

Research Article

Comparison of Moore's Versus Hardinge Approach in Total Hip Arthroplasty in Terms of Harris Hip Score and Post Op Hip Dislocation

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Abstract

Introduction: Total Hip Arthroplasty (THA) has become one of the most dependable and often sought surgical procedures in all of medicine. A number of surgical methods can be used to accomplish the treatment, although the posterior approach, direct lateral approach, and direct anterior approach are by far the most prevalent across the world. Each approach has its unique benefits and drawbacks.

Material and methods: It is a two-year Randomized Controlled Trial started from April 2020. After getting approval from hospital ethical committee, 90 (45 in each) patients were selected. The patients were allocated into two groups by a lottery system. Moore's approach in Group-A and Hardinge approach in Group-B was used. Harris hip score was calculated and hip dislocation was noted.

Results: Out of 90 patients (45 in each group) mean age in Moore's group was 45.07 ± 10.69 years and mean age of hardinge group was 43.02 ± 8.42 years. There were 32.2% (n=29) were male where as 17.8% (n=16) females in Moore group. Hardinge group has 32.2% (n=29) and 17.8% (n=16) males and females respectively. We found significant differences in the Harris hip score and hip dislocation between the two groups (P-value <0.05).

Conclusion: We got the significant results. We concluded that hardinge technique is better than Moore technique.

Keywords: Total hip arthroplasty; Hip dislocation; Moore's approach; Hardinge approach

Introduction

These days Total hip replacement is regarded as one of the most successful procedure with excellent outcome to treat hips damaged by osteoarthritis, late-stage degenerative bone, fractures and cartilage disease, or other injuries and disease [1,2]. Therefore the number of total hip replacements is expected to increase over the next few decades [1,3].

On the other hand, there are multiple causes of hip joint replacement surgery failure like infection, wear, loosening, persistent pain, fracture and dislocation [4,5]. In order to minimize the above mentioned failures, different surgical approaches to the hip joint have been described [6]. The type of surgical approach used has a major impact on stability and muscle function after total hip replacement [7].

An ideal approach should be safe, simple and anatomic, preventing unnecessary devascularization. There are two main

surgical approaches which are lateral Hardinge and posterior Moore's approach [8-10]. The best approach for hip joint arthroplasty, however, still remains controversial [11,12].

Moore's approach provides excellent exposure to hip; no disruption of abductor and fast rehabilitation, but hip dislocations after this procedure is common. However, by the use of larger head diameters of femoral component and soft-tissue repair after component placement has reduced the dislocation rate [13,14]. On the other hand, Hardinge approach includes separating the gluteus medius and vastus lateralis insertions from the greater trochanteric insertions, which are re-attached after prosthesis implantation. The advantage of Hardinge approach is that it can provide generous exposure of the acetabulum, which facilitates cup positioning. Appropriate cup positioning may decrease rates of hip dislocation [15].

One study reported that the frequency of hip dislocation was 0% with Hardinge approach while 13.3% with Moore's approach for hip fracture ($p < 0.05$) [16]. While another study reported that the frequency of hip dislocation was 4.6% with Hardinge approach while 11.5% with Moore's approach ($p > 0.05$) [17]. Another study found that the mean Harris hip score was 83 (68-89) with Moore's approach while 77 (65-82) with Hardinge approach ($p > 0.05$), while dislocation was observed in 25% with Moore's approach while with Hardinge's approach no dislocation was reported ($p > 0.05$) [18]. The rationale of this study is to compare the outcome of Moore's and Hardinge approach in Total Hip Arthroplasty in relatively younger age group.

Material and Methods

It is a Randomized Controlled Trial conducted over a period of two

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years from 02-04-2020. After getting approval from hospital ethical committee, 90 (45 in each) patients were included. Procedure was explained and informed consent was taken. Demographic information like name, age, gender, BMI, affected side and duration of disease was noted. Patients were divided into two groups by using lottery method. In Group-A, Moore's approach and in Group-B, Hardinge approach was used. In Hardinge approach, access to the hip joint was achieved through an abductor muscle split; the gluteus medius was split longitudinally at the junction of the anterior two-third to posterior one-third of muscle width and the split was extended <3 cm superior to trochanter insertion. In the posterior Moore's approach, the hip joint was revealed by detaching the short external rotators from femur insertion with preservation of the piriformis tendon, SER were reattached after implant placement. To reduce biases, all surgeries were done under general anesthesia by a single surgical team and size 32 mm femoral heads were used. Non-cemented implants were used in all patients. All patients had secondary Osteoarthritis hip due to Avascular Necrosis (AVN). Patients were mobilized allowing for partial weight-bearing as soon as possible and all of them followed same rehabilitation protocols. Data will be entered and analyzed using SPSS 22.

