

ORIGINAL RESEARCH

Prospective and Retrospective Study of Multiple Rush Nailing in Fracture Shaft Humerus

Dr Rabiul Haque¹, Dr Subhankar Mukherjee², Dr Prasun Mandal³, Dr. Mriganka M Ghosh^{4*}, Prof Sandip Ghosh⁵, Prof Sanjay Kumar⁶

¹Senior Resident, Dept of Orthopaedics, Midnapore Medical College and Hospital, India.

²Associate Professor, KPC Medical College Kolkata, India.

³Associate Professor, Sarat Chandra Chattopadhyay Govt Medical College Uluberia Howrah, India.

^{4*}DNB Orthopedics, Senior Resident, Rg kar Medical College and Hospital, India.

⁵Principal, R G Kar Medical College and Hospital, India.

⁶Head, Dept of Orthopaedics, R G Kar Medical College and Hospital, India.

Corresponding Author

Dr. Mriganka M Ghosh

DNB Orthopedics, Senior Resident, Rg kar Medical College and Hospital, India

Received: 25 January, 2024

Accepted: 30 April, 2024

ABSTRACT

Background: Diaphyseal Humerus fractures treated with multiple Rush nails is a modality of treatment used widely for various advantages. In this present study we have evaluated results for its advantages and lacunae over conservative and open approaches. **Methods:** Study was conducted in department of Orthopaedics in KPC medical College, Jadavpur, Kolkata. Rush nailing was done in patients with closed displaced shaft humerus fracture with intact proper consent and followed up for period of 6 months for functional mobility. **Result:** 75 patients with diaphyseal Humerus shaft fractures were managed with multiple Rush nails. Out of those, that 44.0% patients had Full recreation, 25.3% patients had Full work and 30.7% patients had Unaffected sleep in Post-op ADL. 13.3% patients had Complication. DASH scores were utilized for ADL. Excellent results were noted in 17.3% (13 cases). In our study the mean Amount of distraction of patients in cm was $2.1133 \pm .7193$ in cm and Amount of distraction of patients in degrees was 21.1333 ± 7.5146 . **Conclusion:** Closed reduction of diaphyseal fractures of humerus is better option than open reduction and plating having advantages of minimal soft tissue dissection and as it is close reduction, the biology of the fracture is also not disturbed and nerve injury are much less and shorter time of surgery and ease of process.

Key words: Stack Nailing, Diaphyseal Fractures, Humerus.

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INTRODUCTION

General incidence of humeral shaft fractures remain in the area to 1% to 2% of all fractures occurring in the human body and 14% of all fractures of the humerus occurring due to RTA or domestic fall or injury, assault, etc.

Humeral fractures have different modalities for treatment ranging from conservative to closed reduction with internal fixation with pinning or nailing till open reduction and plating. However, patients in modern times demand faster union rates and earlier return to pre-injury activities while preserving functionality and motion of nearby joints. Therefore, over the last few decades, we have witnessed significant advances in the field of surgical management of diaphyseal humeral fractures. Intramedullary flexible nailing used for displaced

transverse humeral shaft fracture was advocated decades ago. Now, we try to use Rush pins to fulfill the theory of "filling-up" and "3-point" fixation.

The stability is achieved by the flexibility and elasticity of the nails and the crowding of the medullary canal and the anchorage they gain in the distal humeral metaphysis. Rush nailing combines the advantages of the minimal invasive surgery, minimal instrumentation, cost efficient implants with a minimum morbidity providing better axial, angulatory, and rotational stability, preserves blood supply as reaming is not required and early joint motions are permitted thus decreasing the chances of stiffness.

The present study is conducted with aim to achieve treatment of humeral shaft fractures with near anatomic alignment as much possible with lesser

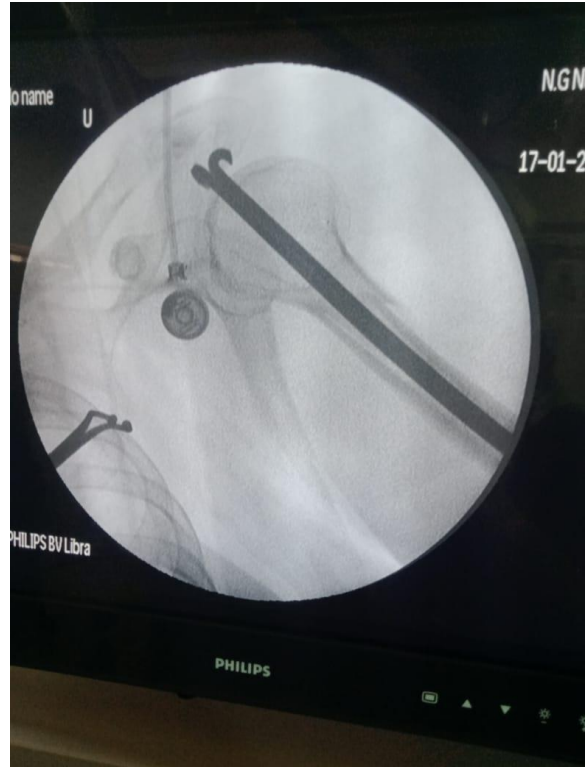
operative time and early union and faster rehabilitation.

