

## OUTCOME COMPARISON OF TREATMENT BASICERVICAL NECK OF FEMUR FRACTURE USING HEMIARTHROPLASTY VERSUS DYNAMIC HIP SCREW

Dr. Manpreet Singh<sup>1</sup>, Dr. Anurag Dhaker<sup>2</sup>, Dr. Pradeep Kumar Mundotiya<sup>3</sup>

<sup>1</sup>Resident Doctor, Department of Orthopaedics, SMS Medical College and Attached Group of Hospitals, Jaipur, Rajasthan

<sup>2</sup>Professor, Department of Orthopaedics, SMS Medical College and Attached Group of Hospitals, Jaipur, Rajasthan

<sup>3</sup>Resident Doctor, Department of Orthopaedics, SMS Medical College and Attached Group of Hospitals, Jaipur, Rajasthan

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**Corresponding author:** Dr. Manpreet Singh

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### Abstract

**Background:** The present study was conducted to compare outcome of hemiarthroplasty with dynamic hip screw for basicervical neck of femur fracture.

**Methods:** Hospital based, randomized prospective, comparative interventional study conducted on Basicervical neck of femur fracture cases attending with orthopaedics department of S.M.S. Medical College and Hospital, Jaipur (Rajasthan, India)

**Results:** As per the post operative complications in Hemiarthroplasty and DHS groups respectively, no significant difference was observed among the group. As per the age groups clinical score (merle's d aubigne), at 6m and 12 m Group H was better than group D. As per average functional outcome at 3,6 ,12months. Score improved with the time.

**Conclusion:** We concluded that Hemiarthroplastymay allow better restoration of function and should be favoured for treatment of fracture neck of femur in patients that meet the indications for surgery whenever the technical competence and facilities exist.

**Keywords:** Femur, Hemiarthroplasty, DHS

### Introduction:

A hip fracture is a life changing event for any patient and the risk of disability, increased dependence and death is substantial. Basicervical fractures of femur are relatively rare injuries which account for only 1.8–7.6% of hip fractures.<sup>3,4</sup> It is a fracture through the base of femoral neck at its junction with the intertrochanteric region<sup>5</sup> Due to this location, it represents an intermediate form between femoral neck, usually fixed with multiple cancellous screws and the intertrochanteric fracture, fixed with a sliding screw device. Basicervical fracture is a controversial type of hip fracture and it has been regarded as an extra capsular or intracapsular fracture by different authors.<sup>1</sup>

Hemiarthroplasty and Dynamic hip screw (DHS) are established treatment modalities for femoral neck fractures. With the Hemiarthroplasty, immediate full weight bearing regardless of bone quality is achieved after primary cemented arthroplasty, satisfactory functional outcome has been reported and the problem of non-union and avascular necrosis is eliminated as the femoral head and neck was replaced by metallic implant<sup>2</sup>

The disadvantages of hemiarthroplasty are relatively poor outcomes in active patients secondary to poor femoral fixation and a marked potential for acetabular erosion. Therefore, it should be reserved for very limited or non-ambulatory, low-demand patients with relatively shorter life expectancy. The DHS confers stable fracture fixation,

which allows early mobilization of the patient and restoration of function.<sup>3</sup>

The DHS is based on “tension band principle” which allows the screw to slide within the barrel to enable compression of the fracture when the patient begins to bear weight with consequent high rates of union and restoration of hip function to pre injury level.<sup>4</sup>

The commonest mechanical failure of fixation in using the sliding hip screw system is cut out of the implant from the femoral head and failure rate of 8%-13% has been reported in previous studies. This is most frequent in elderly patients who usually are not able to walk without weight bearing and often necessitates revision or a secondary hemiarthroplasty. It is important that the technique of screw placement is precise and should ideally be central in the femoral neck, on both anteroposterior and lateral radiographs. This is why the concept of tip apex distance (TAD) is critical to the outcome of fixation and accurately predicts failure or survival of the DHS.<sup>5</sup>

### Material and methods

#### Study area

- Patients in the department of orthopaedics in teaching hospital attached to S.M.S. Medical College and Hospital, Jaipur.

**Study design**

- Hospital based, randomized prospective, comparative interventional study.

