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Role of JESS Fixators in Proximal Humerus Fractures

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Abstract

Background: Proximal humerus fracture (PHF) contributes 4% to 5 % of fracture which are bimodal in distribution. Treatment varies from conservative to replacement and every modality having its pros and cons. Aetiologically accidental fall in elderly population due to insufficiency and RTA contributes more to younger population. Though the treatment is in wide spectrum, outcome depends upon many factors like Age, Anatomy of fracture, communition, associated pathological conditions, mode of treatment. In this study we justify how JESS method over scores the other methods of fixation...

Material and Methods: 42 patients (24 females and 18 males) age between 19 to 88 done between 2019 to 2022. Fracture is being classified by Neers classification. All surgeries were done under regional block. All patients were followed up regularly and assessed functionally and radiologically.

Results: Total number of cases were 42 and above 45yrs were 29, less than 45yrs were 13. Out of total cases 24 cases were RTA. Neers Type II -13, Type III -16, Type IV -11, head split-2. Outcome was assessed by constant score. 2 cases went for nonunion and 4 cases were underwent premature removal due to various reasons. 66% of cases showed excellent outcome.

Discussion: Proximal humerus fracture always a challenge for the orthopaedic surgeons and controversial. As we mentioned earlier here, one of the main factors deciding the outcome is mode of fixation, and JESS shows it superiority than plating in closed reduction and then K Wires in giving advantage of rigid fixation, early mobilization and no loosening. Hence JESS fixation in PHF is a wonderful and viable option of fixation method irrespective of the age and fracture pattern.

Keywords: ***JESS (joshi external stabilsation system); Proximal humerus fracture; Murley score***

1. Introduction

Proximal humerus fracture (PHF) accounts for 5% to 9% [1] of all fractures and is the third most Common fracture after hip [2] and distal radius. It is bimodal [3] in distribution. They frequently Occur in elderly population due to osteoporosis [4] and

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in young individuals [5] due to high velocity [6] injuries like RTA.80% of PHF are undisplaced or minimally displaced and are well managed Conservatively [7] and the remaining cases are to be managed surgically for better outcome functionally and radiologically. The controversy starts here Which is the best method of fixation, since a great variety of Options [8] like locking [9] plates, nails, k wires and external fixators (JESS and ILIZAROV), Prosthetic replacement [10] are available. All of them suffer from a persistently substantial rate of Mechanical failure and other complications like stiff shoulder etc.

2. Objective

Though the treatment is a wide spectrum [11] the outcome depends upon many factors like Age, anatomy of fracture, communition, associated pathological conditions, mode of treatment. In this study we have evaluated and assessed the FUNCTIONAL OUTCOME of the fractures treated with JESS [12] and its superiority over the other mode of fixation irrespective of the age and nature of fracture.

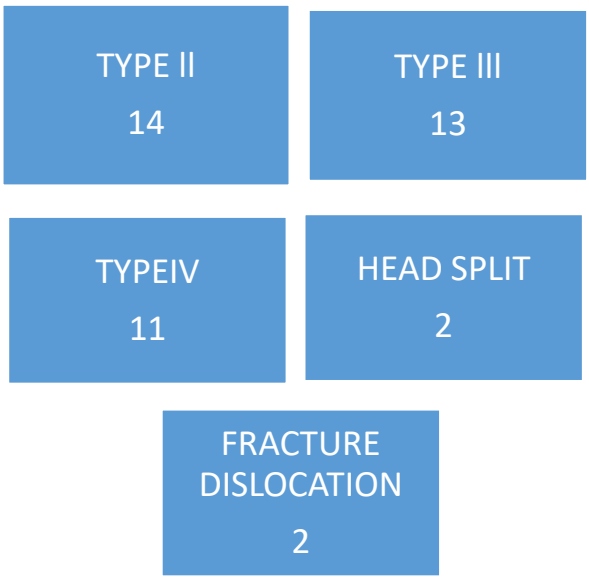
3. Material and Methods

This study was conducted between 2019 and 2022 operated at a hospital (Parvathy Nursing Home) in kalakad, Tirunelveli district by a single surgeon.

All the cases were operated under regional block. 42 patients (24 females and 18 males) age between 19 to 88 done between 2019 to 2022. Fracture is being classified by Neers Classification. Neer type II, III, IV and Head split are 13,16,11 and 2 respectively. 29 patients are more than 45 years.

Upon admission, careful history was obtained and severity of trauma assessed. Other injuries and fractures were ruled out. X ray AP and AXILLARY views were taken and CT was taken whenever necessary.

All surgeries were done under regional block. All patients were followed up regularly, assessed Functionally and radiologically.



