

# A COMPARATIVE STUDY BETWEEN ANTEGRADE AND RETROGRADE INTRAMEDULLARY NAILING IN MANAGEMENT OF HUMERUS SHAFT FRACTURE FIXATION

1.DR. SUSHANT A. PANDIT    2.DR. RAVINDRA GUNAKI SIR

<sup>1</sup>Resident, <sup>2</sup>Professor,  
<sup>1</sup>Dept. of Orthopedics, <sup>2</sup>Dept. of Orthopedics  
KRISHNA INSTITUTE OF MEDICAL SCIENCES DEEMED TO BE UNIVERSITY, KARAD.  
PIN CODE-415110, MAHARASHTRA STATE.  
<sup>1</sup> sushant26031996@gmail.com, <sup>2</sup> rbgunaki@yahoo.com

*Abstract—*

## **Background:**

Humeral shaft fractures are common orthopedic injuries that can be managed through conservative or surgical methods. Intramedullary nailing has become a widely accepted surgical technique due to its minimally invasive nature, preservation of fracture hematoma, and early mobilization. The procedure can be performed using either an antegrade or retrograde approach, and the optimal technique remains a subject of discussion among orthopedic surgeons.

## **Objectives:**

To compare the functional and radiological outcomes of antegrade intramedullary nailing and retrograde intramedullary nailing in the management of humeral shaft fractures.

## **Methods:**

This prospective comparative study included 40 patients with humeral shaft fractures treated at a tertiary care center. Patients were divided into two groups: antegrade intramedullary nailing (AIN, n=20) and retrograde intramedullary nailing (RIN, n=20). Patients were evaluated based on operative time, intraoperative blood loss, radiological union, functional outcome using the ASES score, and pain assessment using the VAS score. Follow-up was conducted for a minimum period of six months.

## **Results:**

The mean operative time in the AIN group was 52 minutes compared to 67 minutes in the RIN group. Mean intraoperative blood loss was lower in the AIN group (85 mL) compared to the RIN group (110 mL). Functional outcomes were better in the AIN group with a higher mean ASES score (90) compared to the RIN group (85). Pain scores measured using the VAS scale were also lower in the AIN group at final follow-up. Radiological union and overall complication rates were comparable between the two groups.

## **Conclusion:**

Both antegrade and retrograde intramedullary nailing are effective treatment options for humeral shaft fractures with comparable union rates and safety profiles. However, antegrade intramedullary nailing demonstrated shorter operative time, reduced blood loss, and better functional outcomes, making it a more favorable technique for fracture fixation.

## **Keywords:**

Humerus Shaft Fracture, Antegrade Intramedullary Nailing, Retrograde Intramedullary Nailing, Functional Outcome, Orthopedic Surgery.

## I. INTRODUCTION

Treatment of humeral shaft fractures has come a long way from its initial conception of non-operative methods like coaptation splint, Functional bracing to operative interventions like plate osteosynthesis and intramedullary nailing. Although non-operative modalities have varied results, they are associated with disadvantages like, prolonged immobilization, non-anatomical union, and decrease in activities of daily living. Plate osteosynthesis has been considered as the gold standard but has associated problems like extensive soft tissue dissection, radial nerve palsy, non-union, and infection. With the advent of intramedullary nailing for humerus shaft fractures, the benefits of closed reduction, preservation of fracture hematoma and minimally invasive techniques can be achieved. These nails can be inserted into an ante or retrograde fashion depending upon the fracture geometry, bone quality, underlying pathology, presence of co-morbid conditions, localized skin condition and surgeon's preference.

## II. AIMS

The aim of the present study is to compare the functional and radiological outcome in patients with humerus shaft fractures treated with antegrade or retrograde nailing technique.

## III. OBJECTIVE

1. To Compare functional outcome between both the techniques.
2. To compare surgical time, intra-operative radiation and duration of the hospital stay between both the techniques.
3. To compare radiological union between the two techniques.

## IV. METHODOLOGY

Patients were selected for the study after taking careful detailed history, clinical examination, laboratory investigations, and X rays as described above. The patients eligible for the study were selected, informed, and explained regarding the above study and a proper informed, valid, written consent will be taken for participation in the study.

