

Comparison of Functional Outcomes in Terms Of Post-Operative Mobility for Unipolar Versus Bipolar Un-Cemented Hemiarthroplasty in Elderly Patients with Displaced Intracapsular Femoral Neck Fractures

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Abstract:

Objective: To compare of functional outcomes in terms of post-operative mobility for unipolar versus bipolar un-cemented hemiarthroplasty in elderly patients with displaced intracapsular femoral neck fractures.

Methodology: Our study design is Randomized Control Trial conducted in Department of Orthopedics Bahawal Victoria Hospital, Bahawalpur. April 2015 to October 2016. Sample size is (calculated by taking $n^6 = 138$, confidence interval 95, power of study 80, $P_1 = 33\%$, $P_2 = 13\%$) 69 in each group. Sampling technique used was non probability consecutive sampling. All patients who meet the inclusion criteria presenting to orthopedic unit of Nishtar Hospital Multan with fracture neck of femur were selected for study. Patients were divided into two groups randomly by lottery method and enrolled for unipolar or bipolar hemiarthroplasty. Chi-square test was used to compare outcome variable in both groups. A p-value < 0.05 was considered statistically significant. Effect modifiers like age and sex was controlled by stratification. Chi square test was applied to see significant difference.

Results: Overall, there were 100% (n=138) patients in this study, both genders. The mean age of the patients was 66.35 ± 4.29 years. (Range: 60 to 80 years) Mean age and SD of group A (no walking aid) was 54.52 ± 3.10 and in group B (walking aid) 54.99 ± 3.19 . Time up go score was noted as successful 33.3% (n=46) and 66.7% (n=92) as unsuccessful. Walking aid was noted in 65.2% (n=90) patients. Functional outcome was noted as good in 26.8% (n=37) patients and noted as bad in 73.2% (n=101) patients. Out of 100% (n=38) patients, good outcome was 26.3% (n=10) unipolar and 73.7% (n=28) bipolar. Out of 100% (n=100) Bad outcome was 59% unipolar and bipolar 41%.

Conclusion: Functional outcome in term of mobility is better in case of bipolar prosthesis as compared to unipolar. Thus in our conclusion bipolar prosthesis is preferred procedure as compared to unipolar hemiarthroplasty in treating patients with displaced intracapsular femoral neck fracture.

Keywords: Bipolar Hemiarthroplasty, Unipolar Hemiarthroplasty, Displaced intracapsular femoral neck fractures.

Introduction:

Annual occurrence of hip fracture is 1.7 million and it is a major health issue in elderly people all over the world. Incidence is expected to get tripled within next 50 years [1], because of the increasing age of population around the world and other elderly diseases like poor cognition and osteoporosis [2]. For treatment of displacing fracture of neck of femur in elderly, both unipolar and bipolar hemiarthroplasty has been approved [3]. Bipolar has an advantage over unipolar because it reduces acetabular erosion by creating movement at two poles and thus less movement between prosthetic head and acetabulum [4]. But most commonly used treatment of displaced fracture of neck of femur is unipolar hemiarthroplasty due its less cost [5]. If complications are involved and there is need of second operation, unipolar becomes more expensive.

In a study by Bhushan M Sabnis, I J Brenkel, they compared the outcome of mobility for both unipolar and bipolar hemiarthroplasty and concluded results of 33% and 13% for bipolar and unipolar hip hemiarthroplasty [6]. Even though many previous studies have been conducted and proved quite promising yet the treatment course is still the same. In our study, Timed Up and Go test [7] is used, through which future physical function in patients with hip fracture treated with unipolar or bipolar hemiarthroplasty can be determined early [8, 9]. This study being a prospective randomized study and consisting of definitive group of patients has the power to answer the needs and also change the treatment course. Main objective of treatment of femoral neck fractures are lessening the mortality rate, morbidity rate, need of reoperation and early return to normal functional status. In active elderly patients, with femoral neck fracture management is controversial [10]. No common grounds have been set over the choice of treatment among unipolar or bipolar hemiarthroplasty, total hip replacement and internal fixation.

Cemented unipolar hemiarthroplasty is recommend by The Scottish intercollegiate guidelines [11]. Active patients aged 70-90 with fracture of femoral neck show unsatisfying results after unipolar prosthesis because of enhanced needs on that type of hip. The rationale of the study is to compare the functional outcomes of unipolar versus bipolar uncemented hemiarthroplasty in elder patients with intracapsular fractures of the neck of the femur and also studying the factors affecting the outcomes.

