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To assess and compare the functional outcome in patient operated as BDSF Vs conventional method in fracture neck of femur.

[1]Dr. R. L. Dayma, Sr. Professor & Unit Head, Department of Orthopaedics, Sawai Man Singh Medical College & Attached Group of Hospitals, Jaipur, Raj.

[2]Dr. Shankar Lal, Resident Doctor, Department of Orthopaedics, Sawai Man Singh Medical College & Attached Group of Hospitals, Jaipur, Raj.

[3]Dr. H L Dhawan, Assistant professor, Department of Orthopaedics, Sawai Man Singh Medical College & Attached Group of Hospitals, Jaipur, Raj.

[4]Dr. Pradeep Singh, Resident Doctor, Department of Orthopaedics, Sawai Man Singh Medical College & Attached Group of Hospitals, Jaipur, Raj.

Corresponding Author: Dr. Shankar Lal, Resident Doctor, Department of Orthopaedics, Sawai Man Singh Medical College & Attached Group of Hospitals, Jaipur, Raj.

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Abstract

Background: Hip fractures are common and these comprise about 20% of the operative workload for orthopaedic trauma. Lifetime risk of sustaining hip fracture is high and lies within a range of 40% to 50% in females and 14% to 22% in males. Femoral neck fractures almost account for 50% of all the fractures around hip. As the Life expectancy is increasing throughout the world, the demographic changes are causing the hip fractures incidence also to increase.

Methods: This study was conducted in the Department of Orthopaedic , S.M.S Medical College and attached group of hospitals, Jaipur with due permission from the institutional ethical committee and review board and after taking written informed consent from the patient .

Results: In BDSF method we obtained 87.5% good results as compare to 75% in CONVENTIONAL method.

Conclusion: In conclusion, BDSF cannulated screw fixation little bit better option of treatment for neck of femur fracture then conventional method but it take more operative time, more radiation exposure than conventional method.

Keywords: BDSF, Conventional, Femur.

Introduction

Hip fractures are common and these comprise about 20% of the operative workload for orthopaedic trauma. Lifetime risk of sustaining hip fracture is high and lies within a range of 40% to 50% in females and 14% to 22% in males. Femoral neck fractures almost account for 50% of all the fractures around hip. As the Life

expectancy is increasing throughout the world, the demographic changes is causing the hip fractures incidence also to increase [1] .The worldwide incidence of femoral neck fractures has continued to increase from an estimated 1.3 million hip fractures in 1990, which is predicted to rise 2.5 million by 2025 and 4.5 million by 2050, assuming there is no age specific increase.(2;3)

There are several option for treating femoral neck fracture in younger age group including traditional solid screw, cannulated cancellous screw and sliding hip screw. Use of three parallel cannulated cancellous screw in “inverted triangle” orientation is considered the treatment of choice[4] because of adequacy of fracture reduction and subsequent stable fixation.

There result clearly show that the triangular configuration had a higher peak load, less displacement and more energy absorption then other configuration. Since the screw are inserted close to each other with entry points near the thin cortex at the base of greater trochanter, they may not be able to withstand anterioposterior bending and varus stress especially in osteoporotic patients.[4]

To overcome this problem, filipov devised a method of biplane double supported screw fixation (BDSF) in which the two screw are laid in two planes, which make it possible for entery points of middle and distal screw to be placed in distal solid cortex of proximal diaphysis, the distal screw is placed in the dorsal oblique plane while the middle and proximal screws are inserted in ventral oblique plane. BDSF method use two calcar buttressed screw as position achieved by distal as well as the middle screw, in view of statics, turn them in to a simple beam with an overhanging end,loaded with a vertical force. This beam with an overhanging end succesfully supports the head fragment, bearing the body weight and transferring it to the diaphysis.[5]

The new method of Biplane double-supported screw fixation (BDSF) increases the fixation strength by its innovative concept of biplane positioning of the three screws, which makes it possible for the screws to be placed at an increased angle, so they to lean on two solid supporting points[4]. The BDSF-method has two calcar-buttressed implants. The distal screw touches on the calcar in the lateral part of the femoral neck, and also in the middle part of the femoral neck this screw has a cortical support on the posterior cortex of the neck. The middle screw touches on the calcar in the middle part of the neck.