INCLUSION CRITERIA	EXCLUSION CRITERIA
Age more than 18 Displaced fracture more than 1 cm displacement or 45 degree angulation No arthritic changes Neer 2,3,4 ,head split fracture Fractures with dislocation	Less than 18 yrs Undisplaced Pathological Poor compliance Associated with other upper limb fractures in the same side Open injuries

3.1 Surgical technique

All were done under regional block in beach chair position.

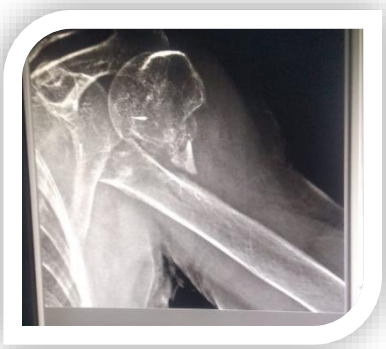
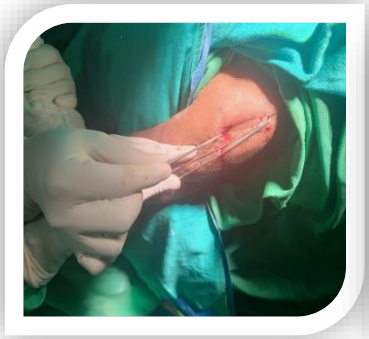
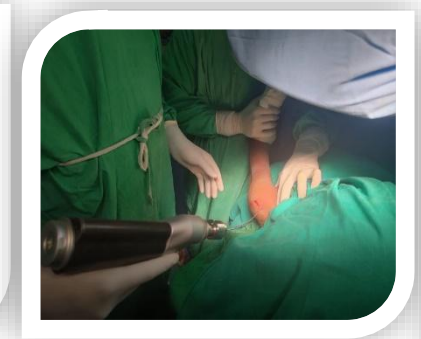
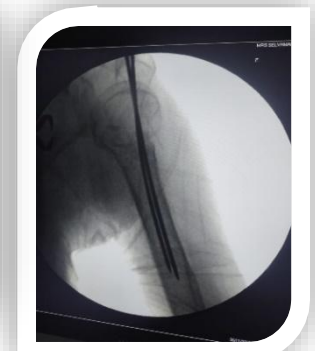
It's **ala cart** approach depends upon type of fracture, bone stock, associated with dislocation or not. First step is to bring the head into position which was done by joystick method by blunt thick K wires and temporarily fixed with glenoid in very unstable situation.

Second step is to introduce 2 or 2.5 long K wires 2 or 3 in number as a core kwire from GT to medullary cavity which is the main structure to connect all peripheral k wires.

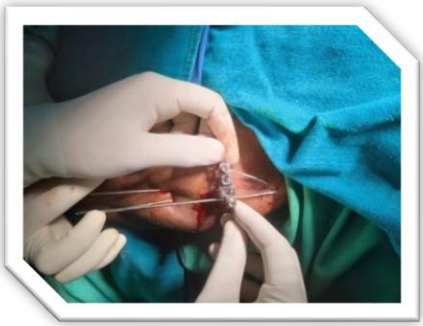
Third step is to introduce K wires into the head fragment depending upon the number of fragment and bone quality in a circumferential fashion which has been connected with connecting rod or thick K wire bent according to the pattern.

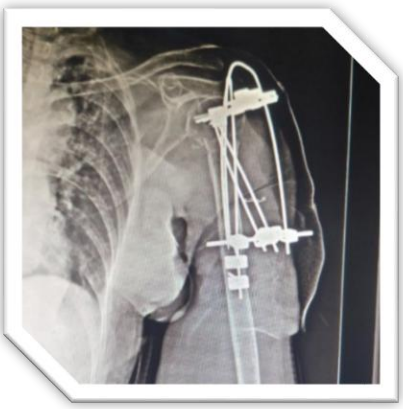
Fourth step is to bend the long core k wires into 180 degree and connect the head k wires after disimpacting the head into valgus. Final step is to pass calcar k wires and shaft k wires in a single or double row depending upon the bone quality and connect one with another and tighten with core k wires. Stability was assessed under CArm, dressing done and arm sling was applied.

Pre op **Joysticking** **Core K-Wire**

K- Wires for head fragment **Final construct**





3.2 Post op Protocol

Simple sling for 3 weeks, Dressing as opd for every 3 days.

Flexion and extension and pendulum exercises started from 2nd and 3rd post op day.

Abduction started cautiously from 3rd week and isometric exercises started from 3rd to 6th Week. Post op x-rays taken every week, 2nd week, every month till 3, 6, 24 months respectively.

