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Fracture Nof Treatment By Bdsf

(*THE BEAM EFFECT*)

(A Case Series)

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ABSTRACT

Introduction

Conventionally, neck of femur fractures have been treated with cannulated cancellous screws in an inverted triangle or parallel fashion using the lag principal. In the biplanar double-supported screw system, two screws are medially calcar buttress and among it one of the cannulated cancellous screw is positioned in obtuse angle taking purchase in the diaphysis(lateral column) and in the far end over the femorale calcar as beam with a over hang at the end(head of femur).

Material and Methods

In the present study which took place in the Department of Orthopaedics, Sri Lakshmi Narayana Institute of Medical Sciences, Pondicherry from December 2022 to April 2024 we have taken data of 56 patients. In this prospective study according to inclusion and exclusion criteria patient above age of 18 yrs male and female both group were included with a follow up of 6 months. All fractures after fitness with in 48 hours were treated with BDSF(Biplanar Double Support Screw Fixation) method which is supported by two calcar buttress and one among it an obtuse angled screw with the diaphyseal cortical bone support on the lateral column thus following the beam principal which can bear large forces acting on hip during weight bearing .Our aim is to get better functional outcome clinically as well as radiologically.

Results

In this Study duration: December 2022 to April 2024 we operated Total cases 56 in which there were minimal Complication so far in one and half year . All patient full weight bearing with out collapse with Mean age of patients is 42yrs, youngest 18 yrs and oldest 67yrs. Harris hip score is 92 mean at 6 months.

Conclusion

According to our study comparing with conventional cannulated cancellous (CC) screw fixation with biplane double-supported screw fixation (BDSF) for treating femoral neck fractures, we observed that there is no supratrochanteric collapse or shortning with early weight bearing with in one and half month and radiological union was also seen by the end of 6 wks using BDSF CC screw fixation.

Introduction

Internal fixation of femoral neck fractures has been debated for several decades. Although parallel oriented cannulated screws are frequently used, such a fixation is associated with poor outcomes in up to 46% of the clinical cases.[3] On the basis of recent clinical evidence and experimental results, the novel method of biplane double-supported screw fixation (BDSF) was introduced and deemed to improve substantially the stability of cannulated screws osteosynthesis by implementation of an innovative biomechanical concept.[4]It is associated with up to 44% higher axial fixation strength in vitro compared with conventional parallel screw fixation (CFIX) and a bone union rate of up to 96.6% in the clinical practice, being much higher compared with the latter.[4] The concept of biplane positioning facilitates positioning of three medially diverging cannulated screws in steeper angles to the diaphyseal axis. Two of the screws are with entry points within the thicker cortex of the proximal diaphysis to improve their beam function and lateral cortical support . Moreover, two screws are calcar buttressed with different inclination angles in the coronal plane, whereas one of them is additionally supported on the posterior femoral neck cortex. Thus, constant fixation strength is provided during various patient activities, and immediate full weight bearing is possible after surgery for patients also older than 55 years.[1,2]

- Hip fractures are common and comprise 20% of the operative workload of an orthopedic trauma unit. Intracapsular femoral neck fractures account for 50% of all hip fractures.
- The estimated annual cost of treating these fractures is enormous and a significant burden to any health care system.
- The concept of biplanar fixation was introduced to decrease the cost of surgical expenses and early mobilization of the patients
- Biplanar positioning entails positioning of three medially diverging cannulated screws in steeper angles to the diaphyseal axis.

Materials and Methods

- Here we have taken data of 56 individuals who suffered from # nof and treated with the NOVEL BDSF method from
- Study design : Prospective Study
- Study Setting : Department of Orthopaedics, SLIMS PUDUCHERRY
- Study duration : APRIL 2023 to OCTOBER 2024

Technique

- The BDSF-method has three screws in which two are calcar-buttressed implants
- BDSF increases the fixation strength by its noval concept of biplane positioning of the three screws, which makes it possible for the screws to be placed at an increased angle, so they lean on two solid supporting points
- The screw, placed at a highly increased angle, works in a direction close to the direction of the loading force, which guarantees better results for the screw in its role of a beam because of the influence of its sagging decreases
- Distal screw is touched on the posterior cortex, which together with the highly increased angle of this screw, provides improved strength of fixation at antero-posterior bending of the neck,

