

Comparison of Functional Outcome Between Bipolar Hemiarthroplasty and Total Hip Arthroplasty for Displaced Femoral Neck Fractures in Elderly Patients

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Abstract

Objectives: The intention of this study to compare functional outcomes between Total Hip Arthroplasty and Bipolar Hemi Arthroplasty for displaced femoral neck fracture after 3 months and 1 year from injury in elderly patients.

Methods: Prospectively 43 patients were enrolled in this study, ages more than 60, twenty-four of them managed by Total Hip Arthroplasty, and 19 were managed by Bipolar Hemi Arthroplasty. These patients were followed up postoperatively for one year, at (3 and 12 months), to compare functional outcomes using Haris Hip Score.

Results: Duration of operation was significantly higher in Total Hip Arthroplasty (98.54 min) versus (62.63 min) in the Bipolar Hemi Arthroplasty group, and intra-operative blood loss also considerably higher in Total Hip Arthroplasty (322.5 ml) than Bipolar Hemi Arthroplasty (178.42 ml). Regarding complications, there is no difference between the two groups; however, the incidence of mortality higher in the Bipolar Hemi Arthroplasty population. Average Haris Hip Score, pain and the motion were significantly better after three months and one-year follow-up in the Total Hip Arthroplasty group. The function was nearly the same at both groups after three months but after one-year of follow-up function significantly better (P -value < 0.5) in the Total Hip Arthroplasty patients.

Conclusion: Total Hip Arthroplasty provides better functional outcomes after three months and one year of follow-up than Bipolar Hemi Arthroplasty when used to manage femoral neck fracture for active old age patients. Bipolar Hemi Arthroplasty may be suitable for older inactive patients with narrow life expectancy with multiple comorbidity.

Keywords: Hemiarthroplasty, femoral neck fractures, arthroplasty, elderly

Introduction

The term hip fracture is most commonly used for defining fractures in the proximal part of the femur, including neck of femur, trochanteric and subtrochanteric fractures. A femoral neck fracture simply classifies as either intracapsular or extracapsular fractures. Intracapsular femoral neck fracture accounts for nearly 55–60% of all hip fractures, and most of them non-displace. The trochanteric fractures, either intertrochanteric or pertrochantric, account for about 30–52 % of all hip fractures, extracapsular part of the neck (basicervical), and subtrochanteric fracture only involves 5–7 % of all hip fracture.^{1,2} It is approximate that about 1.6 million hip fractures happened in the year 2000, and the prevalence of hip fractures is predicted to rise to more than six million worldwide by the year 2050.³

There has been much discussion and controversy regarding the management of displaced intracapsular femoral neck fracture in the geriatric patient in the previous four decades. As claimed by the latest recommendation from the American Academy of Orthopedic Surgeons (AAOS), carry strong suggestion for the management of displaced femoral neck fracture by arthroplasty either (THA or HA) and with a moderate suggestion for the use of THA in properly specify patient (Figure 1).⁴

Our study's main goal is to assess elderly patients with displaced femoral neck fractures managed with either THA or BHA and compare their results and analyze functional outcomes using Harris Hip Score after three months and 1-year from surgery.

Patients and Methods

This is a prospective study carried out in Sulaimani Teaching Hospital and Shar Teaching Hospital, collected over the period "Between" July 1, 2018 to August 1, 2020. The study includes 43 Hips in 43 patients none of them bilateral, aged more than 60 years with a mean age of 72.9 years (ranging from 65–90). Female to male ratio about 1.5:1.0 (25 female and 18 male).

These patients were divided into two groups, 24 (55.8%) of them managed with THA (16 female and eight male), remained 19 (44.18%) were managed with BHA (9 female and ten male). They were followed up at 3 months from the day of discharge and one year after surgery.

Most of the patients were elderly sustained low energy trauma, sharing the same scenario for the fracture mechanism in which they slipped and fell on the flat ground or in the bathroom. Data were analyzed prospectively concerning patients' demographic profile, intraoperative detail, post-operative events, including early and late complications regarding general complication or hip-related complications, comparing function outcome for both operations in three months and one year after operation concerning total score, pain, motion, and activity of patients postoperatively.

Patients were interviewed to evaluate their mobility, daily activity, and health-related quality of life during the last week prior to fracture and scored according to Barthel Index. Most of our patients were independent or slight independent before fall.

