



For Osteosynthesis of Adult Fracture Neck of Femur- is FNS the Real Answer or do we need Something Extra??

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Abstract

Background: Fixation of femoral neck fractures is challenging due to diverse fracture patterns and biomechanical demands. The Femoral Neck System (FNS) improves fixation stability, but some fracture morphologies may require supplementary fixation.

Objective: To evaluate whether adding an extra cannulated screw to FNS, placed according to fracture morphology, enhances stability and clinical outcomes compared to FNS alone.

Methods: We prospectively studied 10 patients under 50 years with displaced femoral neck fractures treated using FNS plus an additional screw placed in a direction tailored to fracture type. Outcomes included radiographic union time, femoral neck shortening, Harris Hip Score (HHS), and complications over 12 months.

Results: Mean time to union was 13.6 ± 1.51 weeks. Femoral neck shortening averaged 3.1 ± 1.2 mm. Mean HHS at 12 months was 89 ± 5 . One patient required revision for delayed union; no avascular necrosis cases occurred. Outcomes compare favorably with existing data on FNS alone.

Conclusion: Augmentation of FNS with an additional screw, placed based on fracture morphology, may improve fixation stability and functional outcomes in femoral neck fractures. Larger studies are warranted.

Keywords: Osteosynthesis; Adult Fracture; Femur; FNS

Introduction

Femoral neck fractures represent a significant orthopedic challenge, particularly in young adults, due to the risk of complications such as nonunion and avascular necrosis. The fracture pattern varies widely, from transverse to vertical (Pauwels classification), with vertical fractures experiencing higher shear forces and instability.

The Femoral Neck System (FNS) is an innovative fixation device that provides angular stability and controlled compression, out-

performing traditional cannulated screw fixation in biomechanical studies. However, clinical data suggest that in some fracture types, particularly Pauwels type II and III, FNS alone may not provide adequate resistance to shear and rotational forces.

We propose a modified fixation technique combining the FNS with an additional cannulated screw, oriented individually to fracture morphology rather than strictly parallel to the FNS device. This approach aims to enhance construct stability by counteracting specific mechanical stresses inherent to different fracture patterns.

This study presents a prospective evaluation of 10 patients under 50 years with femoral neck fractures treated with this combined fixation strategy, analyzing radiological and functional outcomes over a one- year follow-up.

Why we thought of additional screw with FNS??

Initially we started with only FNS without any additional screw,however we found even after obtaining perfect reduction and fixation, it failed (as shown in the case 1).

Even in the literature, it is mentioned that there are high failure rates with FNS, which were mainly due to the Cut out of the implant, AVN and non union (Revision rates with FNS alone were 9.2%).