The surgery was performed with an incision on lateral cortex of humeral surgical neck. The size and number of Rush pins were decided according to the inner diameter and length of the humeral shaft. (The Rush pins were pre-bent before insertion.) The whole procedure of pin insertion was carried out under C-arm guidance.

MATERIALS AND METHODS

This study was conducted in KPC medical college and hospital, Jadavpur. The 75 patients for this present study have attended the emergency unit as well as outpatient department of orthopaedics after fulfilling inclusion criteria and exclusion as well. Ethical clearance and informed consent was taken for the study. Skeletally mature patient with closed and open diaphyseal Humerus fractures without neurovascular deficit. Oblique, spiral and Transverse, alongwith comminuted anatomical variants of fracture in around diaphyseal area were taken up in this study. Open fractures with grade2 and 3 with distal neurovascular deficit were excluded from study and those with refusal to consent were not included in this study.

Pre operative procedures was followed with preop antibiotics was given and Multiple intramedullary Rush nailing in diaphyseal fracture of humerus was inserted after closed reduction. Antegrade technique for fracture of middle and lower third of humeral shaft and retrograde for proximal 3rd humerus fractures. The surgery was performed with an incision on lateral cortex of humeral surgical neck. The size and number of Rush pins were decided according to the inner diameter and length of the humeral shaft. (The Rush pins were pre-bent before insertion.) The whole procedure of pin insertion was carried out under C-arm guidance.



A 2.5 cm transverse incision is given just lateral to the acromian process, after splitting the deltoid muscle the head of the humerus is identified and an awl is introduced thereafter. The entry portal is opened with the hand awl. More medial location of the entry portal would facilitate nail insertion but it is usually not possible because of the presence of the acromion. The hand awl must penetrate the humeral head for at least 4 to 5 cm.

The correct alignment of the arm is obtained by traction, supination of the forearm, and 90 degrees of elbow flexion applied and maintained by the assistant. After application of nailing shaft of Humerus, U slab application was made. Post op analgesics and elevation of limb was followed.

REHABILITATION PROTOCOL

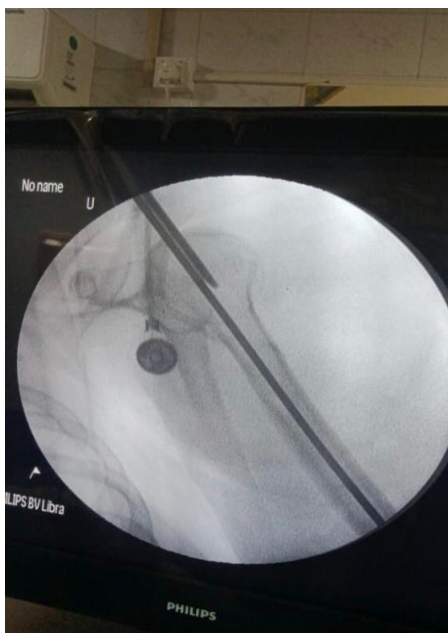
- Removal of stitches at 2 weeks.
- Range of motion of elbow wrist and hand encouraged immediately.
- Passive motion and pendulum exercises started generally between 2-4 weeks after surgery.
- Healing if satisfactory at 6 weeks then active assisted range of motion started

Statistical Analysis

Table: Distribution of Complication

| Complication | Frequency | Percent |
|--------------|-----------|---------|
| No | 65 | 86.7% |
| Yes | 10 | 13.3% |
| Total | 75 | 100.0% |

In our study, 10 (13.3%) patients hadComplications.



The value of z is 8.9815. The value of p is < .00001. The result is significant at p < .05.