Material and Methods:

Our study design was Randomized Control Trial conducted in Department of Orthopedics Bahawal Victoria Hospital, Bahawalpur. from April 2015 to October 2016. Sample size is (calculated by taking $n^6 = 138$, confidence interval 95, power of study 80, $P1 = 33\%$, $P2 = 13\%$) 69 in each group. Sampling technique used was non probability consecutive sampling. Functional outcome was measured in terms of independent mobility (good outcome) and dependent mobility (bad outcome) measured by The Timed Up and Go Test and use of walking aid at 12th weeks. The Timed Up and Go Test is a test used to examine functional mobility in older adults. The test requires an adult to stand up, walk 3 m (10 ft), turn, walk back, and sit down. The time taken to complete this task is noted.

Inclusion criteria was patients with age greater than or equal to 50 years, patients diagnosed on X-ray showing Garden III and IV type displaced femoral neck fractures either at the time of presentation or within one week after injury or trauma, patient falling in ASA (American Society of Anesthesiologists), patients who were able to walk unaided/ without support before injury. Exclusion criteria was patients with un-displaced femoral neck fractures on X- ray, patients who are predisposed to severe osteopenia, patients with ipsilateral femoral shaft fracture, multiple trauma patients, patients with pre-existing arthritis, patients who refuse to participate in the study.

All patients who met the inclusion criteria presenting to orthopedic unit of Nishtar Hospital Multan with fracture neck of femur was selected for study. Ethical approval for this study was taken from Hospital Ethics Committee. All patients who were willing to participate then were asked to provide written consent to be randomized to one of the group of the study. Patients were divided into two groups randomly by lottery method and enrolled for unipolar or bipolar hemiarthroplasty. All data was coded by study ID number for analysis, with the study coordinator having the only link to patient name and chart number. Patients in Group A were undergoing uncemented unipolar (Austien Moore) prosthesis. Group B patients were undergoing uncemented bipolar hemiarthroplasty on the basis of randomization. Prophylaxis for antibacterial and deep vein thrombosis was given.

The operative procedures were performed by a single selected team of surgeons of the Orthopedic Department of Nishtar Hospital Multan under spinal anesthesia and through posterior (Moor's) approach hemiarthroplasty was undertaken. The researcher of this study assisted the operative procedure. The patients were followed up to three months and their mobility level was assessed by an independent observer at 12th weeks according to instructions given in Annex.i, allowing one trial done before the test in time and recorded so that patients understand the procedure well. The observer was not to look at the file of the patient to know the type of surgery performed. Final outcome was measured at the end of 12th week postoperatively. All the information including outcome variable was recorded on a specially designed Performa by the researcher (Performa attached). All the data was entered on SPSS for windows version 10.

Mean and standard deviation was calculated for quantitative variables i.e. age and timed up and go score. Frequencies and percentages were calculated for gender and outcome variable independent mobility versus

dependent mobility. Chi-square test was used to compare outcome variable in both groups. A p-value < 0.05 was considered statistically significant. Effect modifiers like age and sex was controlled by stratification. Chi square test was applied to see significant difference.

Results:

Overall, there were 100% (n=138) patients in this study, both genders. Gender distribution showed there were 50.7% (n=70) males and 49.3% (n=68) females. The mean age of the patients was 66.35±4.29 years. (Range: 60 to 80 years). There were 48.6% (n=67) patients between 60-65 years and 51.4% (n=71) patients between 66-80 years. (Table. 1) Mean age and SD of group A (no walking aid) was 54.52 ± 3.10 and in group B (walking aid) 54.99 ± 3.19.

Time up go score was noted as successful 33.3% (n=46) and 66.7% (n=92) as unsuccessful. Walking aid was noted in 65.2% (n=90) patients. Functional outcome was noted as good in 26.8% (n=37) patients and noted as bad in 73.2% (n=101) patients. Out of 100% (n=38) patients, good outcome was 26.3% (n=10) unipolar and 73.7% (n=28) bipolar. Out of 100% (n=100) Bad outcome was 59% unipolar and bipolar 41%. (Table. 2).

No association was found between functional outcome with gender (p=0.391), time up to go score (p=0.342), walking aid (p=0.958), and stratified age (p=0.243), except good outcome (p=0.027) and bad outcome (p=0.011), after applying the chi-square. (Table. 3).