Case 1
36 yrs /Male H/O RTA



Figure a

Immediate post op x-ray

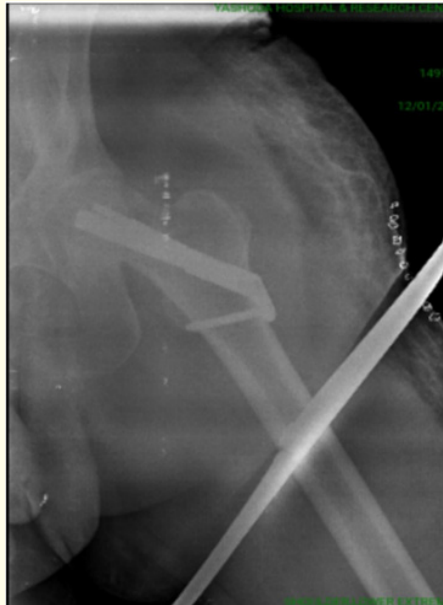


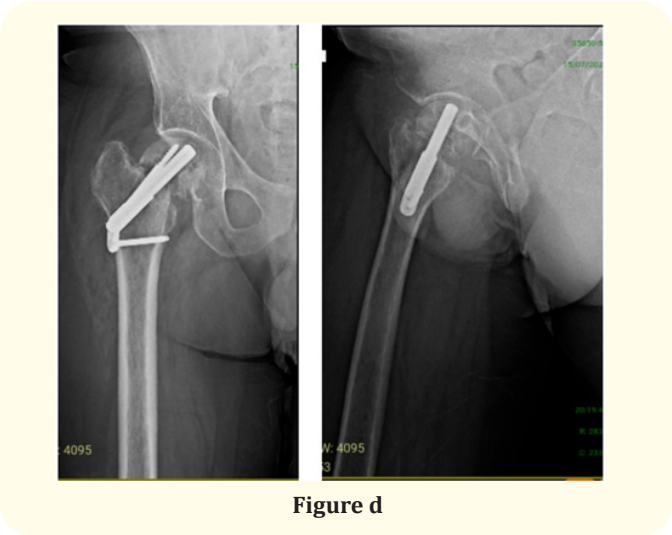
Figure b

3 Months post op x-rays

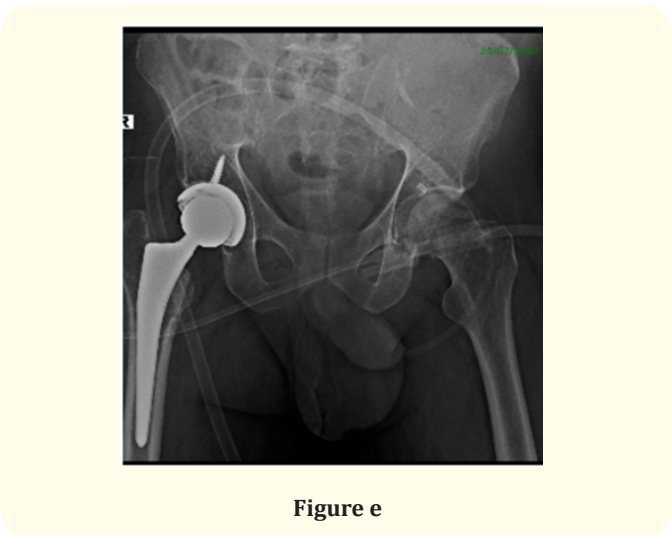


Figure c

6 Months Post op X-rays



Right Total Hip Replacement



After few failures with FNS alone in our cases, we recognised that FNS alone is not a robust fixation method and then we thought of giving an additional support in the form of additional screw (as shown in case 2,3 and 4).

Materials and Methods

Patient selection

Patients aged 18–50 years presenting with displaced femoral neck fractures (Garden II-IV, Pauwels I-III) between January 2023 and March 2025 were included. Exclusion criteria were pathological fractures, open fractures, and contraindications to surgery.

Surgical procedure

Under fluoroscopic guidance, the Femoral Neck System was implanted in standard fashion. An additional cannulated screw was inserted based on preoperative and intraoperative assessment of fracture morphology to optimize biomechanical stability. The secondary screw’s orientation varied (anterior, posterior, superior, or inferior) as indicated by fracture line and pattern. Screw placement was not restricted to parallel configuration.

Postoperative management

Early mobilization with toe-touch weight-bearing was initiated, progressing to full weight bearing as tolerated. Clinical and radiological evaluations were conducted at 6 weeks, 3 months, 6 months, and 12 months.

Outcome measures

Primary outcomes were time to radiographic union, femoral neck shortening measured on serial radiographs, Harris Hip Score (HHS) at 12 months, and complication rates (nonunion, avascular necrosis, fixation failure).