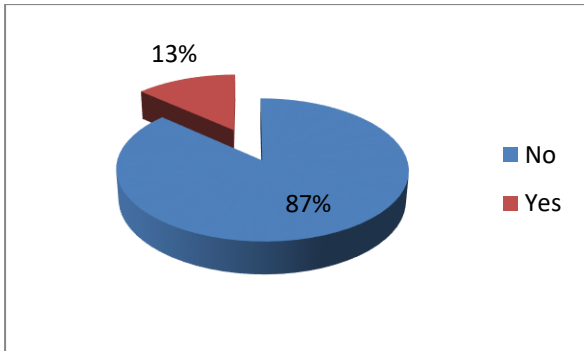


Table: Distribution of mean Amount of distraction in cm

| | No | Mean | SD | Min | Max | Median |
|-----------------------------|----|--------|-------|--------|--------|--------|
| Amount of distraction in cm | 75 | 2.1133 | .7193 | 0.5000 | 3.5000 | 2.0000 |

In above table showed that the mean Amount of distraction in cm (mean±s.d.) of patients was 2.1133±.7193.

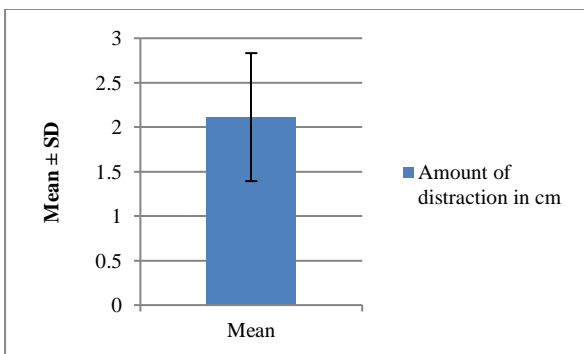


Table: Distribution of mean Amount of distraction in deg

| | No | Mean | SD | Min | Max | Median |
|------------------------------|----|---------|--------|---------|---------|---------|
| Amount of distraction in deg | 75 | 21.1333 | 7.5146 | 10.0000 | 35.0000 | 20.0000 |

In above table showed that the mean Amount of distraction in deg (mean±s.d.) of patients was 21.1333±7.5146.

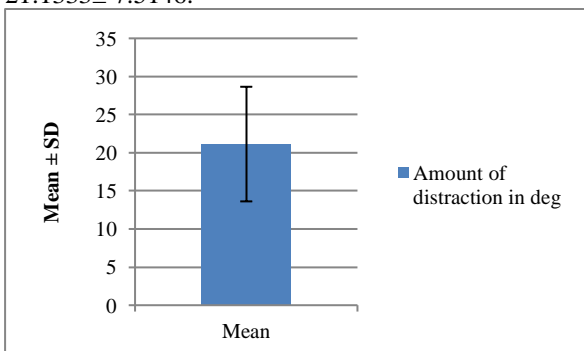


Table: Distribution of mean post-op ROM

| | No | Mean | SD | Min | Max | Median |
|-------------|----|----------|---------|----------|----------|----------|
| post-op ROM | 75 | 156.1333 | 17.0764 | 120.0000 | 180.0000 | 160.0000 |

In above table showed that the mean post-op ROM (mean±s.d.) of patients was 156.1333±17.0764.

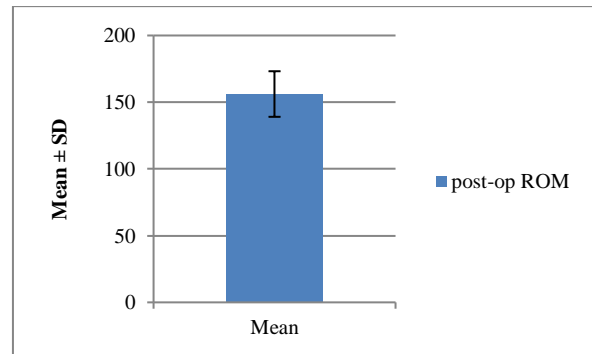
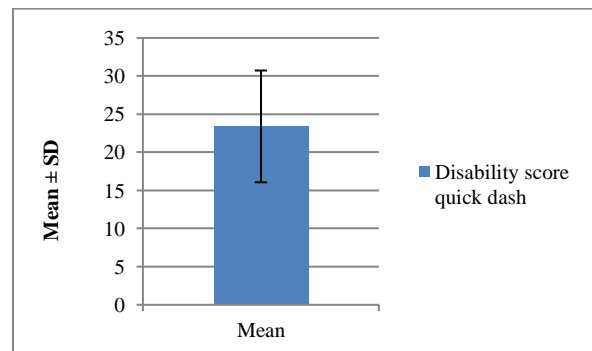


Table: Distribution of mean Disability score quick dash

| | No. | Mean | SD | Min | Max | Median |
|-----------------------------|-----|---------|--------|---------|---------|---------|
| Disability score quick dash | 75 | 23.4000 | 7.3301 | 11.0000 | 38.0000 | 24.0000 |

In above table showed that the mean Disability score quick dash (mean±s.d.) of patients was 23.4000±7.3301.



