# Outcomes of Bipolar Hemiarthroplasty versus Dynamic Hip Screw Fixation in Patients with Basicervical Femoral Neck Fractures: A Randomized Controlled Trial

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# Abstract

**Aim:** To compare the outcome of Bipolar Hemiarthroplasty versus Dynamic Hip Screw Fixation in patients with Basicervical Femoral Neck Fractures.

Study design: A randomized controlled trial

**Place and Duration:** This study was conducted at Liaquat National Hospital and Medical College Karachi Pakistan from June 2020 to June 2021.

**Methodology:** This study includes 70 patients who were divided into two groups. One group was of bipolar hemiarthroplasty and the other of DHS fixation. Functional evaluation was made through questionnaires like Harris hip score HHS and visual analog scale VAS. There was a follow-up of one year.

**Results:** In the hemiarthroplasty group, the average age was  $70.95\pm8.85$  years and in the internal fixation group, it was  $72.22\pm6.86$  years. Two patients of the internal fixation group and three of the bipolar hemiarthroplasty group were excluded. There was not much difference in VAS scores of both groups but a significant difference in HHS scores of both groups. There were cases of device failure in the internal fixation group.

**Conclusion:** The comparison shows more good results of bipolar hemiarthroplasty over internal fixation by DHS due to lower revision rate, a short stay in the hospital, and lower device failure.

**Keywords:** bipolar hemiarthroplasty, Dynamic Hip Screw Fixation, adults, Bipolar Hemiarthroplasty

### Introduction:

One of the most common injuries in the elderly is Peritrochanteric fracture. In most of the patients with fractures of the hip area, there is permanent damage to motor function. In 1.5 years of follow-up, a 12%-25% mortality rate was reported (1-4). Basicervical fractures are more damaging in nature because these fractures cause disturbance in both areas. So internal fixation with a dynamic hip screw (DHS) combined with an anti-rotation screw should be the preferable treatment (5, 6). There is a narrow contact between the cortex and main fragment because of fracture instability which arises from the narrow cortical base of the proximal fragment.

Higher varus forces increase the chance of collapse and device failure in these fractures as compared to intertrochanteric fractures (6-9). On the other side, poor bone density in these patients lowers the chance of screw purchase in the femoral head. This can also increase the probability of device failure. So this study is about the comparison of bipolar hemiarthroplasty and fractures reduction and fixation by treating the patients with DHS.

# Methodology

This study was carried out in a controlled clinical trial. Patients with Basicervical fractures were included in this study who were hospitalized in our hospital. By using the sampling method participants were selected. Consent was also taken from patients before entering the study. Permission was taken from the ethical review committee of the institute. Inclusion criteria were to select patients with age more than 55 years, Basicervical fracture, and movement without any help. Exclusion criteria include patients who did not participate in the study willingly and hip joint Osteoarthritis (OA). There were two groups of patients, one was bipolar hemiarthroplasty and the second was fixation using DHS. A questionnaire was given to every patient to know about age, gender, underlying diseases, and tobacco use. Type of questionnaire known as Harris Hip Score questionnaire which is used for function evaluation. The occurrence of postoperative problems such as re-fracture, infection, and mortality rates were also recorded. Analysis of data was made through Stata software. Data was described through mean and standard deviation. These two groups were compared through the Mann-Whitney U test and the  $x^2$  test was used to compare the means of non-parametric variables.

# **Results:**

This randomized controlled trial includes 70 patients. The mean age of patients was  $70.95\pm8.85$  years in the control group and  $72.22\pm6.86$  years in the intervention groups. Basic characteristics were the same such as gender distribution, diabetes, and smoking status. For the analysis of data Mann-Whitney U test was used because in the Shapiro-Wilk test study

population was not normally distributed. In 1 and 1.5 years of follow-ups, it was observed that there is a difference between the two groups and this was done by comparing the means of HHS scores, while VAS scores showed not many differences. Nerve injury was present in both groups while there were no complexities of prosthesis dislocation in the intervention group. Five non-union cases were reported with a follow-up of 10 months in the control group. So these cases were treated with bipolar hemiarthroplasty. Three patients in hemiarthroplasty and two in the internal fixation group died during the follow-up period. There were two cases of surgical site ailments in the intervention group. There were three cases of cerclage wiring in the internal fixation by the DHS group and no re-fractures in the control group.

Variables		6 months	P-value	1 year after	P-value
		after		surgery	
		surgery			
HHS	Control	70.78 <u>+</u> 7.22	0.0005	75.00 <u>+</u> 7.55	0.0098
	intervention	77.63 <u>+</u> 6.72		77.00 <u>+</u> 5.92	
VAS	Control	3.30 <u>+</u> 2.07	0.4658	3.71 <u>+</u> 0.98	0.4679
	intervention	2.78±2.13		3.49 <u>±</u> 1.07	

Table 1. U test for Harris Hip Score (HHS) and Visual Analogue Scale (VAS) scores

# Table 2. The frequencies of the study participants in terms of smoking, age, and diabetes condition in the control and intervention groups

Variables		Control	Intervention	<i>x</i> <sup>2</sup>	P-value
Gender	Male	15	16	0.12	0.7600
	Female	12	12		
Smoking	Smoker	6	10	0.60	0.4500
	Nonsmoker	20	20		
Diabetes	Diabetic	10	12	0.12	0.7500
	Nondiabetic	15	16		

#### **Discussion:**

The aim of treatment is to avoid high morbidity and mortality rate due to complexities like pneumonia, atelectasis, and malunion (12, 13). Internal fixation treatment has advantages but pre-fracture problems like osteoporosis and excessive slide can result in collapsing of fracture site and introduction of the lag screw into the joint. This can limit the movement in patients. Patient movement is limited until complete union (14). Therefore surgeons are in search of better therapeutic treatments with low failure rates (9, 12). In this study, the device failure rate is 6.6% lower than the previous studies (15-17). The results of HHS evaluation were better after bipolar hemiarthroplasty than the internal fixation given in the studies by Emami et al., (19). And this can also be seen in this study, in which the HHS was better in bipolar hemiarthroplasty in both the follow-ups.

Previous studies have also shown that bipolar hemiarthroplasty gives better results than the internal fixation group taking into account factors such as blood loss and transfusion need during operation and hospitalization duration (15). One of the important complexity related to hip fractures is deep infection being reported as 4%. Large incisions and excessive dissection can increase the rate of infection (14). In this study, two cases of infections were reported in the bipolar hemiarthroplasty group which was then treated with oral antibiotics. Arthroplasty has another important complication such as prosthesis dislocation. It is caused by different reasons such as weakness of the abductor's muscles and small size of the femoral head. In the previous studies by Rodop et al. (18), there were no cases of prosthesis dislocation which is also in accordance with this study.

VAS was used to evaluate pain severity in both follow-ups. There was no drastic difference between the two groups as given in past studies (19, 20). The mortality rate given in this study is also in accordance with previous studies. Various studies have given different mortality rates in their studies. One with higher and other with lower mortality rate which may be due to long surgery duration or delayed movement.

#### **Conclusion:**

Bipolar hemiarthroplasty surgery has good results over internal fixation using DHS due to high HHS scores, short hospitalization duration, less device failure rate.

#### **Funding source**

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#### **Conflict of interest**

None

#### Permission

Permission was taken from the ethical review committee of the institute

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