Serial no.	Age (years)	Gender	Garden Type	Pauwels Type	Additional screw position
1.	28	M	III	II	Posterior
2.	45	F	II	I	Superior
3.	32	M	IV	III	Inferior
4.	35	F	III	II	Inferior
5.	29	M	IV	III	Superior
6.	31	M	II	I	Posterior
7.	40	M	III	II	Superior
8.	27	M	IV	III	Superior
9.	22	F	II	II	Inferior
10.	38	M	III	III	Posterior

Table a

SerialNo.	Timetoradiologicalunion (weeks)
1.	14
2.	13
3.	16
4.	11
5.	13
6.	12
7.	13
8.	15
9.	15
10.	14

Table b: Mean ± SD 13.6 ± 1.51
Range: 11-16

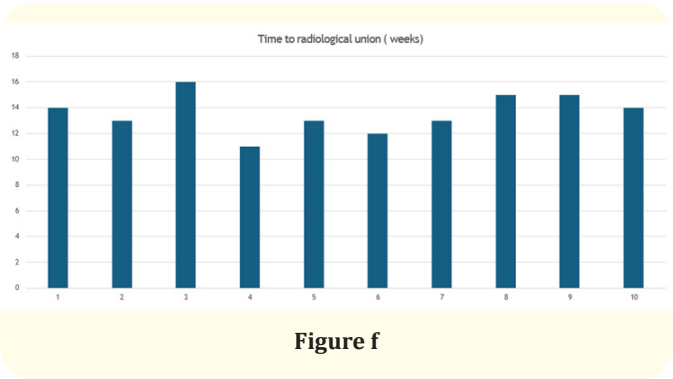


Figure f

Serial No.	Femoral Neck Shortening (mm)
1.	3.2
2.	2.9
3.	3.8
4.	1.1
5.	4.2
6.	2
7.	3.5
8.	5.3
9.	2.4
10.	3