4. Results

In our study, fractures classified according to Neers classification and radiological union assessed by post op x ray AP and AXILLARY views and the functional results by murley constant score. (excellent>85, good 71 to 85, fair 50 to 70, poor less than 50).

Outcome	Murley score	Mean (at the time of removal)	Mean (2 months after removal)
Excellent	26	56	91
Good	10	51	82
Fair	4	41	67
Poor	2	22	48

In 42 cases, 32 cases are domestic injuries and remaining are high velocity in etiology. The interval between the injury and the surgery plays an important role as the prime aim of the study is to show the superiority in results like good functional outcome.

Complications	Number
None	34
Pin tract infection	2
Early pin removal	1
Pin loosening	1
Malunion	2
Non union	2
Neurovascular injury	0

5. Discussion

Proximal humerus fracture stands the 3rd most common fracture and the incidence is likely to trend upwards in future as well. Why then is the management of proximal humerus fracture one of the most debated in the trauma podiums. Because, even though most of the undisplaced and a miniscule population of displaced fractures are well managed by conservative treatment, the argument starts with the mode of fixation of the remaining displaced fractures requiring surgical intervention. We have a wide range of options starting from Kwires, external fixation, locking plates, IM nail, suture anchor fixation and of late have moved on to prosthetic replacement. Any method will have its pros and cons when outcome is assessed in terms of functionality and union. Outcome depends upon many factors like type of fracture, communition, bonestock, patient factors like age, smoking, range of activity and surgeon factor like experience, [13] method of fixation. Two school of thoughts when it comes to implant choices are 1) Rigid 2) Semi Rigid. Rigid provides utmost stability in younger age group with good bone density. Semi Rigid stands a viable option in providing some interfragmentary micromotion and gives elastic kind of fixation as it reduces forces acting on the bone metal interface while straining.

Let's look into each mode of fixation and its complications. Conservative method has complications like pain, stiffness & malunion. Kwire, though most popular method especially in old patients, we cannot mobilize the patient early and also has chances of easy Kwire pullout, pintract infection and shoulder stiffness. Reverse shoulder Arthroplasty though has gained lot of attention; outcome is not so great because of a lot of reasons.

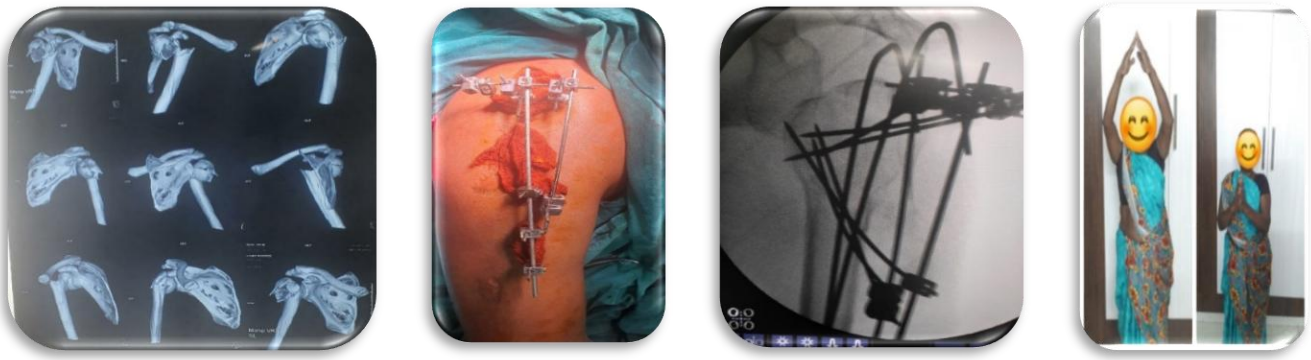
Open reduction and internal fixation with PHILOS Plate [14] is the most commonly used method of fixation but because of wide dissection and intraoperative bleeding [15,16] leads to adhesions, stiffness, AVN and implant failure due to thin shell of bones.

So, the best implant should provide early ROM, minimally Invasive [17], preserve the biology, surgeon friendly and good stability which is JESS .