Post admission patients were given U-SLAB then patient were to be posted for open reduction internal fixation with humerus nailing.

Postoperative hospital stay was measure from the date of surgery to the date of discharge. Patients were ask to follow-up on day 14, day 30 and 6 weeks postoperatively. Suture removal was done on postoperative day 14 in all cases. Time to return to normal activity was noted in all patients. Patients were reassess on all occasions and wound infection, stiffness, pain and all patients were followed up for minimum 6 months after surgery.

### A) INCLUSION CRITERIA:

Patients with shaft Humerus fracture who are,

1. Skeletally mature > 18 years in either gender.
2. Include fresh (<3 week old) shaft Humerus fractures {closed fractures, compound grade 1 and grade 2 fractures and segmental fractures}

### B) EXCLUSION CRITERIA

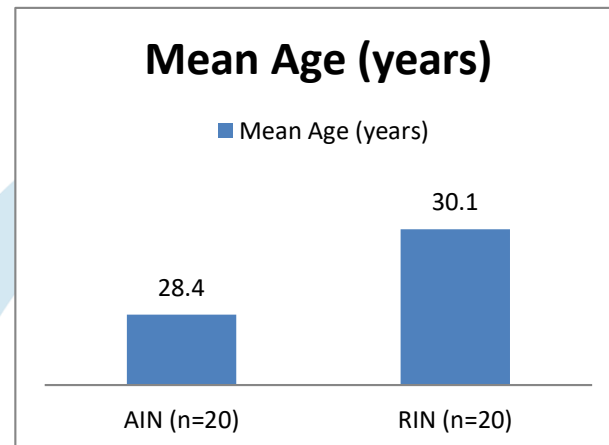
Patients with

- 1) Open fractures (compound grade -3)
- 2) Pathological fractures
- 3) Associated Neurovascular injury / head injury
- 4) Skeletally immature patients.
- 5) Poly trauma patient
- 6) Patient on chemotherapy.
- 7) Prior radial nerve palsy,
- 8) A narrow medullary canal (<6 mm at the isthmus)
- 9) Severe medical co-morbidities like cardio-pulmonary dysfunction were excluded from the study

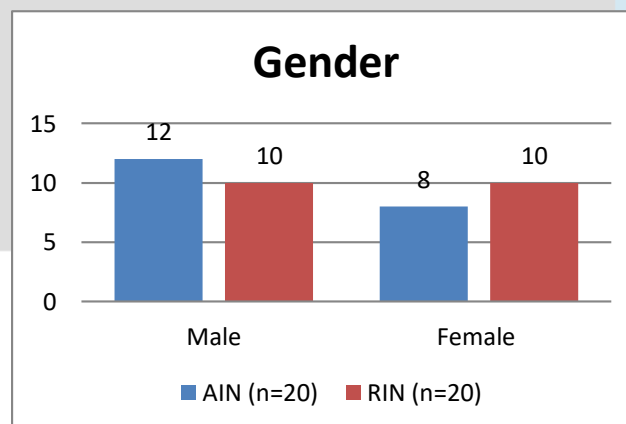
All the facilities, equipment's required for the present study were available in our institute

## RESULTS

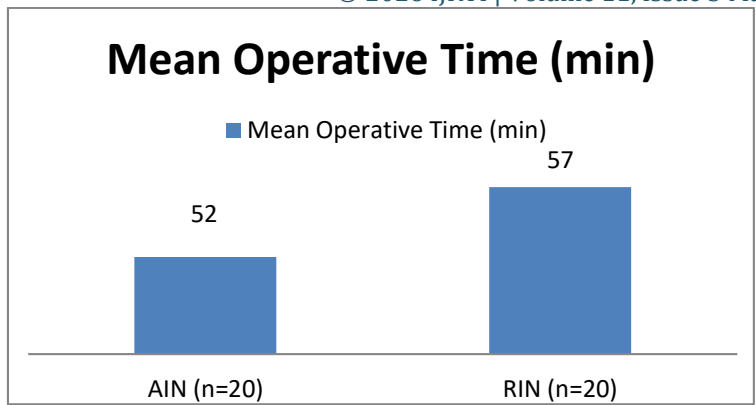
Parameter	AIN (n=20)	RIN (n=20)	p-value
Mean Age (years)	28.4	30.1	>0.05