Table c: Mean m SD: 3.1 m 1.2
Range: 1.1 – 5.3

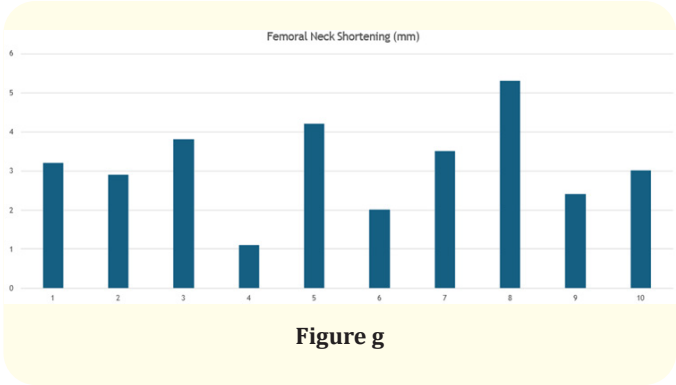


Figure g

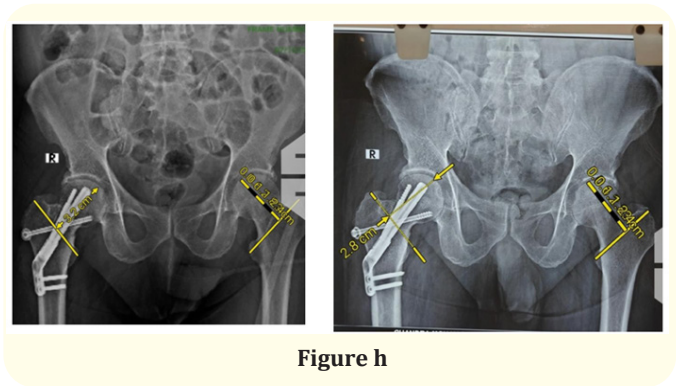


Figure h

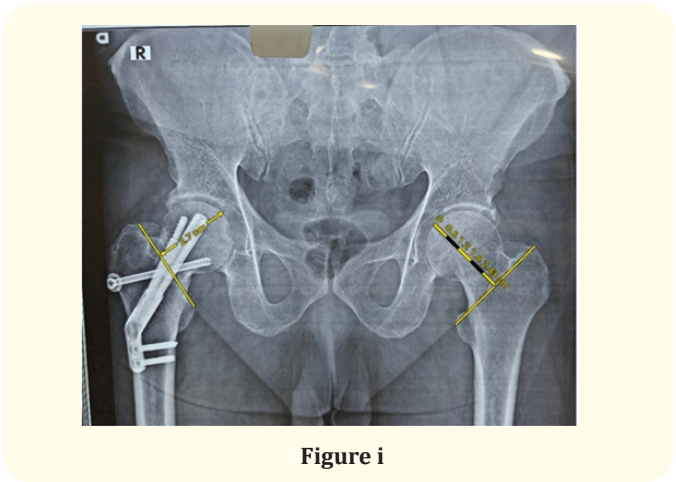


Figure i

Serial No.	Harris Hip Score (12 months)
1.	90
2.	84
3.	91
4.	82
5.	96
6.	99
7.	79
8.	94
9.	88
10.	87

Table d: Mean m SD: 86 m 5
Range: 76-66

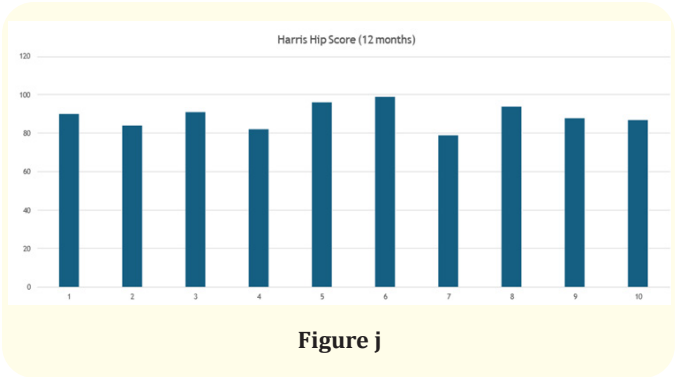


Figure j

Serial No.	Complications
1.	None
2.	None
3.	None
4.	None
5.	None
6.	None
7.	None
8.	None
9.	None
10.	None

Table e

Discussion

Our study demonstrates that combining FNS with an additional screw, placed individually according to fracture morphology, offers promising clinical and radiological outcomes in femoral neck fractures among patients under 50 years. The flexible screw orientation allows tailored resistance to biomechanical forces unique to each fracture type, which may explain the favorable union times, minimal femoral neck shortening, and functional results observed.

Previous biomechanical studies have suggested that adding supplementary screws enhances construct stiffness, especially in high-angle Pauwels fractures. Our findings translate these insights into clinical practice, showing low complication rates and improved outcomes compared to historical data on FNS alone.

Limitations include the small sample size and lack of a randomized control group. Larger prospective studies and biomechanical testing are needed to confirm these findings and optimize screw placement strategies [1-20].

Conclusion

Augmenting FNS fixation with an additional screw, oriented according to fracture morphology, is a viable strategy for managing femoral neck fractures in young adults.

This method enhances mechanical stability and clinical outcomes, supporting its consideration as a tailored surgical option.

