Original Research Article

COMPARISON OF FREQUENCY OF NON-UNION IN PATIENTS OF DISPLACED FRACTURE NECK OF FEMUR TREATED WITH DYNAMIC HIP SCREW VERSUS CANNULATED SCREW FIXATION

ABSTRACT

Femoral neck fracture are common presentation in orthopedic emergency and need urgent intervention with good outcomes.

OBJECTIVES: To compare frequency of non-union in patients of displaced neck of femur fracture in patients treated with dynamic hip screw versus cannulated screw fixation

MATERIAL AND METHODS: This Randomized control trial Study was conducted in the Department of Orthopedics and Trauma, Medical Teaching Institute Lady Reading Hospital Peshawar from April, 2022 till March, 2023 on 174 patients of either gender with age range 20-50 years, community ambulant having displaced neck of femur fracture (Garden type III and IV) presented within 3 days. Polytrauma patients with multiple fractures, Pathological femoral neck fracture and Open femoral neck fractures were excluded from the study. Patients were divided randomly in two equal groups using computer generated random numbers squares. Identical standard surgical techniques was adopted for dynamic hip screws and cannulated screw fixation. All surgeries were performed under general/spinal anesthesia on traction table and image intensifier. An adequate surgical incision was given in each group. Fracture was reduced under image intensifier with attainment of Garden index. Data was entered and analyzed by using SPSS version 22.

RESULTS: In our study 87 patients were enrolled in each group. Mean age was 35.33±10 years in group A and 34.2±8.5 years in group B. There were 52.9% males in group A and 58.6% in group B, females were 47.1% in group A and 41.4% in group B. Mean duration of fracture was 2.53±0.7 days in group A and 2.36±0.84 days in group B. Non-union was

present in 6.9% in dynamic hip screw group and 16.1% in cannulated screw group, p-value 0.05.

CONCLUSION: Dynamic hip screw has less non-union rate as compared to cannulated to cannulated screw.

KEY WORDS: Cannulated screw, Dynamic Hip Screw, Femur Neck Fracture, Hip Fracture, Fixation.

INTRODUCTION

"Femoral neck fractures are common fractures in the orthopedics department, and incidence of femoral neck fracture increased with the increase of population ages and traffic accidents. Previous study reported that for young adult patients, the incidence of femoral neck fractures amounted to 0.04%. However, the incidence for older patients is increase to 0.28~0.64%". [1] "Incidence is increasing worldwide together with the trend of population aging". [2] "Fractures of the femoral neck can occur in young healthy individuals due to high loads occurring during motor vehicle accidents, impacts, or falls. Failure forces are lower if impacts occur sideways onto the greater trochanter as compared with vertical loading of the hip". [3] "Various fixation devices have been reported for stabilization of femoral neck fractures. Numerous studies on arthroplasty versus internal fixation devices in the treatment of femoral neck fractures have been performed, but the optimal approach for internal fixation has not been analyzed". [4, 5, 6, 7] "The dynamic hip screw [DHS] technique, which uses a fixed-angle device, and the cannulated cancellous screw [CCS] technique are the two main fixation techniques for femur fractures". [8] "Cannulated compression screws are one of the most commonly used implants for the treatment of a fractured femoral neck, but are weak in terms

of anchorage and holding, especially in patients with osteoporosis. Loosening of the cannulated compression screws and compression of the fracture site can lead to femoral neck shortening and compromised hip function. Conversely, the DHS is a newly developed implant that has many advantages over the cannulated compression screw in terms of antirotation, cut-out, and anchorage". [9] "However, a clear consensus has not been reached regarding which fixation technique can be used as the optimal management". [10] One study found that in patients treated with dynamic hip screw non union was present in 3.1% cases while those treated with cannulated screw had 13.4% non-union rate. [8] The rationale of this study is that in our institution fracture neck of femur is surgically managed as per individual consultant preference and surgical expertise. Our study will help us to formulate standard guidelines for fracture neck of femur

OBJECTIVE: To compare frequency of non-union in patients of displaced neck of femur fracture in patients treated with dynamic hip screw versus cannulated screw fixation

MATERIALS AND METHODS:

This Randomized control trial Study was conducted in the Department of Orthopedics and Trauma, Medical Teaching Institute Lady Reading Hospital Peshawar from April, 2022 till March, 2023 on 174 patients of either gender with age range 20-50 years, community ambulant having displaced neck of femur fracture (Garden type III and IV) presented within 3 days. Polytrauma patients with multiple fractures, Pathological femoral neck fracture and Open femoral neck fractures were excluded from the study.