Results

Demographic distribution of patients showed that 62 patients were in age group of 25-35 years and 28 were in age group of 36-45 years. Gender distribution showed 58 males and 32 females (Table 1). We compare the Harris hip score in both groups using the independent sample t-test and we got the significant results (p -value<0.05) (Table 2).

Comparison of both groups for Harris hip score considering age, gender, BMI, duration of AVN, and affected side factors are provided. Significant results (p <0.05) are observed for all factors except when the duration of AVN has >1 year (p =0.900) (Table 3). We conducted χ^2 test to compare the Harris hip score in both groups. It can be concluded that the p -values for the χ^2 statistic is .024, which is smaller than α =0.05, therefore, there is enough evidence that there is a significant difference between the Harris hip score of Moore's approach and Hardinge approach. Furthermore, stratification for hip dislocation based on all variables for both group is also provided. As noted, there is significant difference found between both groups at all variables as (p -value < α) AVN (Tables 4 and 5).

Table 1: Demographical data of patients.

		Group		Total	
		Moore's	Hardinge		
Age group	25-35 years	Count	29	33	62
		% of Total	32.20%	36.70%	68.90%
	36-45 years	Count	16	12	28
		% of Total	17.80%	13.30%	31.10%
Total		Count	45	45	90
		% of Total	50.00%	50.00%	100.00%
Gender	male	Count	29	29	58
		% of Total	32.20%	32.20%	64.40%
	female	Count	16	16	32
		% of Total	17.80%	17.80%	35.60%
Total		Count	45	45	90
		% of Total	50.00%	50.00%	100.00%
Affected side	Left	Count	23	20	43
		% of Total	25.60%	22.20%	47.80%
	right	Count	22	25	47
		% of Total	24.40%	27.80%	52.20%
Total		Count	45	45	90
		% of Total	50.00%	50.00%	100.00%

Discussion

Femoral head fractures can appear in a variety of forms, with or without concomitant hip fractures. As a result, to obtain the optimum functional outcome while avoiding complications, the treating orthopaedic surgeon must grasp not only the fracture pattern, but also patient-related fractures and the corresponding operational exposures and reconstructive choices. Options for therapy include non-operative care, fracture fragment removal, and fracture fixing utilizing a variety of surgical exposes and implants [19].

Although femoral head fractures are a relatively infrequent injury, it is crucial to treat them properly to help prevent the onset of post-traumatic osteoarthritis. A femoral head fracture has been observed to be related to 6% to 16% percent of posterior hip dislocations [20-22].

In current study, Age distribution of the patients was done, it showed that out of 90 patients, 32.2% (n=29) were in age group of 30-50 years and 36.7% (n=33) were in Moore group and 17.8% (n=16) were in age group of 30-50 years and 13.3% (n=12) were in hardinge group, mean age of moore group was calculated as 45.07 ± 10.69 years and mean age of hardinge group was 12.90 ± 3.16 years.

In this study, there were 32.2% (n=29) were male whereas 17.8% (n=16) were females in Moore group and 32.2% (n=29) were male whereas 17.8% (n=16) were females in hardinge group.

In current study, we compare the Harris hip score in both groups and we got the significant results (p -value<0.05), Harris hip score was 72.42 ± 0.67 in Moore group and 75.29 ± 0.689 in hardinge group. There were also significant results when we compare both groups for hip dislocation. Hip dislocation was 10% in more group and 3.3% in hardinge group (p -value<0.05).

The diagnosis of an impaction fracture, very small head fragments, and intra-articular free bodies might be challenging with conventional radiology alone. Due to this, the CT scan is a crucial component of the imaging evaluation. Following a posterior hip dislocation, osteochondral fractures brought on by impact on the femoral head have been recorded in about 63% of instances, and following an anterior hip dislocation, between 12% and 100% of cases [23].