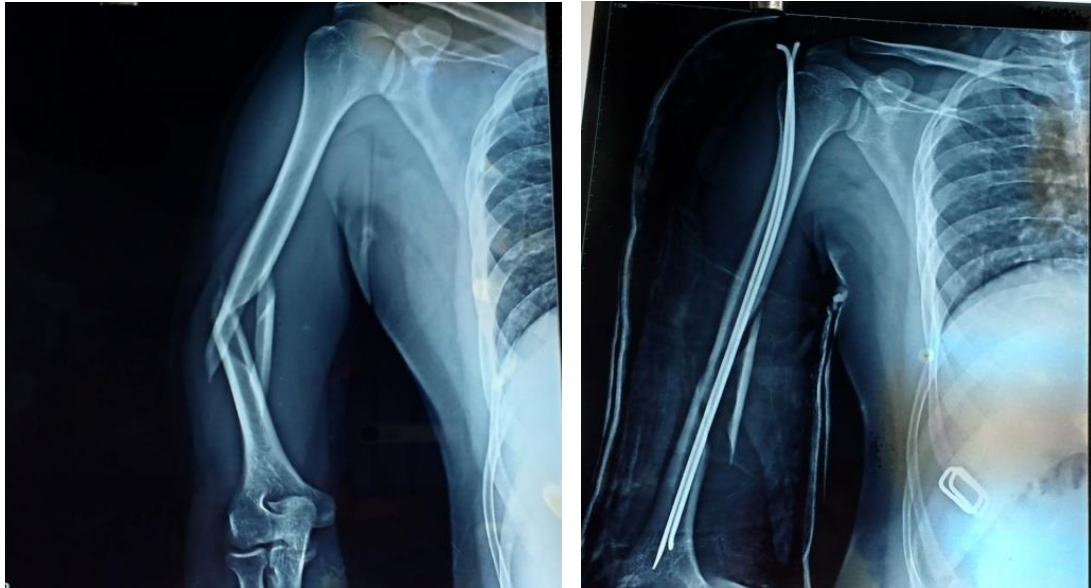
RESULT & DISCUSSION

We found that out of 75 patients, 19 patients were 21-30 years old, 30 patients were 31-40 years old and 26 patients were ≥41 years old. So, most of the patients were 31-40 years old. The mean Age of patients was 37.2133 years.

In our study male population was higher than the female population.

We observed that 38.7% patients had fall and 46 (61.3%) patients had RTA. It was found that Fresh fracture was more common in our study.

Our study showed that 44.0% patients had Full recreation, 25.3% patients had Full work and 30.7% patients had Unaffected sleep in Post-op ADL. 13.3% patients had Complication.



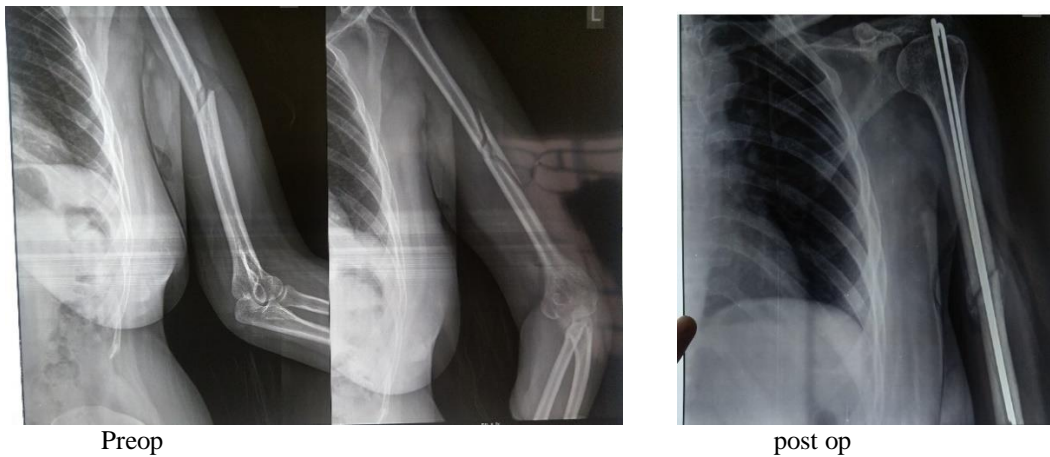
We examined that 30.7% patients had Grade 1 Open jar, 37.3% patients had Grade 2 Open jar, 28.0% patients had Grade 3 Open jar and 4.0% patients had Grade 4 Open jar.