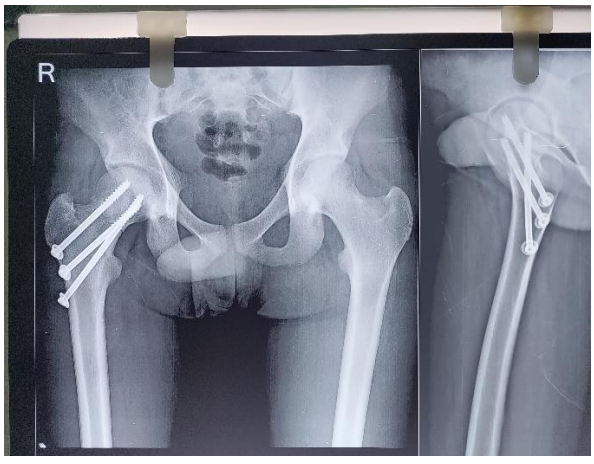
Screw placement:

- First screw goes in posterior half and is calcar buttressed and directed antero inferior in the head.
- Second screw one come above it parallel and is directed antero superior in the head.
- Third is the obtuse angled 150 TO 160 degree placement of the screw which is placed in the diaphysis well below with cortical bone entry in the middle third of the diaphyseal bone with calcar buttress directed postero superior in the head.