In 76% of severe hip dislocation cases undergoing arthroscopy, McCarthy and Busconi noted loose pieces within the joint that were missed by traditional radiography. Over time, various joint reduction methods have been documented in the literature [24].

One study reported that the frequency of hip dislocation was 0% with Hardinge approach while 13.3% with Moore's approach for hip fracture (p <0.05) [25]. While another study reported that the frequency of hip dislocation was 4.6% with Hardinge approach while 11.5% with Moore's approach for hip fracture (p >0.05) [26].

Another study found that the mean Harris hip score was 83 (68-89) with Moore's approach while 77 (65-82) with Hardinge approach (p >0.05), while dislocation was observed in 0.25% with Moore's approach while with Hardinge's approach no dislocation was reported (p >0.05) [27]. According to Bourne et al. the dislocation rate for total hip arthroplasty ranges from 0.3% to 10% overall and rises to 28% for revision procedures [28]. Recent studies have demonstrated that the posterior method and anterior total hip arthroplasty have rates that are almost equal. A rise in anterior hip procedures could result from

Table 2: Comparison of both groups for harris hip score using independent sample t-test.

	Group	N	Mean	Std. Deviation	Std. Error Mean	p-value
Harris hip score	Moore's	45	72.42	4.525	0.675	0.004
	Hardinge	45	75.29	4.625	0.689	

Table 3: Comparison of both groups for harris hip score using all variables.

	Group	N	Mean	Std. Deviation	Std. Error Mean	p-value
Age	25-35 years	moore	29	71.34	4.295	0.002
		hardinge	33	74.82	4.194	
	36-45 years	moore	16	74.38	4.395	0.255
		hardinge	12	76.58	5.648	
Gender	male	moore	29	71.72	4.644	0.007
		hardinge	29	74.69	3.263	
	female	moore	16	73.69	4.143	0.169
		hardinge	16	76.38	6.397	
BMI	20-25kg/m ²	moore	15	72.87	4.033	0.495
		hardinge	12	74.25	6.298	
	>25kg/m ²	moore	30	72.2	4.802	0.002
		hardinge	33	75.67	3.902	
Duration of AVN	1 year	moore	17	70.29	4.674	0.001
		hardinge	35	75.69	4.776	
	>1 year	moore	28	73.71	3.98	0.9
		hardinge	10	73.9	3.957	
Affected side	left	moore	23	73.57	4.241	0.416
		hardinge	20	74.8	5.597	
	right	moore	22	71.23	4.597	0.001
		hardinge	25	75.68	3.75	

Table 4: Comparison of both groups for hip dislocation using chi-square test.

		Count	Group		Total	p-value
			Moore's	hardinge		
Hip dislocation	yes		4	1	11	0.024
		% of Total	4.44%	1.11%	5.55%	
no		Count	41	44	79	
		% of Total	45.56%	48.89%	94.45%	
Total		Count	45	45	90	
		% of Total	50.00%	50.00%	100.00%	

Table 5: Stratification for hip dislocation in both groups with respect to all variables using chi-square test.