Table. 1
Demographic Variables:
(n=138)

Characteristics	Frequency	Percentage (%)
Gender		
Male	70	50.7
Female	68	49.3
Total	138	100.0
Stratified Age		
60-65 years	67	48.6
66-80 years	71	51.4
Total	138	100.0
	Mean±S.D	
Age	66.35±4.29 years	

Table. 2
Functional Outcomes

Characteristics	Frequency	Percentage (%)
Time up go score		
Successful	46	33.3
Unsuccessful	92	66.7
Total	138	100.0
Walking Aid		
Yes	90	65.2
No	48	34.8
Total	138	100.0
Functional Outcome		
Good	37	26.8
Bad	101	73.2
Total	138	100.0
Good Outcome		
Unipolar	10	26.3
Bipolar	28	73.7
Total	38	100.0
Bad Outcome		
Unipolar	59	59.0
Bipolar	41	41.0
Total	100	100.0

Discussion:

Hip fractures comprise almost two third of the total duration of hospital stay as a result of fractures [12]. Because of short life expectancy of very elderly patients, choice of treatment and outcome evaluation is controversial. This is reason that early satisfaction becomes as much important as long term outcomes [13]. Hip fracture treatment is targeted to achieve early satisfactory, pre injury status as soon as possible, so that impairment of independence and quality of life can be avoided, also because annual mortality rate is more than 30% [14]. Three surgical options for hip fracture are internal fixation, total hip replacement and the one under discussion, hemiarthroplasty. Bipolar or unipolar hemiarthroplasty is thought to be most optimum technique to manage displaced femoral neck fracture as it produces significant results [15].

In a study conducted by Khorami M et al reported that bipolar hemiarthroplasty have better mobility outcomes as compared to unipolar hemiarthroplasty [16]. Use of Austin Moore prosthesis in hemiarthroplasty is most common choice [17]. Bipolar prosthesis reduces acetabular erosion and increases life time and function of the prosthesis [18, 19]. In a study Jia Z et al reported that both techniques are equally effective bipolar hemiarthroplasty have n superiority over unipolar hemoarhtroplasty [4]. As compared to bipolar hemiarthroplasty, bipolar hemiarthroplasty provides poorer or similar [20] results and also better pain control and function. Because of these reasons, bipolar type is recommended for active and elderly patients [21]. Although unipolar type is less expensive but bipolar hemiarthroplasty proves cost-effective seeing its effect on overall outcome [21]. Another study was conducted by Bhushan M Sabnis et al and reported bipolar technique is better than unipolar [6]. But there is no definite point of age to determine the use of unipolar or bipolar hemiarthroplasty.

Variety of results has been recorded for treatment of hip fracture by using hip replacement technique [22, 23]. Cemented hemiarthroplasty is recommended by The Scottish Intercollegiate Guidelines and other various studies [18, 24, and 25]. Quite appreciable short and long term results have been obtained by using cemented bipolar hemiarthroplasty [16]. In total hip replacement technique, use of uncemented hydroxyapatite coated femoral stems also give satisfactory long term outcome in the form of prosthesis survival [26]. In similar way satisfying midterm results are obtained by using uncemented hydroxyapatite coated bipolar hemiarthroplasty in femoral

neck fracture patients of elder age [26].

Table. 3
Association of Functional Outcome with other variables

Variable		Functional Outcome		Total	Chi-Square P-value
		Good	Bad		
Gender	Male	21	49	70	0.391
	Female	16	52	68	
Total		37	101	138	
Time Up Go Score	Successful	10	36	46	0.342
	Unsuccessful	27	65	92	
Total		37	101	138	
Walking Aid	Yes	24	66	90	0.958
	No	13	35	48	
Total		37	101	138	
Stratified Age	60-65 years	21	46	67	0.243
	66-80 years	16	55	71	
Total		37	101	138	
Good Outcome	Unipolar	2	12	14	0.027
	Bipolar	12	12	24	
Total		14	24	38	
Bad outcome	Unipolar	20	39	59	0.011
	Bipolar	10	31	41	
Total		30	70	100	

Conclusion:

Functional outcome in term of mobility is better in case of bipolar prosthesis as compared to unipolar. Thus in our conclusion bipolar prosthesis is preferred procedure as compared to unipolar hemiarthroplasty in treating patients with displaced intracapsular femoral neck fracture.

Conflict of interest: Nil

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