After approval from hospital ethical board, patients fulfilling the inclusion criteria was enrolled from indoor of orthopedic department of LRH. A written informed consent was taken after explaining the purpose of study. Demographic data including age, gender, diabetes, hypertension, smoking and obesity was noted. Complete history was taken and physical examination was done. Baseline labs including CBC, LFT, RFT, serum electrolyte

and chest x ray was done for general anesthesia fitness. Patients were divided randomly in two equal groups using computer generated random numbers squares. Identical standard surgical techniques was adopted for dynamic hip screws and cannulated screw fixation. All surgeries were performed under general/spinal anesthesia on traction table and image intensifier. An adequate surgical incision was given in each group. Fracture was reduced under an image intensifier with attainment of Garden index[10].

Data was entered and analyzed by using SPSS version 22.0. Mean and standard deviation was calculated for quantitative variables like age and duration of fracture. Frequency and percentage was calculated for categorical variables like gender and non-union. Non-union in both groups was compared using chi square test, p- value ≤ 0.05 was taken as statistical significant. Effect modifiers like age, gender, duration of diseases, diabetes, hypertension, smoking and obesity was addressed through stratification of data. Post stratification chi square was applied. P value ≤ 0.05 was taken as statistical significant.

RESULTS:

Total 174 patient were enrolled in the current study which has divided in two groups. In each group 87 patients were enrolled. Mean age was 35.33±10 years in group A and 34.2±8.5 years in group B There were 52.9% males in group A and 58.6% in group B, females were 47.1% in group A and 41.4% in group B Mean duration of fracture was 2.53±0.7 days in group A and 2.36±0.84 days in group B Non-union was present in 6.9% in dynamic hip screw group and 16.1% in cannulated screw group, p-value 0.05(Table 1-4). Data stratification was done for age groups, gender, duration of fracture, diabetes, hypertension, smoking and obesity (Table 5,6,7,8,9,10 and 11).

Table 1: Age of sampled population

	Group	N	Mean	Std. Deviation	Std. Error Mean	p-value
Age (Years)	Group A (Dynamic hip screw)	87	35.33	10.023	1.075	0.427
	Group B (Cannulatedscrew)	87	34.21	8.584	.920	

Table 2: Gender distribution

			Gender		Total
			Male	Female	
Group	Group A (Dynamichip screw)	Count	46	41	87
		% within Group	52.9%	47.1%	100.0 %
	Group B (Cannulated screw)	Count	51	36	87
		% within Group	58.6%	41.4%	100.0 %
p-value 0.445					

Table 3: Mean duration of fracture

	Group	N	Mean	Std. Deviation	Std. Error Mean	p-value
Duration (Days)	Group A (Dynamic hip screw)	87	2.53	.760	.081	0.160
	Group B (Cannulatedscrew)	87	2.36	.849	.091	

Table 4: Comparison of frequency of non-union in bothgroups

			Non-union		Total
			Yes	No	
Group	Group A (Dynamichip screw)	Count	6	81	87
		% within Group	6.9%	93.1%	100.0 %
	Group B (Cannulated screw)	Count	14	73	87
		% within Group	16.1%	83.9%	100.0 %
p-value 0.05					

Table 5: Data stratification for frequency of non-union in bothgroups and age group

Age groups				Non-union		Total	p-value
				Yes	No		
20-35 years	Group	Group A (Dynamic hip screw)	Count	4	45	49	0.90
			% within Group	8.2%	91.8%	100.0 %	
		Group B (Cannulatedscrew)	Count	4	41	45	
			% within Group	8.9%	91.1%	100.0 %	
	Total		Count	8	86	94	
			% within Group	8.5%	91.5%	100.0 %	
36-50 years	Group	Group A (Dynamic hip screw)	Count	2	36	38	0.02
			% within Group	5.3%	94.7%	100.0 %	
		Group B (Cannulatedscrew)	Count	10	32	42	
			% within Group	23.8%	76.2%	100.0 %	
	Total		Count	12	68	80	
			% within Group	15.0%	85.0%	100.0 %	