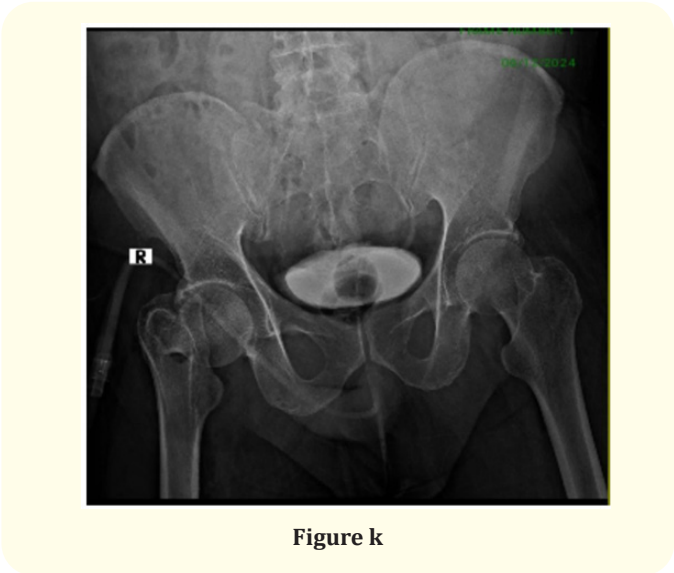




Figure l

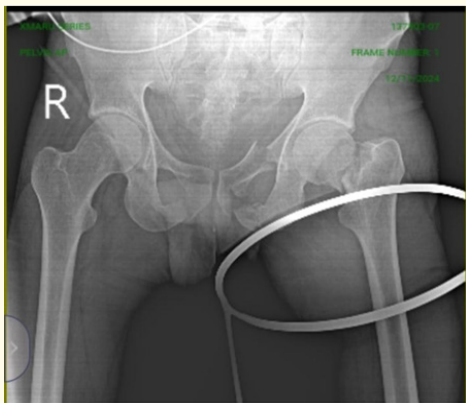


Figure p

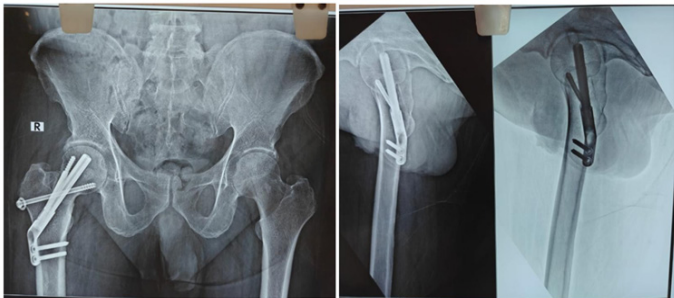


Figure m

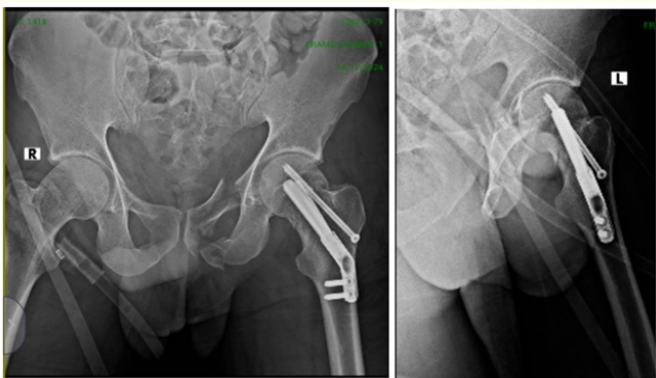


Figure q

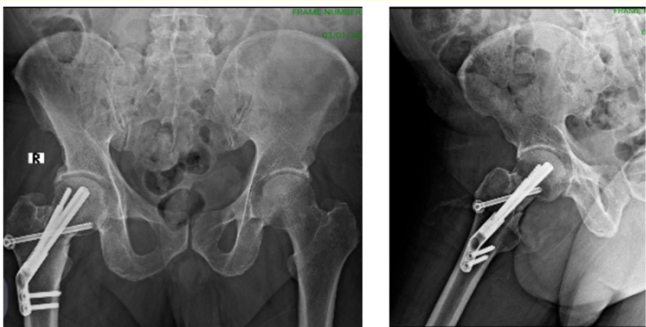


Figure n

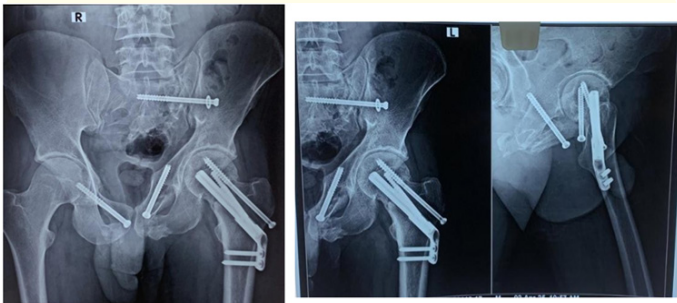


Figure r