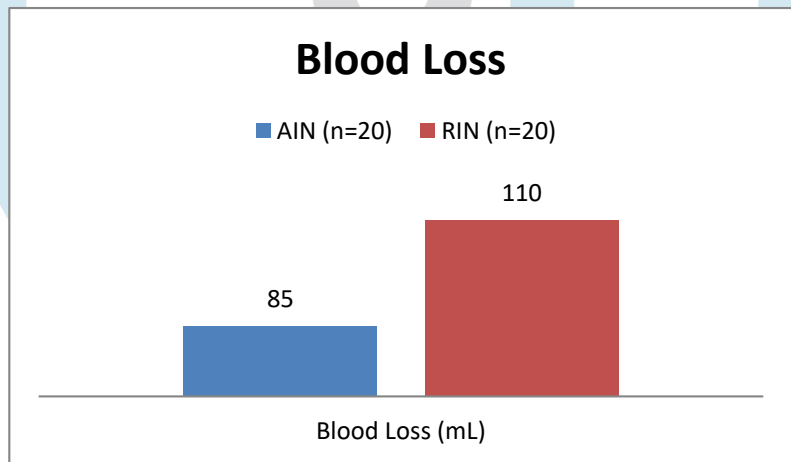
Gender	AIN (n=20)	RIN (n=20)	p-value
Male	12	10	>0.05
Female	8	10	



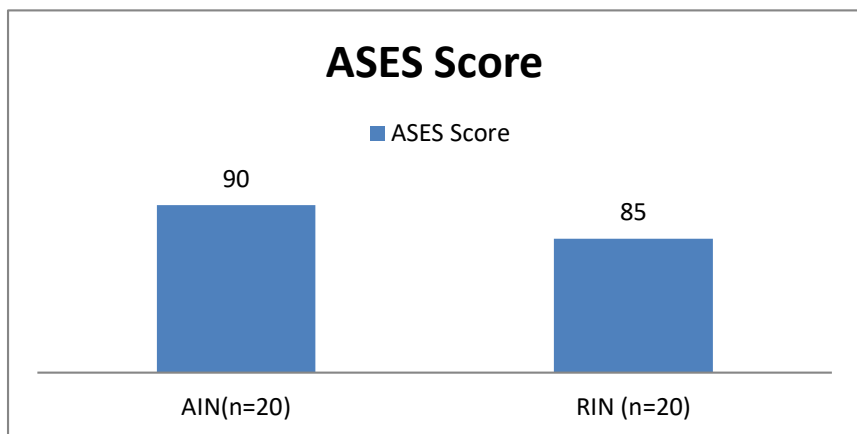
Parameter	AIN (n=20)	RIN (n=20)	p-value
Mean Operative Time (min)	52	67	<0.05



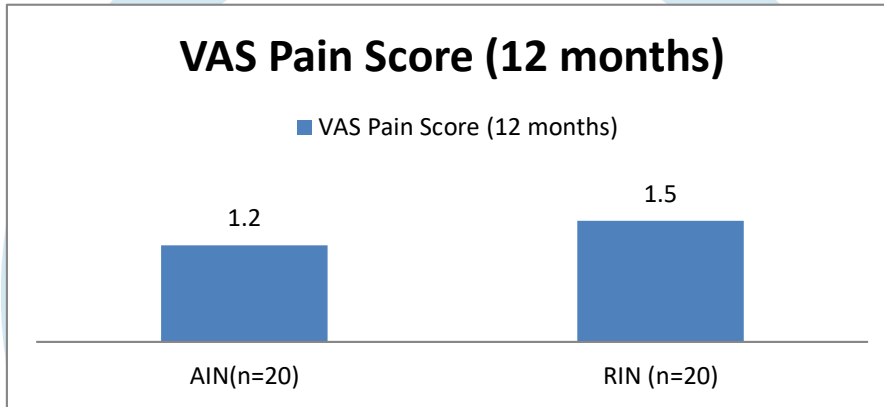
Parameter	AIN (n=20)	RIN (n=20)	p-value
Blood Loss (mL)	85	110	<0.05