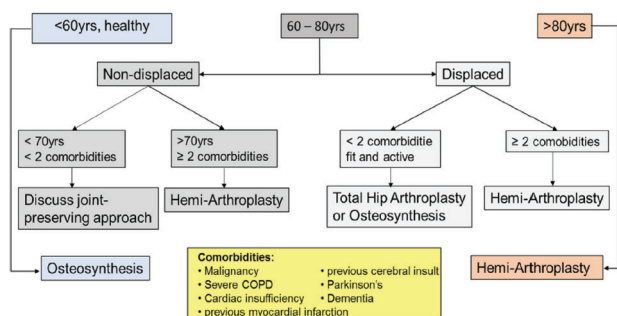


Fig. 1 Management algorithm for femoral neck fractures according to the specific patient characteristics.⁵

Inclusion Criteria for Participating in this Study

1. Elderly patients age more than 60 and capability to give informed consent.
2. Recent displaced femoral neck fracture (Garden III & IV) occurred within 48 hours from admission.
3. The ability to walk independently with or without walking aids before fracture.

Exclusion Criteria Were

1. Suspected pathological fracture other than osteoporotic fracture or metastatic disease.
2. Bedridden, barely mobile patients or one with significant dementia.
3. Parkinson and paraplegic patients.
4. Advanced radiological osteoarthritis or rheumatoid arthritis in the fractured hip.

A total of 43 patients who met the inclusion criteria were included in the study. Informed consent from patients and family taken, detailed history about the mechanism of injury, and past medical diseases were reported. Associated injuries were excluded, the general and orthopedic examination done for each case. Preoperatively skin traction is applied to decrease pain and reduce unnecessary movement from injured limb. Oral or/and parenteral analgesia are prescribed for patients to relieve pain. The anti-thromboembolic parameter, like mechanical compression socket and low molecular weight heparin, adjusted by the patient's weight from the day of the accident, was prescribed until 12 hours before surgery. Patients on antiplatelet medication discontinued it five days before operation instead of that low molecular weight heparin started. An anteroposterior radiograph of the pelvis, affected hip with the ipsilateral femur and contralateral hip was taken.

The characteristic of the fracture and planned management were described for both patients and their next of kin, as well as risk factors and complications of surgery. In most cases, the operation was done within 2–3 days after preoperative assessment by anesthetist.

Surgical Technique

The patient was admitted on a day of surgery to Operation Theater after preoperative preparation, and informed surgical consent was taken before surgery by both orthopedic surgeon and anesthesiologist after checking the patient ID and side of the operation.

After rechecking the investigation and vital signs, the patient was received spinal anesthesia or general anesthesia

according to the patient's factors and anesthesiologist decision. All of the patients received antibiotics (3rd generation cephalosporin) within 1-hour prior to skin incision, and the operated area was shaved. All operations were performed by experienced surgeons. Operation in both groups was done using posterior approach. The position of the patient was lateral decubitus and anchored firmly.

Statistical Analysis

All statistical computation is enhanced using statistical method (SPSS 21). The data had been coded, tabulated, and presented in a descriptive form. The statistical procedure that was applied to determine the results of the present study including:

1. Descriptive statistical data analysis (Frequency, Percentage, Mean and stander deviation).
2. Inferential data analysis.
 - A. Chi square.
 - B. Independent *t*-test (*T*-test).

Results

Forty-three patients with a mean age of 72.9 ± 6.78 SD, 24 (16 female; 8 male) underwent THA treatment, and 19 (10 male; 9 female) underwent bipolar hemiarthroplasty treatment. The mean age patient was 70.91years in the THA group and 75.42 years in bipolar hemiarthroplasty groups (See Table 1).

There is a statistically significant difference between types of operation (THA and BHA) with age ($P = 0.029$), the result of the *P*-value was less < 0.05 . Females represent 58.1% ($N = 25$) of all of our cases, while males represent 41.9% ($N = 18$) of all cases. Data analysis revealed no significant association was

Table 1. Patients demographic data

Variables		Frequency	Percent %
Age	60–69 years old	16	37.2
	70–79 years old	21	48.8
	More than 79 years old	6	14
Sex	Male	18	41.9
	Female	25	58.1
Sites	LEFT	23	53.5
	RIGHT	20	46.5
Types of operation	THA	24	55.8
	bipolar hemiarthroplasty	19	44.2
Types of anesthesia	spinal anesthesia	36	83.7
	general anesthesia	7	16.3
Past medical history	HT	18	41.9
	DM	10	23.3
	CVA	2	4.65
	IHD	8	18.6
Mean ADL score		98.5	97.57
Total		43	100

AD, activity of daily living.

identified between the types of surgical operation and the sex of the patients (P -value = 0.203) (See Table 2).