Present study showed that 17.3% patients had Grade 1 Pain intensity, 34.7% patients had Grade 2 Pain intensity, 32.0% patients had Grade 3 Pain intensity and 16.0% patients had Grade 4 Pain intensity.

We found that 17.3% patients had Grade 1 Tingling intensity, 49.3% patients had Grade 2 Tingling intensity, 25.3% patients had Grade 3 Tingling intensity and 8.0% patients had Grade 4 Tingling intensity.

Our study showed that 53.3% patients had Grade 1 Sleep, 42.7% patients had Grade 2 Sleep and 4.0% patients had Grade 3 Sleep.

We examined that 20.0% patients had Grade 1 Socialize, 58.7% patients had Grade 2 Socialize and 21.3% patients had Grade 3 Socialize.



We found that 18.7% patients had Grade 1 Wash back, 41.3% patients had Grade 2 Wash back, 30.7% patients had Grade 3 Wash back and 9.3% patients were Grade 4 Wash back.

In our study 64.0% patients had Grade 1 fracture for Forceful recreation, 12.0% patients had Grade 2 fracture for Forceful recreation, 16.0% patients had Grade 3 fracture for Forceful recreation and 8.0% patients had Grade 4 fracture for Forceful recreation.

Present study showed that 8.0% patients had Grade 1 fracture for Heavy chores, 33.3% patients had Grade 2 fracture for Heavy chores, 52.0% patients had Grade 3

fracture for Heavy chores and 6.7% patients had Grade 4 fracture for Heavy chores.

Our study showed that 25.3% patients had Grade 1 fracture for Carry a bag, 42.7% patients had Grade 2 fracture for Carry a bag, 20.0% patients had Grade 3 fracture for Carry a bag and 12.0% patients had Grade 4 fracture for Carry a bag.

We observed that 26.7% patients had Grade 1 fracture for Use knife, 46.7% patients had Grade 2 fracture for Use knife, 21.3% patients had Grade 3 fracture for Use knife and 5.3% patients had Grade 4 fracture for Use knife.

In our study the mean Amount of distraction of patients was $2.1133 \pm .7193$ in cm and Amount of distraction of patients was 21.1333 ± 7.5146 .

We found that the mean post-op ROM was 156.1333 ± 17.0764 and Disability score quick dash was 23.4000 ± 7.3301 .

We also found that quickDASH score for 13 pts was <14 while for the rest it was 15-40.i.e. 13 pts had recovered and achieved complete functional outcome and the rest were recovering either delayed or gradual. Though newer techniques have emerged with time, Rush Nailing is still very much applicable in our present times due to its advantages.

- Minimal exposure
- Fracture biology preservation
- Rotational malalignment prevented by multiple Rush nailing
- Axial alignment maintained
- Angular alignment maintained
- Neutralize shearing and bending forces but allow axial compression and rotation.
- They are, in a sense, wedged into position, which makes them self retaining.
- Simpler
- Cost effective
- Less morbidity

Analysing the technical difficulties while performing this study we suggest the following points for the betterment of this stack nailing technique:-

- Rush nail should be prebent.
- While introducing or hammering the nail into medullary canal, angulation and rotation of distal fragment should be checked.
- The proximal end of rush nail should be buried into the humeral head by gentle hammering which prevents the proximal migration of the nails.
- Hammering of rush nail should not be done at any stage.
- Care should be taken to avoid distraction at the fracture site.
- Distally the nail should be fan out in different directions and gain anchorage in the distal metaphyseal region.
- The shoulder should be moved in all the direction to check the possible obstruction by rush nails. The suggestion made by us were implemented by us while performing the operation of stack nailing and found to be successful.

CONCLUSION

Multiple rush nailing can be a cheap alternative than TENS and also from open reduction and plating. It has faster operative time, less chances of infection and ease of access. Rush nailing should be performed in diaphyseal fractures of Humerus, lesser chances of joint stiffness and should enable faster return to activities to daily living.

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