CASE SCENARIO

Case 1:- Pre operative picture

Case 1:- Pre Operative x ray

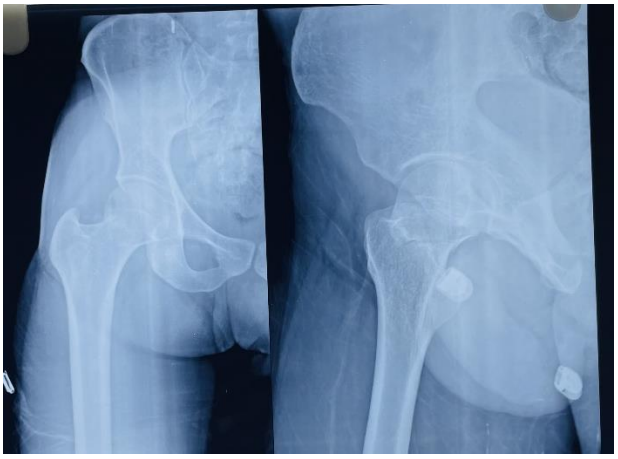


Case 1:- Post Operative x ray

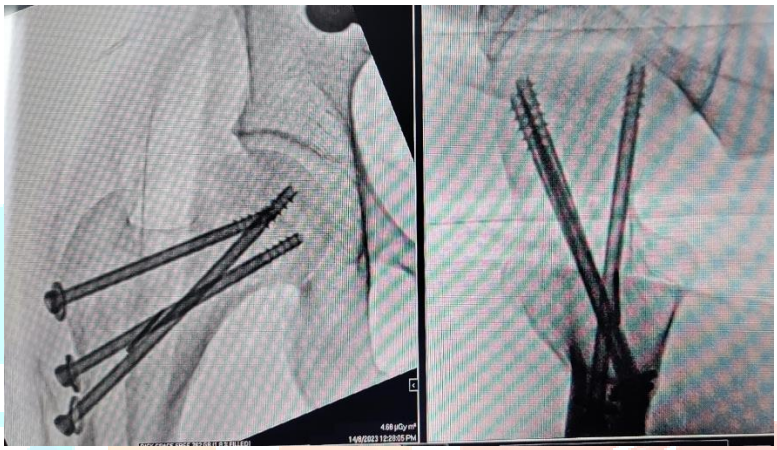
Case 1:- 6 months post operative x ray

Case 1:-Function at 6 months

Case 2:- Pre Operative Picture



Case 2:- Pre operative x ray



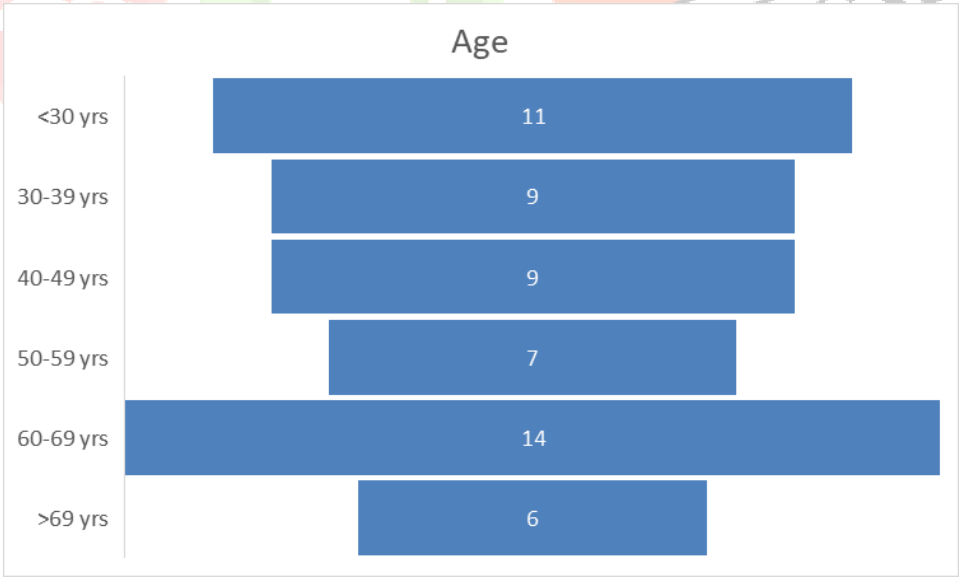
Case 2:- Post operative x ray

Case 2:- 6 months post op x ray

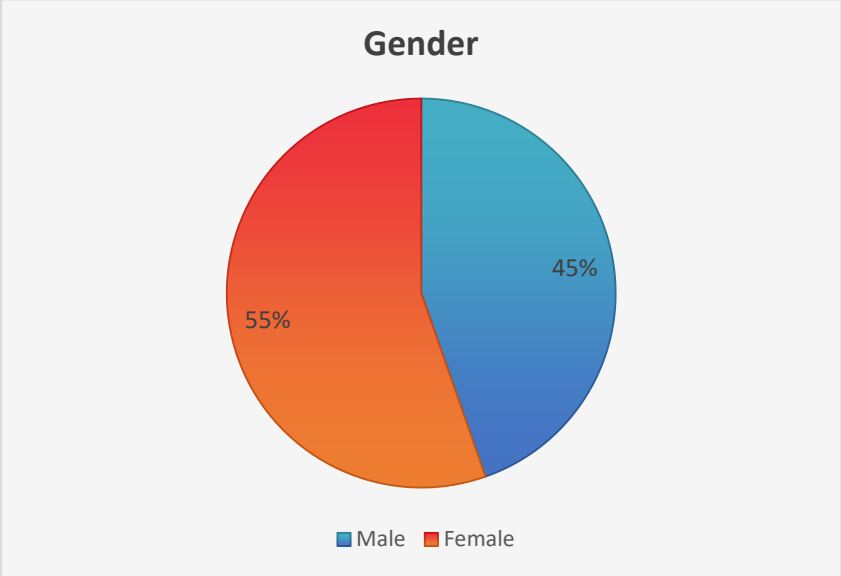
Case 2 Functional outcome at 6 months

Age Distribution

Age	Frequency	Percent
<30 yrs	11	19.6
30-39 yrs	9	16.1
40-49 yrs	9	16.1
50-59 yrs	7	12.5
60-69 yrs	14	25.0
>69 yrs	6	10.7
Total	56	100.0



Gender



Classification

	Garden Classification	Pauwels Classification
Type I	7 (12.50%)	12 (21.43%)
Type II	15 (26.79%)	28 (50.00%)
Type III	34 (60.71%)	16 (28.57%)
Total	56 (100.00%)	56 (100.00%)

Outcome

In our current study, the Harris Hip Score (HHS) showed a steady improvement over time, starting with moderate functional status at 79.04 ± 8.45 postoperatively. It increased to 81.23 ± 7.14 by two weeks, reaching 84.02 ± 5.92 at four weeks, and reaching 87.98 ± 5.91 by eight weeks, 89.95 ± 5.92 at 16 weeks, and 91.91 ± 5.93 at 24 weeks, indicating near-optimal recovery. Filipov et al. (2017) [4] in a large prospective study of 207 patients treated with the **bi-planar double-supported screw fixation (BDSF)** technique, the **mean HHS reached 86.2,** with most patients achieving **good to excellent outcomes.** The study emphasized the method's ability to allow immediate full weight-bearing and secure fixation for displaced fractures. **Sami et al. (2022)[5]** study focused on 27 patients treated with the BDSF method and tracked their **HHS over time**. It showed a **steady improvement**, with the **mean HHS reaching 94.8 at 12 months** and a **union rate of 92.6%,** supporting the long-term effectiveness of the technique.

In our current study, the Harris Hip Score (HHS) showed significant improvement postoperatively, reaching 91.91 ± 5.93 at 24 weeks, indicating substantial improvement in hip function. The mean VAS score, initially severe, decreased to 2.02 ± 2.21 by 24 weeks, indicating mild pain, a statistically significant decrease in pain levels over time. Both measures indicate substantial improvement in hip function over time.In a study by Vijay and Srivastava (2016)[6], **72% of patients had excellent outcomes** on HHS and only 4% had poor results after fixation. Naik et al. (2022) [7]reported **75% excellent and 10% good HHS** scores, showing clear progressive functional improvement. Gupta et al. (2022) [8] showed that the **mean HHS was significantly better in the Femoral Neck System (FNS) group** than in the CC screw group, but CC screw still showed consistent functional gains. Khan et al. (2022)[9] found that **89.6% had satisfactory HHS outcomes,** regardless of surgery timing.