The health-related quality of life and daily activity assessed before fracturing by Barthel scores (ADL), data shows that ADL higher in the THA than the BHA group, but differences were not significant ($p = 0.055$) before fracture.

Duration of operation in BHA ranging from (45–120 min) with a mean (62.63 min \pm 17.51 SD), while the duration of operation in THA ranging between (65–150min) with mean (98.54 min \pm 24.02 SD), the statistical analysis very highly significant difference in duration of operation between the two groups (P -value = 0.000), the result of the P -value was less than alpha (0.05), it's clear that BHA took less time than THA. The amount of blood loss in BHA range between (50–320 ml) with a mean (178.42 ml \pm 91.06), amount of blood loss in THA range between (200–650 ml) with a mean (322.5 \pm 141.37 SD), there is a highly significant difference between the amount of blood loss and type of operation (P -value = 0.001). There is no significant difference between the duration of hospital stay after the operation and the type of operation (P -value = 0.266) (See Table 3).

At three months of follow up, the HHS was measured in both THA and bipolar hemiarthroplasty, an average total score in THA was 80.61 in comparison to 76.08 in BHA; data analysis reveal significant difference (P -value = 0.047) in average HHS in both operation also the mean HHS in THA were better during three months of follow up compared to BHA. Both pain and motion with (P -value = 0.01) and (P -value = 0.038) respectively are significant differences between THA and BHA. There no significant difference (P -value = 0.679) between HTA and BHA in our series for function at a three-month follow-up (See Table 4).

At one year of follow up, the HHS was measured in both THA and BHA, average HHS in THA was 85.3 in comparison to 76.87 in BHA, data analysis revealed that there is a very high significant difference (P -value < 0.000) in average HHS in both operation in which reveal significant improvement in HHS in 1 year for THA groups. The p -value for the pain and motion (P -value < 0.000) and (P -value < 0.001) respectively at 12-month data analysis reveal a very highly significant difference between the two operations for pain and highly significance for motion between the two groups, both in favor of THA after one year from the operation. Also, there is a significant difference in function with a P -value < 0.01 between 2 groups after one year (See Table 5).

In our study, only there is one (4.16%) case of hip dislocation in THA patients; BHA dislocation was not reported. We have 1 (5.23%) case of superficial infection in BHA patients, but no patient THA group complicated with superficial infection, one (4.16%) case of deep infection in THA group's patient re-operated later successfully.

Concerning the general complication, one case in THA patients after two months from operation developed severe chest infection; he was successfully treated with supportive therapy. One case of BHA groups after one month from operation develop CVA; she was also known case of IHD and DM; the same patient later also develop bedsore in the sacrum region. One case in BHA patients two days after the operation develop fat embolism, he was successfully managed in hospital (See Table 6).

An average HHS at the end of 3 months according to different categories of ages were tested, the average HHS in the category of 60–69 years was higher in both groups if compare to others category of ages, also statistically there was a

Table 2. Statistical analysis between age, sex and ADL index of patient and types of surgery

Variables	Items	Types of operation		Total	Significant test
		THA	BHA		
		Mean \pm SD	Mean \pm SD		
		N (%)	N (%)		
	Age	70.91 \pm 5.01	75.42 \pm 7.95	43	T-test = -2.267 P -value = 0.029
	ADL score	98.5 \pm 1.35	97.57 \pm 1.71	43	T-test = 1.974 P -value = 0.055
Sex	Male	8 (44.4)	10 (55.6)	18	Chi-square = 1.623 P -value = 0.203
	Female	16 (64)	9 (36)	25	

SD, Standard deviation.

Table 3. Intraoperative data

Variables		N*	Mean	SD	T-test	P-value
Duration of operation (min)	THA	24	98.54	24.02	5.462	0.000
	BH	19	62.63	17.51		
Amount of blood loss (ml)	THA	24	322.5	141.37	3.85	0.001
	BH	19	178.42	91.06		
Mean hospitalization time (days)	THA	24	3.96	1.08	1.129	0.266
	BH	19	3.53	1.43		

*independent t-test. N, number; min, minute; ml, milliliter.