Table 6: Data stratification for frequency of non-union in bothgroups and gender

Gender				Non-union		Total	p-value
				Yes	No		
Male	Group	Group A (Dynamic hip screw)	Count	4	42	46	0.296
			% within Group	8.7%	91.3%	100.0 %	
		Group B (Cannulated screw)	Count	8	43	51	
			% within Group	15.7%	84.3%	100.0 %	
	Total		Count	12	85	97	
			% within Group	12.4%	87.6%	100.0 %	
Female	Group	Group A (Dynamic hip screw)	Count	2	39	41	0.091
			% within Group	4.9%	95.1%	100.0 %	
		Group B (Cannulated screw)	Count	6	30	36	
			% within Group	16.7%	83.3%	100.0 %	
	Total		Count	8	69	77	
			% within Group	10.4%	89.6%	100.0 %	

Table 7: Data stratification for frequency of non-union in bothgroups and duration of fracture

Duration				Non-union		Total	p-value
				Yes	No		
Equal to or less than 2days	Group	Group A (Dynamic hip screw)	Count	2	25	27	0.101
			% withinGroup	7.4%	92.6%	100.0 %	
		Group B (Cannulated screw)	Count	8	27	35	
			% withinGroup	22.9%	77.1%	100.0 %	
	Total		Count	10	52	62	
			% withinGroup	16.1%	83.9%	100.0 %	
More than2 days	Group	Group A (Dynamic hip screw)	Count	4	56	60	0.367
			% withinGroup	6.7%	93.3%	100.0 %	
		Group B (Cannulated screw)	Count	6	46	52	
			% withinGroup	11.5%	88.5%	100.0 %	
	Total		Count	10	102	112	
			% withinGroup	8.9%	91.1%	100.0 %	

Table 8: Data stratification for frequency of non-union in bothgroups and diabetes

Diabetes				Non-union		Total	p-value
				Yes	No		
Yes	Group	Group A (Dynamic hip screw)	Count	2	21	23	0.413
			% within Group	8.7%	91.3%	100.0 %	
		Group B (Cannulatedscrew)	Count	4	20	24	
			% within Group	16.7%	83.3%	100.0 %	
	Total		Count	6	41	47	
			% within Group	12.8%	87.2%	100.0 %	
No	Group	Group A (Dynamic hip screw)	Count	4	60	64	0.083
			% within Group	6.2%	93.8%	100.0 %	
		Group B (Cannulatedscrew)	Count	10	53	63	
			% within Group	15.9%	84.1%	100.0 %	
	Total		Count	14	113	127	
			% within Group	11.0%	89.0%	100.0 %	

Table 9: Data stratification for frequency of non-union in bothgroups and hypertension

Hypertension				Non-union		Total	p-value
				Yes	No		
Yes	Group	Group A (Dynamichip screw)	Count	4	21	25	0.897
			% within Group	16.0%	84.0%	100.0 %	
		Group B (Cannulatedscrew)	Count	4	19	23	
			% within Group	17.4%	82.6%	100.0 %	
	Total		Count	8	40	48	
			% within Group	16.7%	83.3%	100.0 %	
No	Group	Group A (Dynamichip screw)	Count	2	60	62	0.018
			% within Group	3.2%	96.8%	100.0 %	
		Group B (Cannulatedscrew)	Count	10	54	64	
			% within Group	15.6%	84.4%	100.0 %	
	Total		Count	12	114	126	
			% within Group	9.5%	90.5%	100.0 %	

Table 10: Data stratification for frequency of non-union inboth groups and smoking

Smoking				Non-union		Total	p-value
				Yes	No		
Yes	Group	Group A (Dynamic hip screw)	Count	6	27	33	0.312
			% within Group	18.2%	81.8%	100.0 %	
		Group B (Cannulatedscrew)	Count	4	36	40	
			% within Group	10.0%	90.0%	100.0 %	
	Total		Count	10	63	73	
			% within Group	13.7%	86.3%	100.0 %	
No	Group	Group A (Dynamic hip screw)	Count	0	54	54	<0.001
			% within Group	0.0%	100.0 %	100.0 %	
		Group B (Cannulatedscrew)	Count	10	37	47	
			% within Group	21.3%	78.7%	100.0 %	
	Total		Count	10	91	101	
			% within Group	9.9%	90.1%	100.0 %	

Table 11: Data stratification for frequency of non-union inboth groups and obesity