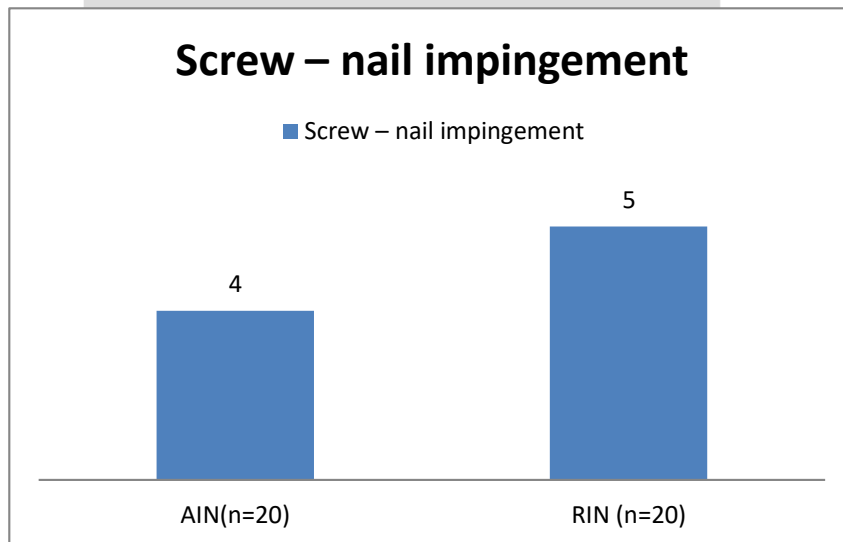
Outcome Measure	AIN(n=20)	RIN (n=20)	p-value
ASES Score	90	85	<0.05



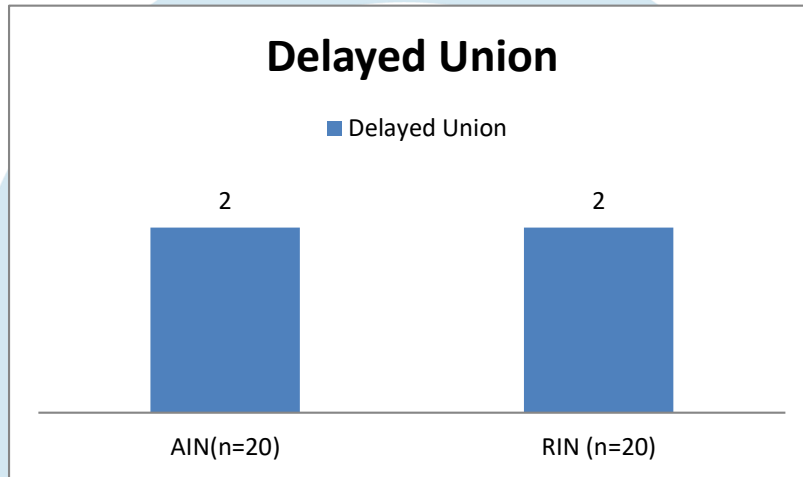
Outcome Measure	AIN(n=20)	RIN (n=20)	p-value
VAS Pain Score (12 months)	1.2	1.5	<0.05



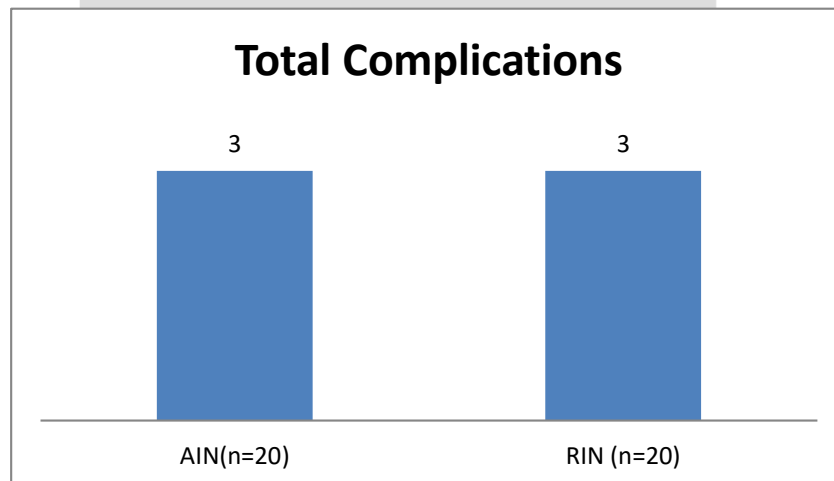
Outcome Measure	AIN(n=20)	RIN (n=20)	p-value
Screw – nail impingement	3	4	<0.05