Table 4. Mean harris hip score assessment in both the groups at 3 months

Variables		Mean \pm SD	P-value
HHS	THA	80.61 \pm 8.12	0.047
	BHA	74.91 \pm 10.15	
Pain	THA	40.00 \pm 3.49	0.01
	BHA	35.58 \pm 7.04	
Function	THA	35.4 \pm 4.33	0.679
	BHA	34.81 \pm 4.93	
Motion	THA	4.18 \pm 0.36	0.038
	BHA	3.93 \pm 0.42	

Table 5. Mean harris hip score assessment in both the groups at 1 year

Variables		Mean \pm SD	P-value
HHS	THA	85.3 \pm 6.24	0.000
	BH	74.42 \pm 8.28	
Pain	THA	42.83 \pm 1.86	0.000
	BH	37.75 \pm 4.73	
Function	THA	37.84 \pm 3.32	0.011
	BH	34.95 \pm 3.39	
Motion	THA	4.38 \pm 0.24	0.001
	BH	4.00 \pm 0.47	

significant difference between types of operation which is P -value < 0.05 . At the same time, HHS in the category of 70–79 lower than the first category and higher than the last category, but data analysis shows no significant difference P -value > 0.05 between types of operation in this category of age. Average HHS in the last category was lower than the first two categories, and statically no significant difference between types of operation.

At the end of one year, there is a significant improvement in average HHS in all categories of ages except for the last category in the BHA group, which is a drop in average HHS. Statistically, there was a significant difference between types of operation and ages in both (60–69 years) and (70–79 years) category because of P -value < 0.05 , in the last group, no significant difference between types of operation and ages because P -value > 0.05 .

Discussion

Femoral neck fractures are common injuries among older people. The management for these fractures in an old age group is usually joint replacement, which is either hemiarthroplasty or total hip replacement, modality will give the best result; this issue is still in continuous debating.

Factors that should be considered for selecting management modality in elderly patients with femoral neck fractures are the age of the patient, medical state of a patient, associated co-morbidity, lifestyle, level of ambulation, cognitive condition, availability of facilities and socio-economic state of the patient.

Table 6. Complication and adverse events

Variables		THA	BH
		N (%)	N (%)
Hip related complication	Dislocation	1 (4.16%)	0 (0.0%)
	Superficial infection	0 (0.0%)	1 (5.23%)
	Deep infection	1 (4.16%)	0 (0.0%)
	Total	2	1
General complication	Chest infection	1 (4.16%)	0 (0.0%)
	CVA	0 (0.0%)	1 (5.23%)
	Bed sore	0 (0.0%)	1 (5.23%)
	Fat embolism	0 (0.0%)	1 (5.23%)
	Total	1	3
Re operation	Surgical DBR and 1 stage operation	1	0
	Close reduction	1	0

In our study, the femoral neck fracture rate was more common in females (58.1%); this could be due to senile post-menopausal osteoporosis in our community, which may be related to social lifestyle, lack of taking care of their general health and depriving of the sports activity. Our results were compatible with the study conducted by Shukla R et al., who reported a female more commonly sustained femoral neck fracture in a study that involved 45 patients.⁶ Thorngren G k et al. reveal that in Sweden, three-quarter of hip fractures were females; they attributed these observations to the fact that most of these patients live alone, osteoporotic, and more subject to trauma.⁷

Duration of operation in our study differ between THA and BHA, THA has a longer operation time with a mean of 98.54 minutes compare to BHA with 62.63 minutes, about 35.91 minutes longer than BHA, since THA require additional preparation and implantation of the acetabulum that's why it needs more times. A study conducted by van den et al., which included 252 patients comparing functional outcomes between THA and bipolar hemiarthroplasty, also showed the same result, demonstrating a longer operation duration.⁸

The mean blood loss was less in BHA than THA because there were shorter operative times, minimum soft tissue dissection, and preserving native acetabulum in BHA. In contrast, in addition to sequential reaming of the acetabulum in THA, all these will be associated with more blood loss. Statically it was a highly significant difference in our study between the two groups. Tuteja SV et al., in their research conducted on 45 patients, also demonstrated a considerable amount of blood loss for those THA comparing to BHA. They also conclude that the requirement and amount of blood transfusion are usually related to pre-operative hemoglobin levels rather than intraoperative blood loss.⁸ In our study, only 3 of the cases in bipolar hemiarthroplasty and 6 cases in THA required blood transfusion postoperatively. Keating et al., in their series, reveal that THA-managed patients were more probably receive a blood transfusion in contrast to BHA.⁹