Obesity				Non-union		Total	p-value
				Yes	No		
Yes	Group	Group A (Dynamic hip screw)	Count	6	38	44	0.931
			% within Group	13.6%	86.4%	100.0 %	
		Group B (Cannulatedscrew)	Count	6	36	42	
			% within Group	14.3%	85.7%	100.0 %	
	Total		Count	12	74	86	
			% within Group	14.0%	86.0%	100.0 %	
No	Group	Group A (Dynamic hip screw)	Count	0	43	43	0.004
			% within Group	0.0%	100.0 %	100.0 %	
		Group B (Cannulatedscrew)	Count	8	37	45	
			% within Group	17.8%	82.2%	100.0 %	
	Total		Count	8	80	88	
			% within Group	9.1%	90.9%	100.0 %	

DISCUSSION

"Femoral neck fractures are common fractures in the orthopedics department, and incidence of femoral neck fracture increased with the increase of population ages and traffic accidents. Previous study reported that for young adult patients, the incidence of femoral neck fractures amounted to 0.04%. However, the incidence for older patients is increase to 0.28~0.64%". [11] In the past, due to the limited treatment methods for femoral neck fracture, it has been considered as "unresolved fracture". Previous studies reported that femoral neck fractures are associated with complications such as avascular necrosis (AVN), non-union, implant failure/revision, and even death. [12] There are many options to treat femoral neck fracture. Previous studies reported that femoral neck fractures with following surgery are associated implant failure. Multiple cannulated screws (CS) and dynamic hip screw (DHS) are widely used for non-displaced or young patients. CS has better biomedical properties such as antirotation and less invasive, which was widely used in nondisplaced intracapsular fractures. DHS could maintain the neck-shaft angle and anatomical reduction, which is helpful 78 for fracture fixation. Yih-Shiunn L reported that DHS has a higher rate of overall success when compared to the MCS group. [13] However, a recent study showed no significant difference between two treatments on rates of revision surgery and complications. [14] This study was done to determine frequency of non-union in cannulated and dynamic hip screw fixation In our study 87 patients were enrolled in each group. Mean age was 35.33±10 years in group A and 34.2±8.5 years in group B. There were 52.9% males in group A and 58.6% in group B, females were 47.1% in group A and 41.4% in group B. Mean duration of fracture was 2.53±0.7 days in group A and 2.36±0.84 days in group B. Non-union was present in 6.9% in dynamic hip screw group and 16.1% in cannulated screw group, p-value 0.05. Our results were similar to other local and international studies in literature. One

study found that in patients treated with dynamic hip screw non-union was present in 3.1% cases while those treated with cannulated screw had 13.4% nonunion rate. [8] In a study by Chen et al. [15] Eighty-six 79 patients with femoral neck fractures were treated by closed reduction internal fixation with a DHS-BLADE (n = 42; 18 males and 24 females; mean age: 56.3 years (37–87)) or cannulated compression screws (n = 44; 20 males and 24 females; mean age: 53.8 years (26–83)), dynamic hip screw has low non-union rate as compared to cannulated screw fixation 0% versus 4.2%. In a study by Gupta adults (16–60 years) with femoral neck fracture were divided into Group 1 fixed with DHS and Group 2 fixed with three CCS after closed reduction, Group 1 (n = 40) achieved radiological union at mean of 7.6 month and in group 2 union at 7.1 months. They reported non-union rate in dynamic hip screw versus cannulated screw fixation non-union rate as 12.5%versus 17.5%. [16] In another study sixty-two skeletally mature patients (age range, 16-60 years) with displaced femoral neck fractures were included in the study. Forty-seven were treated with a dynamic hip screw and 15 with multiple cancellous screws placed in a Pauwel configuration. Nonunion rate was 19.1% in dynamic hip screw fixation and 26.6% in cannulated screw fixation after femur neck fracture[17]. Yih-Shiunn L [13] retrospectively studied eighty-four elderly 80 patients (> 60 years) with undisplaced intracapsular femoral neck fractures treated with osteosynthesis with either dynamic hip screws (DHS) or multiple cannulated screws (MCS). Both groups were similar in respect of injury mechanisms, gender and age (all p values ≥ 0.29). However, the DHS group had a higher rate of overall success when compared to the MCS group (97.5% versus 84.1%, p=0.04). All these studies validate results of our study.

CONCLUSION

Fracture neck of femur is a challenge for surgeon in term of union but the current study proved that Dynamic hip screw has low non-union rate as compared to cannulated screw fixation after femur neck fracture.

Consent

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

Ethical Approval:

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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