Material And Methods

- **Study design:** Hospital based, randomized, comparative, prospective, interventional study.
- **Study universe:** Patient who met the inclusion criteria and report at department of Orthopaedic, SMS Hospital, Jaipur were participants.
- **Study Place :** This study was conducted in the Department of Orthopaedic , S.M.S Medical College and attached group of hospitals, Jaipur with due permission from the institutional ethical committee and review board and after taking written informed consent from the patient .
- **Study duration:** in our study operative cases were included from april 2018 to may 2019 and follow up was done up to nov. 2019.
- **Data analysis:** data analysis were complied in MS Excel, Primer, and SPSS software. Those were presented in tables and graphs wherever applicable. Data were analysed as per objectives. Inferences were drawn with the help of appropriate of significance.

Sample size: Sample size was calculated as 95%confidence level ,@ error of 0.05% assuming excellent functional outcome as per harris hip score as 60.4% and 23.07%in 2 group of fracture neck of femur patient as per reference article, in bdsf method and conventional method . Study power of 80%required sample size will be 32 cases of femoral neck fracture in each groups.

Inclusion criteria

- Fracture neck of femur only treated by crif by cc screw.
- Patient age 18-60 years.
- Patients meeting all the prerequisites for BDSF and CONVENTIONAL SCC method.
- Patient should be medically fit with consent.

Exclusion Criteria

- Fracture neck of femur which operated by open reduction.
- Patient multiple injuries with fracture neck of femur.
- Refusal of patient being a part of study.

Observations

Table 1: Age Incidence

Age (yrs.)	Group A		Group B		Total	
	No	%	No	%	No	%
20 to 30	8	25	10	31.25	18	28.12
31 to 50	22	68.75	20	62.50	42	65.62
51-60 year	2	6.25	2	6.25	4	6.25
Total cases	32	100.00	32	100.00	64	100.00
Mean ± SD	38.06		37.03		37.54	

Mean age of group A is 38.06 years and mean age of group B is 37.03 years.

Table 2: Distribution of the cases according to gender

Sex	Group A		Group B	
	No	%	No	%
Male	24	75	23	72
Female	8	25	9	28
Total	32	100.00	32	100.00

Chi-square = 0.049 with 1 degree of freedom; P = 0.814

Out of 64 cases 47were males and 17 were females. Male to female ratio is about 5:2. Fracture neck femur in young adults mainly occurs due to high energy trauma like RTA as the males are more involved in to outdoor activity compared to female so chance of accidents are more.

Table no. 3: Type of fracture and their result in BDSF Procedure

BDSF Cases # Type	Total Case	Excellent	Good	Fair	Poor
Type 1	4	3	1		
Type 2	10	3	7		
Type 3	15	1	10	3	1
Type 4	3	0	2	1	

Table No. 4: Fracture type and their results in conventional method

scc method # type	Total Case	Excellent	Good	Fair	Poor
Type 1	3	2	1	0	0
Type 2	12	3	9	0	0
Type 3	14	0	9	3	2
Type 4	3	0	1	1	1

Table No. 5: Functional result on basis of HHS

	Group A		Group B		Total	
	No	%	No	%	No	%
Excellent	7	22	5	16	12	19.00
Good	21	66	19	59	40	62.50
Fair	3	9	5	16	8	12.50
Poor	1	3	3	9	4	6.00
Total Cases	32	100	32	100	70	100

Chi-square= 1.933 with 3 degrees of freedom; P-value 0.802

Out of 32cases of group A ,7 cases (22%) had excellent, 21(66%) had good, 3(9%) had fair and 1case (3%) had poor results.

In group B, 5 cases (16%) had excellent, 19 cases (59%) had good and 5 cases (16%) had fair results and 3cases (9%) had poor results.

Table No. 6: Functional result on basis of HHS

	Group A		Group B		Total	
	No	%	No	%	No	%
Excellent	7	22	5	16	12	19.00
Good	21	66	19	59	40	62.50
Fair	3	9	5	16	8	12.50
Poor	1	3	3	9	4	6.00
Total Cases	32	100	32	100	70	100

Chi-square= 1.933 with 3 degrees of freedom; P-value 0.802

Table No. 7: Radiological Assessment

	Group A		Group B		Total	
	No	%	No	%	No	%
Non Union	1	3.2%	3	9.4	4	6
Union	31	96.8%	29	90.6	60	94
	32	100.00	50	100.00	100	100.00

Chi square0.267 with 1 degree of freedom ; p value 0.606

Out of 32 cases of group A of BDSF method, 31 were united and 01 case gone into non-union. Average period of union was 4 month. In 32 cases of group B of simple CCS fixation, 29 cases union seen after 6 months of follow-up. 3 cases gone to non-union Average period of union was 4.5 month.