In our study, no dislocation occurred in hemiarthroplasty groups. In THA groups, only one (2.32%) case of dislocation occurred in female patients aged 83 years after fall on ground 10 days postoperatively. In our study, the posterior approach

was performed in all operations in both groups, and the operating surgeon enhanced posterior soft tissue and short external rotator repair for additional stability. Both, Sonaje et al. and Avery et al. reviewed the result of 42 patients and 81 patients, respectively. They revealed that 1 case (2.38%) and 3 cases (7.5%) in THA groups dislocation were reported respectively without any case of BHA dislocation. In both studies, the lateral approach was used.^{10,11} Hedbeck et al. study 120 patients with fractured neck of femur underwent THA and BHA through anterolateral approach; there was no dislocation in either group during four years follow-up.¹² Van den et al. concluded that there significant difference in the rate of dislocation between anterolateral and posterior approaches. The rate of dislocation unexpectedly high in THA, especially after femoral neck fracture, even for active outdoor patients. This fact sometimes hesitates operating surgeon when they choose THA. In recent times the preference is that trained orthopedic surgeons use an anterolateral approach to decrease the risk of dislocation in THA.¹³

Chronic medical disease, especially in patients with a known DM, mostly increases periprosthetic joint infection risk. We have one case of superficial infection after four weeks postoperatively in BHA groups. The patient was known for diabetes mellitus successfully treated with i.v antibiotic for ten days and followed by oral antibiotic for another two weeks, but not any superficial infection in THA groups.

We face one case with deep infection in THA, the patient was also known case of DM and renal insufficiency three weeks postoperatively, the patient was successfully managed with i.v antibiotic for four weeks, soft tissue DBR and polyethylene exchange the infection was cured, and we followed this patient and had a good functional outcome at the 12-month follow-up (HHS 81).

Ghazi Chammout et al. in their study showed the opposite result when studies were done on 120 patients found that three patients with superficial infection in THA group without any case with deep infection, while in BHA groups, there were 3 cases of deep infection with managed with revision arthroplasty without any case of superficial infection in this group.¹⁴

Regarding general complications, we reported one patient from the THA group developed viral pneumonia. Another patient from the BHA group complained of fat embolism within the first two postoperative days; both were treated successfully by oxygen and rehydration. In this series, one patient from the BHA group developed CVA and bedsore four months postoperatively; that patient was a known case of DM and IHD and died one month later. Our results were comparable with J.F. Keating et al. study, which reveals no significant difference in general complications between the two groups.⁹ Our review noted that most of the older and comorbid patients were managed by BHA, which later reflects an increase in general complications.

Functional outcome assessment in our study tends to be in favor of THA than BHA, average HHS, and variables as pain, function, and motion continue to increase at the end of one year follow up. Data analysis statically reveals a very high significant difference for both mean HHS score and pain while the significant difference for function and motion between the two groups at the final follow-up.

Regarding short term outcome, data analysis in our study noted that there was a better functional outcome in THA within three months follow up after the operation and a

statistically significant difference in HHS between the two groups. Both pain and motion were also better in the THA group. But as demonstrated in (Table 7), those patients with age category more than 70 have comparative functional outcomes between 2 groups within short-term outcomes. Bhandari et al. discover that most orthopedic surgeons felt that the short-term outcome following a BHA was comparable with that after a THR.¹⁵ Ghazi Chammout et al. illustrated the results of several published studies that compared short and intermediate outcomes following THA and BHA reveal that no functional difference between the two operations.¹⁴

After 12 months from the operation, the differences in hip function become more significant in favor of THA, the differences were high significance difference in a p-value for HHS, pain, and motion (P -value < 0.001) and significant for function (P -value < 0.01) patients were more comfortable and experiencing normal daily activity in the mean of walking, sitting, and more pain-free in THA groups, an explanation for these differences between 2 groups after one year may be related to acetabular damage and beginning of erosion in BHA group despite no any radiological sign of erosion appeared on x-ray after one year and another fact most active outdoor ambulator were managed by THA while those underwent BHA they are older age, home ambulatory and more flaccid even some of them used walking aid even before fracture, after one year from operation there is still some pain, and little improvement in function and motion compare to short term outcome in BHA group.