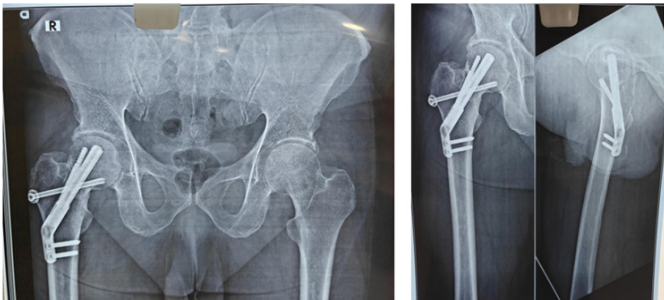


Figure o

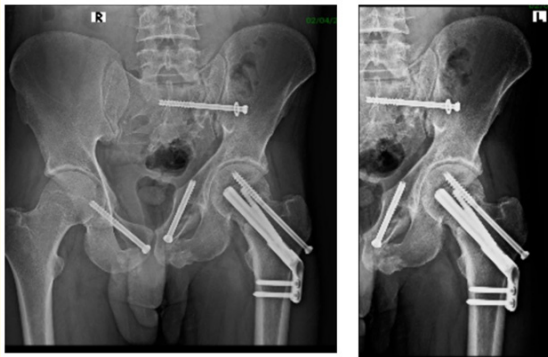


Figure s

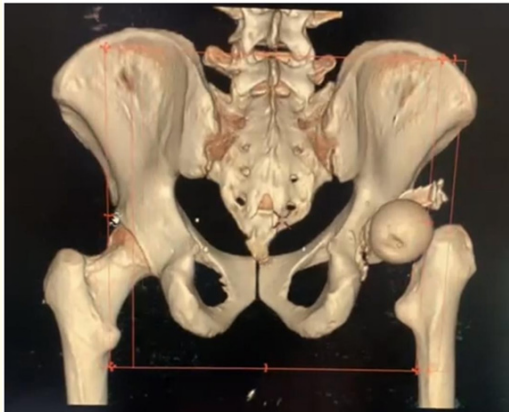


Figure v



Figure t

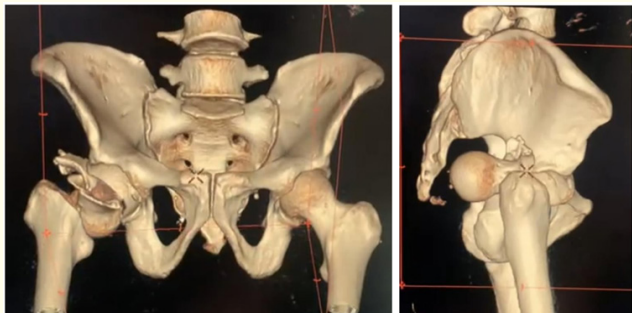


Figure w



Figure u

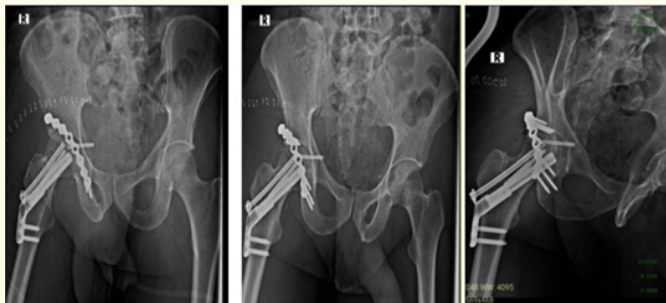


Figure x

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