Parameter	AIN(n=20)	RIN (n=20)	p-value
Delayed Union	2	2	>0.05



Outcome Measure	AIN(n=20)	RIN (n=20)	p-value
Total Complications	3 (15%)	3(15%)	<0.05



## V. DISCUSSION

In the present study, both anterograde intramedullary nailing (AIN) and retrograde intramedullary nailing (RIN) groups were comparable with respect to age and gender distribution, ensuring uniform baseline characteristics and minimizing selection bias. The AIN group demonstrated a significantly shorter operative time and lower intraoperative blood loss, reflecting superior intraoperative efficiency and reduced surgical trauma. Although the RIN group showed statistically earlier radiological union and earlier achievement of full weight bearing, this difference was clinically marginal and did not result in any substantial functional superiority. Functional assessment revealed higher ASES scores in the AIN group, indicating better postoperative shoulder function and patient satisfaction. Furthermore, patients treated with AIN reported significantly lower VAS pain scores at final follow-up, suggesting improved long-term pain control. The overall complication rate was similar in both groups, confirming comparable safety profiles. Considering its advantages in operative parameters, functional outcomes, and pain relief without an increased complication rate, anterograde intramedullary nailing appears to be the more favorable technique in the management of these fractures.

## VI. CONCLUSION

Both anterograde and retrograde intramedullary nailing are effective treatment modalities with comparable union rates and complication profiles. However, anterograde intramedullary nailing demonstrated superior operative efficiency with significantly shorter operative time and lower intraoperative blood loss, along with better functional outcomes and lower residual pain. The marginally earlier union observed with retrograde nailing did not translate into a meaningful clinical advantage. Based on the findings of the present study, anterograde intramedullary nailing is a better and more favorable option for fracture fixation.

## REFERENCES

- [1] Habernek H, Orthner E. A locking nail for fractures of humerus. *J Bone Joint Surg.* 1991; 73B:651-653.
- [2] Muller ME, Nazarian S, Koch P, Schatzker J. *The comprehensive classification of fractures of long bones.* Berlin. Springer-Verlag, 1990.
- [3] Russell TA, Lavelle DG, Nichols RL, Simard J, Taylor JC, Walker BJ et al. Diaphyseal fractures of the humerus treated with a ready made fracture brace. *J Bone Joint Surg.* 1982; 64A:1113.
- [4] Wilson JN. Operative reduction of fractures. Chap-16 in *Watson-Jones Fractures and Joint Injuries.* Ed. New Delhi, B.I. Churchill the Livingstone. 1992; 16:364-394.
- [5] Gongol T, Mracek D. Functional therapy of diaphyseal fractures of the humeral bone. *Acta Chir Ortho Traumatol Cech.* 2002; 69(4):248-253.
- [6] Gregory PR Jr. Fractures of the shaft of the humerus. Chap-24 in *Bucholz RW, Heckman JD (Edt.). Rockwood and Green's Fractures in Adults.* 5th ed. Philadelphia. Lippincott, Williams and Wilkins. 2001; 1:973.
- [7] Durbin RA, Gottesman MJ, Sanders KC. Hackethal *International Journal of Orthopaedics Sciences* stacked nailing of humeral shaft fractures: Experience with 30 patients. *Clinical Ortho.* 1983; 179:168-174.
- [8] Riemer BL, Butterfield SL, D'Ambrosia R, Kellam J. Seidel intramedullary nailing of humeral diaphyseal fractures: A preliminary report. *Orthopaedics.* 1991;