**Study duration**

- Data collection was started first after the approval from institutional research review board and ethical committee upto October 2020,

**Sample size**

- Sample size was calculated 16 subjects at  $\alpha$  error 0.05 and power 80% assuming minimum difference of means was detected in post operative hip score after dynamic hip screw and hemiarthroplasty. 1 with SD1 (as per seed article), so for study purpose 25 cases of basicervical neck of femur fracture was taken for dynamic hip screw and 25 was taken for hemiarthroplasty.

**Study universe**

- Basicervical neck of femur fracture cases attending with orthopaedics department of S.M.S. Medical College and Hospital, Jaipur (Rajasthan, India)

**Inclusion criteria**

1. Required mobility with no or one walking aid, presenting with basicervical fracture or its equivalent.
2. Simulators of the basicervical fracture, defined as a trochanteric fracture in which the head–neck fragment does not remain connected to the trochanters and its inferior cortical extension is not long enough to hinder its rotational movement.
3. Age group >55 years of both sexes.
4. Patients who are fit for anesthesia and surgery, who had given written informed consent and are willing for follow up.

**Exclusion criteria**

1. Intracapsular femoral neck fractures; intertrochanteric fractures in which the head-neck fragment has connection with the trochanter(s), or has inferior cortical extension which can tether it to a distal fragment and prevent its spinning around the lag screw.
2. Patients with advanced arthritis.
3. Patient with pathological fracture.

**Method of randomization**

Chit box method used for randomization of this study

**Data collection and study**

- After obtaining clearance and approval from the institutional ethical committee and patients fulfilling the inclusion/ exclusion criteria were included in the study after obtaining informed consent.
- Detailed history was obtained using the study proforma with special attention to mechanism of injury.
- Examination of other associated symptoms were based on history and clinical examination
- Cases suffering from basicervical neck of femur fracture.

**Statistical analysis**

Collected data was entered in Microsoft excel 2016 spread sheets. Qualitative data was expressed as rate and proportion while quantitative data was expressed as mean and standard deviation. The student 't' test was applied for comparison of means and chi square test was applied to compare the proportional data. P value < 0.05 was considered as significant.

**Results**

**Table 1: Distribution of the cases according to general characteristics**

	Group D	Group H	P-values LS
Age (Mean± SD)	61.76±9.56	61.28±8.53	0.702
Male : Female	2:23	6:19	0.462
Time interval between injury and surgery (days)	5.36±2.86	4.52±1.90	0.579
Mean duration of surgery	1.94±0.36	1.58±0.37	0.01
Mean blood loss	452.00±109.43	390.00±55.90	0.172

The mean  $\pm$ sd value for Group D is 61.76  $\pm$  9.56 and for Group H is 61.28  $\pm$  8.53. The p values found to be 0.702NS. The most cases found to be in 50 to 60 years of age for both the groups. There were no significant changes in terms of basic characteristics such as gender distribution (P = 0.462 NS). The Mean duration of surgery was 1.58 $\pm$ 0.37 and 1.94 $\pm$ 0.36hrs, for Hemiarthroplasty and DHS groups respectively. This table depicts the mean estimated blood loss was 452.00 $\pm$ 109.43 and 390.00 $\pm$ 55.90, in Hemiarthroplasty and DHS groups respectively, but no significant difference was observed.

**Table 2: Distribution of the cases according to displacement**

	Group D		Group H		Grand Total		p-values LS
	Number	%	Number	%	Number	%	
Un displaced#	1	4	0	0	1	2	0.053NS
Partially displaced#	8	32	2	8	10	20	
Displaced #	16	64	23	92	39	78	
Grand Total	25	100	25	100	50	100	

Chi-square = 5.856 with 2 degrees of freedom; P = 0.053NS

Groups were comparable according to displacement. Partially displaced# were observed 32 % in group D and 8% in group H.

**Table 3: Distribution of the cases according to post operative complications**

Post operative complications	Group D(N=25)		Group H(N=25)		Grand Total (N=50)		p-values LS
	Number	%	Number	%	Number	%	
Surgical Site infection	2	8	1	4	3	6	1.000NS

This table depicts the post operative complications in Hemiarthroplasty and DHS groups respectively, no significant difference was observed among the group. The Chi-square = 0.000 with 1 degree of freedom; p = 1.000. Surgical site infection was more in the DHS (8%) than hemiarthroplasty (4%) in study group.