Discussion

The femoral neck fracture is continues to be unsolved fractures and the guidelines for management are still evolving. Non-union and Osteonecrosis of the femoral head are the two most common and challenging complications. Initial fracture displacement and disruption of the femoral head blood flow are contributing factors that are out of the surgeon's control. However, there are multiple other factors under the surgeon's control that can minimize and prevent these complications. The key factors in treating femoral neck fractures should do early diagnosis, early surgery, anatomic reduction, and stable internal fixation. Cannulated screw fixation is a widely accepted surgical method for management of fractures of the neck of femur in younger age group. Many time different study were evaluated the influence of different screw position on stability of fixation in femoral neck fracture.

In this comparative study 64 cases of fracture neck of femur who were treated by Internal Fixation with

Cannulated Cancellous Screws operated as BDSF in group A and CONVENTIONAL method in group B are operated using 6.5mm AO Cannulated Cancellous Screws, were followed up and functional outcomes were analysed and discussed.

It was a hospital based, randomised, comparative and prospective study and total of 32patients were studied in each group. Follow up period in our study was maximum 14 month and minimum 6 month.

Age of the patients varied from 20 to 60 years. Most of cases were in 3rd and 4th decade with mean age of 38.06 years for group A and 37.03 years for group B. In younger age group, RTA is most common cause while in 5th and 6th decade may be due to osteoporotic bone, fall is most common cause.

Table no. 8 Age distribution comparison

Study	No. of cases	Mean age (in years)
Vijay V et al. [6]	25	50 (20-90)
Dincel Y M et al. [7]	67	46.5 (18-75)
Christopher Koo Chee Han et al. [8]	53	42.1 (6-91)
Present study	32	37.5 (20-55)

Out of 64 cases 47were males and 17were females (Table No. 2) .Male to female ratio is about 5:2. Male patient have more involvement its due to more outdoor activity.

Table 9: Sex distribution comparison

Study	No. of male: female	Male: Female
Vijay V et al.[6]	30:34	2.57:1
Dincel Y M et al.[7]	39:28	1.3:1
Christopher Koo Chee Han et al.[8]	39:14	2.7:1
Present study	47:17	2.76:1

Out of 64 cases 45were due to RTA, 19 patients were due to slip and fall on ground (Table No. 3), most common mode of injury was history of fall in 5th to 6th decade and RTA is more common in young patients.

The clinical outcomes were graded according to Harris Hip Score, radiological examination and patients own satisfaction. Out of 32cases of group A , 7 cases (22%) had excellent, 21(66%) had good, 3(9%) had fair and 1case (3%) had poor result In group B, 5 cases (16%) had excellent, 19 cases (59%) had good and 5 cases (16%) had fair results and 3cases (9%) had poor results.so it show that BDSF technique have better results than conventional method but statically not significant as p-value more than .05.

Table10: Harris Hip score result compare with other study

Results	Excellent		Good		Fair		Poor	
	BDSF	SCCS	BDSF	SCCS	BDSF	SCCS	BDSF	SCCS
Orlin filipov[9]	60.4%	-	17.1%	-	10.1%	-	11.6%	-
In our study	22%	16%	66%	59%	9%	16%	3%	9%

Group A had 9% (3 cases)complication rate and group B had 12%(4 cases). In study group A, 1 case of intaoperatively break of guide wire was found, 1 case of loosened screws and 1 case of nonunion was present in follow up period.

In study group B, 1 case have breakage of guide wire intraoperativaly, 1 case of loosened screw with nonunion, 1 case of breakage of screw with nonunion and 1case of non-union without any fixation failure was found. In 54 cases (who were followed for 8 to 14 month) of both group, 1 case of AVN in group A and 1 case in group B were reported.

The possible cause of non-union in our study was seems to be displaced fracture, delayed surgery and osteoporotic bone in 5th to 6th decade age group.

Table11: Union rate compare to other study

Various Study	BDSF Method	SCC Method
Orlin filipov 2017 et al[9]	96.60%	
Dr varun vijay et al[6]		96%
Khoo CCH et al		98%
In our study	96.8%	90.6%

Conclusion

In conclusion, BDSF cannulated screw fixation little bit better option of treatment for neck of femur fracture then conventional method but it take more operative time, more radiation exposure than conventional method.

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