HHS:-

HHS	Group	N	Mean ± SD
Post OP	Good	50	79.18 ± 8.66
	Moderate	3	77.67 ± 9.07
	Poor	3	78.00 ± 6.24
	Total	56	79.04 ± 8.45
2 Weeks	Good	50	81.36 ± 7.35
	Moderate	3	80.00 ± 7.21
	Poor	3	80.33 ± 4.73
	Total	56	81.23 ± 7.14
4 Weeks	Good	50	84.00 ± 6.02
	Moderate	3	84.00 ± 7.21
	Poor	3	84.33 ± 4.73
	Total	56	84.02 ± 5.92
8 Weeks	Good	50	88.00 ± 6.02
	Moderate	3	88.00 ± 7.21
	Poor	3	87.67 ± 4.51
	Total	56	87.98 ± 5.91
16 Weeks	Good	50	90.00 ± 6.02
	Moderate	3	90.00 ± 7.21
	Poor	3	89.00 ± 4.58
	Total	56	89.95 ± 5.92
24 Weeks	Good	50	92.00 ± 6.02
	Moderate	3	92.00 ± 7.21
	Poor	3	90.33 ± 4.93
	Total	56	91.91 ± 5.93

VAS:-

VAS	Group	N	Mean ± SD
During Movement	Good	50	7.72 ± 3.02
	Moderate	3	4.33 ± 1.53
	Poor	3	7.33 ± 4.62
	Total	56	7.52 ± 3.09
Post OP	Good	50	7.30 ± 2.94
	Moderate	3	5.67 ± 3.79
	Poor	3	6.67 ± 4.04
	Total	56	7.18 ± 3.00
2 Weeks	Good	50	6.90 ± 2.78
	Moderate	3	6.00 ± 2.65
	Poor	3	4.00 ± 1.73
	Total	56	6.70 ± 2.78
4 Weeks	Good	50	5.70 ± 2.77
	Moderate	3	6.67 ± 4.04
	Poor	3	3.67 ± 2.31
	Total	56	5.64 ± 2.81
8 Weeks	Good	50	5.16 ± 3.07
	Moderate	3	3.67 ± 4.62
	Poor	3	6.00 ± 5.20
	Total	56	5.13 ± 3.21
16 Weeks	Good	50	3.66 ± 3.28
	Moderate	3	1.00 ± 1.73
	Poor	3	6.00 ± 5.20
	Total	56	3.64 ± 3.37
24 Weeks	Good	50	1.98 ± 2.14
	Moderate	3	0.67 ± 1.15
	Poor	3	4.00 ± 3.46
	Total	56	2.02 ± 2.21

Vas vs HHS At 24 wks

	Mean	N	Std. Deviation	Std. Error Mean	t vaue	p value
Harris Hip Score Post OP	79.04	56	8.449	1.129	-32.015	<0.01*
Harris Hip Score 24 week	91.91	56	5.934	.793		
VAS Score Post OP	7.179	56	2.9976	.4006	15.452	<0.01*
VAS Score 24 week	2.02	56	2.211	.296		

Discussion

The findings of this study highlight the clinical effectiveness of bi-planar double supported cannulated cancellous screw fixation in the management of femoral neck fractures, particularly in patients across a wide age range, including the elderly. The technique demonstrates promising results in terms of early pain relief, progressive functional improvement, and reduced complication rates. The significant enhancement in Harris Hip Scores over 24 weeks, along with the steady decline in VAS pain scores, suggests that this fixation method offers superior biomechanical stability. Its use may therefore be recommended over conventional parallel screw techniques, especially in patients with high Pauwels angle fractures or at risk of instability. Additionally, the low rates of implant failure and AVN underscore the safety profile of this method, supporting its incorporation into routine orthopaedic practice for displaced and undisplaced femoral neck fractures.

Conclusion

Bi-planar double supported CC screw fixation for fracture neck of femur provides excellent functional outcomes and significant pain relief, with minimal complications over a 24-week follow-up period. The technique offers enhanced biomechanical stability, making it a valuable option for managing intracapsular femoral neck fractures across various age groups. Although these results are promising, further randomized controlled trials with longer follow-up and larger patient cohorts are necessary to establish its superiority over traditional fixation methods.

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