**Table 4: Distribution of the cases according to clinical score (merle's d aubigne)**

		3m	6m	12m
		Group D	N	25
	Mean	15.48	15.80	15.80
	SD	1.36	1.66	1.66
Group H	N	25	25	25
	Mean	15.52	16.92	16.96
	SD	1.64	1.55	1.59
Total	N	50	50	50
	Mean	15.50	16.36	16.38
	SD	1.49	1.69	1.71
P Value LS		.925	.017S	.015S

This table depicts the distribution of the cases according to clinical score (merle's d aubigne) after 3 months, According to clinical score (merle's d aubigne) at 6m and 12 m Group H was better than group D.

**Table 5: Distribution of the cases according to clinical score (merle's d aubigne) average functional outcome at 3,6,12months**

	Group D	Group H	Group D	Group H	Group D	Group H
	3m		6m		12 m	
Excellent	6(24)	8(32)	5(20)	12(48)	6(24)	13(52)
Fair	8(32)	2(8)	8(32)	5(20)	8(32)	3(12)
Good	11(44)	13(52)	12(48)	8(32)	11(44)	9(36)
Poor	0(0)	2(8)	0(0)	0(0)	0(0)	0(0)
p-values LS	0.12NS		0.112NS		0.08NS	

This table depicts the distribution of the cases according to clinical score (merle's d aubigne) average functional outcome at 3,6,12 months. Score improved with the time.

## Discussion

Fracture neck of femur forms a major share of fractures in the elderly. Osteoporosis, comorbidities, increased incidence of trivial trauma increases the incidence and complicates the treatment of these fractures. The treatment goal is to return the patient to his or her pre-injury status of function as early as possible.

According to the distribution of the cases according to clinical score (merle's d aubigne). At 6m and 12 m Group H was better than group D.

Mue DD et al (2013)<sup>6</sup> observed that Post-operative hip functional status done according to Merle d Aubigne scoring system at 4 – 6 months postop revealed that patients mean hip score was 15±1(Good) and 17±1(Very Good) for Hemiarthroplasty and DHS groups respectively which was statistically significant (P=0.000) with 69.0% having satisfactory hip function {Very Good(23.0%) and Good(46.0%)} in the hemiarthroplasty group and 92.3% having satisfactory hip function {Excellent(65.4%), Very Good(15.4%), Good(11.5%)} in the DHS group.

In our study, the distribution of the cases according to according to clinical score (merle's d aubigne) average functional outcome at 3, 6, 12 months. Score improved with the time.

Mue DD et al (2013)<sup>6</sup> post-operative hip functional status done according to Postel and Merle d Aubigne scoring system at 4 – 6 months postop revealed that patients mean hip score was 15±1(Good) and 17±1(Very Good) for Hemiarthroplasty and DHS groups. respectively which was statistically significant (P=0.000) with 69.0% having satisfactory hip function {Very Good(23.0%) and Good(46.0%)} in the hemiarthroplasty group and 92.3% having satisfactory hip function {Excellent(65.4%), Very Good(15.4%), Good(11.5%)} in the DHS group. The use of DHS has been supported by biomechanical properties which improve the healing of fractures and the relatively well restored anatomy of the hip may account for superior restoration of function in the DHS study group. These results suggest that the use of DHS allows more patients to return to their previous level of activity. Daniel M et al(2015)<sup>7</sup> post-operative hip functional status according to Postel and Merle d Aubigne revealed that majority (66.6%) of patients had satisfactory hip function with displaced intracapsular fracture neck of femur treated with hemiarthroplasty.

## Conclusion

Hemiarthroplasty had a distinctly better condition than the internal fixation group, considering such as

- Estimated blood loss,
- Requirements for blood transfusion,
- Early mobilization with external support.
- Functional outcome.

This result suggests that Hemiarthroplasty may allow better restoration of function and should be favoured for treatment of fracture neck of femur in patients that meet the indications for surgery whenever the technical competence and facilities exist.

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