Both Hedbeck et al. and Macaulay et al. in their studies reveal better hip function and less pain at 12 months of follow up and continue to be improving outcome within the time and they clarified many explanations for this difference, one of these explanations is related to the degree of acetabular erosion in hemiarthroplasty.^{12,16} While Calder et al., in his study on geriatric patients with femoral neck fracture after FOG treated by unipolar and bipolar hemiarthroplasty, showed that the rate of acetabular erosion (2.2%) in unipolar and (0.0%) in bipolar hemiarthroplasty after 24 months follow-up.¹⁷ Another explanation was the differences in patients' age and related activity between studies and operation types.^{12,16}

In the (Table 7), our data reveal that patients below the age of 70, whether managed by BHA or THA, are getting more benefit from surgery with a good result of mean HHS, and they continue to improve after one year of follow-up. While patients with age of 80 and more, when managed by THA, reveal low mean HHS compare to BHA in the same group but improving within 1-year follow-up, an explanation for this was that patients in this category were older, flaccid and one patient in this category develop dislocation few days after the operation. She was afraid initially, needed time for adaptation to her artificial hip, K Karthik George et al. on their study where they did on Asian population they found better functional outcome for those old patients treated by BHA comparing to THA, they explained that most of their patient has poor socio-economic state and experiencing more dislocation of THA than BHA in their series.¹⁸

Patients within the age 60–69 years old managed with BHA show improved mean HHS after a one-year follow-up. Still, those with age more than 80 managed with BHA show a significant decline in HHS after one year it may be related to a decline in age-related activity and the trauma and major surgery that they passed through. Hedbeck et al. after four years

Table 7. Analysis for mean Harris hip score vs different categories of ages

Harris hip score	Age group	N	Types of operation	Mean \pm SD	T-test	P-value
In three months	60–69 years old	12	TH	84.00 \pm 3.58	2.43	0.029
		4	BH	79.25 \pm 2.55		
	70–79 years old	10	TH	79.13 \pm 9.8	0.909	0.375
		11	BH	74.73 \pm 12.11		
More than 79	2	TH	67.68 \pm 4.14	0.121	0.745	
	4	BH	69.36 \pm 6.01			
Total		43				
In one year	60–69 years old	12	TH	88.42 \pm 3.8	2.464	0.027
		4	BH	83.4 \pm 2.24		
	70–79 years old	10	TH	82.77 \pm 6.96	2.368	0.029
		10	BH	75.85 \pm 6.44		
	More than 79	2	TH	79.16 \pm 6.75	2.45	0.258
		2	BH	64.63 \pm 11.28		
Total		40				

in follow-up comparing functional outcome between THA and BHA, reveal better result in functional outcome and quality in life within 12 months of follow-up in old patients with femoral neck fracture in whom treated by THA and continue to improve after one year.¹² In contrast Van den et al. after one and five years of follow-up 252 patients treated with cemented THA and BHA reach in conclusion that there are no significant differences between the two groups regarding functional outcome, general or hip related complication and mortality.¹³

There are several limitations to this study. First, this study was conducted on only 43 patients (24 THA and 19 BHA); the study on the higher numbers will give more accurate results and better for comparison. Secondly, the maximum duration of follow-up in our study was 12 months; thus, we did not detect long-term complications like prosthesis loosening, subsidence of implant, Heterotopic ossification was not detected in this study because of our limited time, which will affect the results and outcome. However, Blomfeldt et al., in their series, reveal that many previous studies reach a conclusion in which hip function may reach its peak after 12 months.¹⁵ Finally we didn't differentiate between cemented or uncemented prosthesis may need another study to compare functional out between them. However, Ali Abdul Karim et al. on his study in systematic review and meta-analysis of randomized controlled trials comparing cemented and cementless THA reveal no significant difference in complication and

mortality and unclear results regarding long-term outcomes.¹⁹ Also, Macaulay et al. comparing outcomes regardless of prosthesis types; the decision also was intraoperative regarding the use of cement or not.¹⁶

Conclusion

The results of this study confirm that the total hip arthroplasty provides better functional outcome than bipolar hemiarthroplasty both after three months and 12 months of follow up and continue to be improved significantly in younger active patients without increasing risk of perioperative complication and better to apply for those active old age patient expecting long life expectancy. In contrast, bipolar hemiarthroplasty is recommended for those anesthesia-risk patients who needed shorter surgical time and less blood loss.

Recommendation

Hip arthroplasty is the most common operation used as the management of femoral neck fracture. To better evaluate each group's functional outcome and complications, we need to do more study with a larger population and longer follow-up.

Conflict of Interest

None. ■

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