		Hip Dislocation	Group		Total	p-value
			Moore's	Hardinge		
Age	25-35 years	yes	3(4.8%)	1 (1.6%)	4 (6.4%)	0.008
		no	26 (41.9%)	32(51.6%)	58 (93.5%)	
		Total	29 (46.8%)	33 (53.2%)	62 (100.0%)	
	36-45 years	yes	1 (3.5%)	0 (0.0%)	1 (3.5%)	0.012
		no	15 (53.5%)	12 (42.9%)	27 (96.5%)	
		Total	16 (57.1%)	12 (42.9%)	28 (100.0%)	
Gender	Male	yes	2 (3.4%)	1(1.7%)	3 (5.1%)	0.007
		no	27 (46.5%)	28(48.4%)	55 (94.9%)	
		total	29 (50.0%)	29 (50.0%)	58 (100.0%)	
	Female	yes	1 (3.2%)	0 (0.0%)	1(3.2%)	0.014
		no	15 (46.8%)	16 (50.0%)	31 (96.8%)	
		Total	16 (50.0%)	16 (50.0%)	32 (100.0%)	
BMI	20-25kg/m ²	yes	1 (3.7%)	0 (0.0%)	1 (3.7%)	0.04
		no	14 (51.8%)	12 (44.4%)	26 (96.3%)	
		Total	15 (55.6%)	12 (44.4%)	27 (100.0%)	
	>25kg/m ²	yes	3 (4.7%)	1 (1.6%)	4 (6.3%)	0.016
		no	27 (42.9%)	32 (50.8%)	59 (93.6%)	
		Total	30 (47.6%)	33 (52.4%)	63 (100.0%)	
Duration of AVN	1 year	yes	2 (3.8%)	0(0.0%)	2 (3.8%)	0.005
		no	15 (28.8%)	35 (67.3%)	50 (96.2%)	
		total	17(32.7%)	35 (67.3%)	52 (100.0%)	
	>1 year	yes	2 (5.3%)	1 (2.6%)	3 (7.9%)	0.037
		no	26 (68.4%)	9 (23.7%)	35 (92.1%)	
		Total	28 (73.7%)	10 (26.3%)	38 (100.0%)	
Affected side	Left	yes	2 (4.6%)	1 (2.3%)	3 (6.9%)	0.048
		no	21 (48.8%)	19 (44.2%)	40 (93.1%)	
		Total	23 (53.5%)	20 (46.5%)	43 (100.0%)	
	Right	yes	2 (4.2%)	0 (0.0%)	2 (4.2%)	0.012
		no	20 (42.5%)	25 (53.2%)	45 (95.8%)	
		Total	22 (46.8%)	25 (53.2%)	47 (100.0%)	

more awareness of the anterior approach, which would also raise the risk of anterior hip dislocation and other anterior approach problems. Young adult males are more prone to hip dislocations, which are most frequently caused by car accidents. According to a recent study the average age of these patients was 34.4, and more than 90% of them are male. A total of 74.4% of patients had additional injuries, with hip fractures being the most frequent. Over 90% of patients received a closed reduction, and around 70% of those were reduced within a day. According to one study, a delay of more than 12 hours was associated with a rise in long-term problems from 22% to 52%. In kids, anterior hip dislocations are quite uncommon. When patients are monitored for ten years, Brennan et al. discover that dislocation occurs in 3.8% of them after undergoing Total Hip Arthroplasty (THA). A revision arthroplasty is most frequently performed in the first two months due to anterior hip dislocations, which mostly happen in the first month. Numerous factors could make a patient more likely to dislocate.

Femoral head fractures are a rare injury. They frequently accompany a hip dislocation and are frequently the result of high-energy trauma to the hip or lower extremities [29]. The research of large patient groups has proven challenging due to the rarity of these fractures; the majority of the literature on this subject is made up of numerous tiny studies.

In a recent systematic analysis of this heterogeneous literature, 29 publications documented a total of 453 fractures. Only 425 of these fractures included definitive management information; 99 of these fractures were addressed non-operatively, while 326 were surgically treated [30]. For femoral head fractures, several classification schemes have been developed [30-31].

Most systems are essentially descriptive; none offer unqualified advice on how to manage fractures or have validated predictive value. Injury management has made use of the location, size, displacement, and impact of femoral head fractures on hip stability. The surgical approach, fragment fixation/excision, and fixing technique for fractures treated surgically have all been hotly contested topics. Unfortunately, variable fracture classification, treatment approaches, and the dearth of comparison data leave few firm findings. Poorly defined data exist regarding the general prognosis and long-term result of these injuries, notably fixation failure, Avascular Necrosis (AVN), post-traumatic arthritis, and conversion to total hip arthroplasty [32].

It's crucial to keep in mind that the prosthesis should endure longer than the patient's remaining lifetime and should be simple to replace if it breaks down. Larger heads should be more difficult to dislocate but may have more volumetric wear than smaller heads since metal-on-metal and ceramic-on-ceramic bearings have lower wear rates. A cemented Total Hip Arthroplasty (THA) with metal-on-polyethylene bearing, however, appears to be a good alternative for the majority of this population.

Conclusion

In current study, we compare the outcome (Harris hip score and hip dislocation) of Moore's *versus* hardinge approach in patients undergoing total hip arthroplasty for femoral head fracture. We found that the Harris hip score was 72.42 ± 0.67 in Moore group and 75.29 ± 0.689 in hardinge group, hip dislocation was 4.44% in Moore group and 1.11% in hardinge group. We got the significant results. Therefore, we concluded that hardinge technique is better than Moore technique.

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