 (4.76%)	
	Sepsis	2 (5.88%)	0	
	ESRD	3 (8.82%)	3 (14.28%)	
	GIB	2 (5.88%)	1 (4.76%)	
	pneumonia	2 (5.88%)	1 (4.76%)	
	Liver problems	2 (5.88%)	0	
	Brain shunt problems	0	1 (4.76%)	
	Prostate cancer	0	1 (4.76%)	
Joint infection	4 (4%)	2 (3.63%)	0.634	
Repeated surgery	3 (3.03%)	1 (1.81%)	0.550	
DVT	2 (2.02%)	1 (1.81%)	0.710	
Treated PTE	2 (2.02%)	0	0.684	

PTE: Pulmonary thromboembolism, MI: myocardial infarction, CVA: Cerebrovascular accident, ESRD: end-stage renal disease, GIB: gastrointestinal bleeding, DVT: Deep vein thrombosis.

cations (1.81%) was found in posterolateral approach but based on data analysis, there were no significant differences. The average days passed from surgery to the occurrence of dislocation were 196.5 days in the direct lateral method and 187.3 days in the posterior approach. Further items and data regarding mortality, their causes and other complications are summarized in **Table 2**. We found no significant differences between the two groups regarding these data.

Discussion

Here in the present study, we had a survey on different complications following HHA surgery and compared them between posterolateral and direct lateral surgical approaches. Finally, we found no significant difference between these two groups and we report that these two approaches have no superiority to each other. It should also be noted that 10 patients in our study were bedridden which made it difficult to examine them for dislocation and other complications but our expert team visited these patients. We also found no significant difference between the two surgical methods regarding both first-year and total mortality year. In a

study performed by Parker in 2015, they had a survey on 216 patients who had been under HHA and compared posterolateral and direct lateral methods [28]. In their study, they evaluated different morbidities and mortality rates and compared them between posterolateral and direct lateral surgical approaches. They reported no significant difference between the two groups. They also concluded that these two methods bring the same results and surgeons could choose between them based on personal experiences and patient's conditions. These results are also in line with our results.

In another study by Tor B Kristensen and colleagues, they performed a long-term (8 years) follow-up on 20900 patients who had been under HHA and reported no significant difference between posterolateral and direct lateral surgical approaches regarding repeated surgery [5]. These results are also similar to the results reported by our study.

In another study by Mukka and colleagues in 2015, they had a study on 377 patients with HHA performed with two posterolateral and direct lateral surgical approaches. They reported that the frequency of dislocation was higher

in the posterolateral technique. They showed that 10.7% of patients had dislocation. 6.5% of them had been operated by posterolateral and 4.2% by direct lateral method and this difference was significant [25]. These results are not in line with our study. We reported no significant difference between the two methods. Svenøy and others also had an evaluation on 583 patients with HHA in 2017 about complications such as frequency of dislocation. They concluded that risks of dislocation are higher in patients operated by posterolateral method compared to direct lateral [29].

Another study by Unwin and others also reported a significant difference between the two methods regarding the frequency of dislocating. They indicated that 9.6% of patients who had been operated by posterolateral and 4.3% of patients operated using direct lateral technique had experienced dislocation [30].

These reported studies are not in line with the results of our study. We believe that our study is more valid than previous studies because we considered many other factors and reported other complications such as mortality, their causes and frequencies of repeated operation. However, restricted study population and not evaluating exclusion of 41 patients were the most important limitations of the current study. Lack of sufficient data and patient's cooperation led to exclusion of most cases and we recommend that further studies should consider these factors.

Conclusion

Here we indicated that there are no significant differences between the two surgical approaches for HHA: posterolateral and direct lateral regarding different surgical complications. We conclude that physicians and surgeons could make their decisions based on personal experiences and patient situations. We also suggest that more evaluations and studies on larger populations are required.

Disclosure of conflict of interest

None.

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