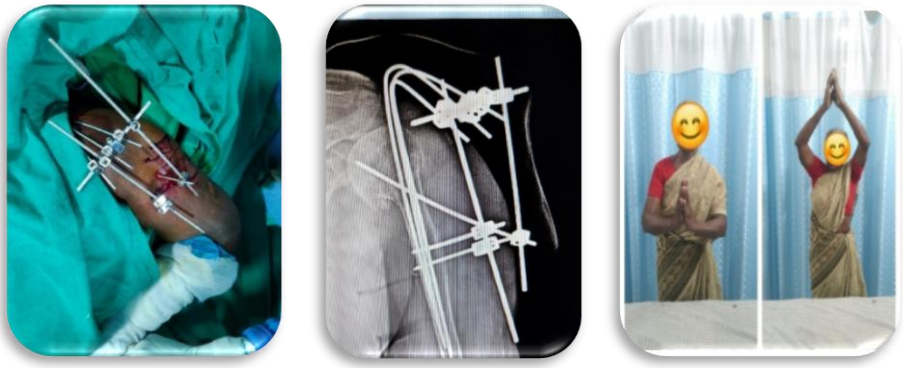
Though JESS is not devoid of complications like early pin removal, malunion, compliance issues, pintract infection, it gives consistent favourable outcome. Patient education and awareness, counselling helps us to catch the problems early and manage all the above said complications. In our study, Premature removal was done in a patient who was having behaviour problems

and 2 non union because of very bad fracture with dislocation and lost follow-up and surprisingly no functional limitation in the above 2 cases. The follow up was done with murley score which was good in most of the cases and became excellent after 2 months of dedicated physiotherapy.

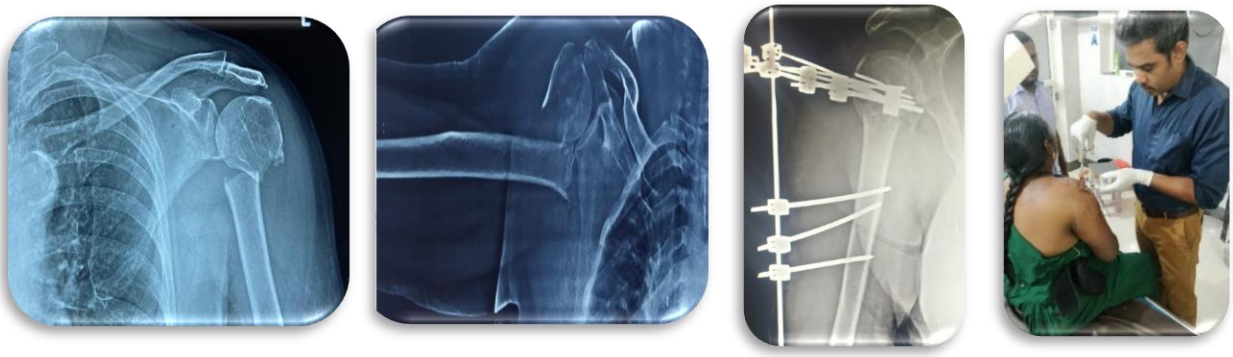
Case 1

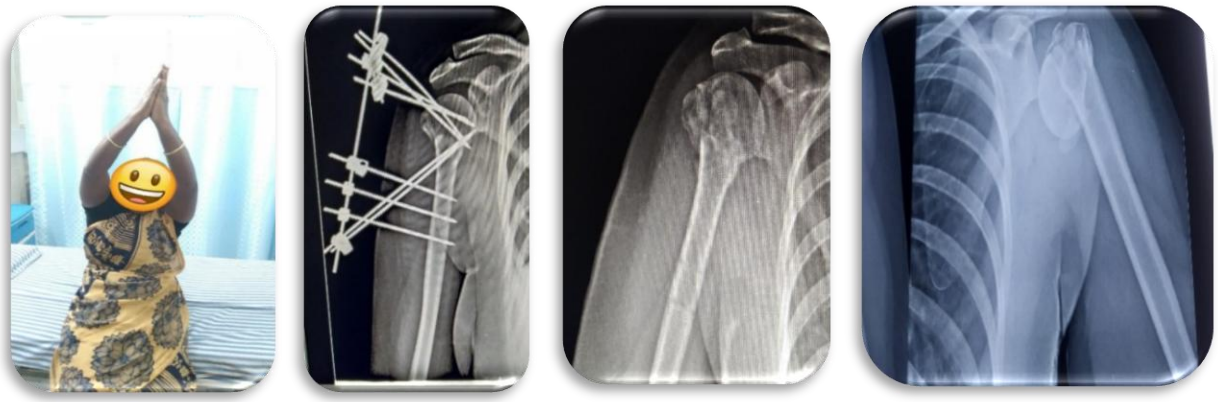


Case 2



Case 2





6. Conclusion

So, JESS is a wonderful option to manage proximal humerus fracture irrespective of fracture type and age. JESS Provides good anatomical reduction, preserving biology [20] stable fixation, early ROM, cost effective, early union, can be tried in special situations, less time Consuming. Pre op counselling, early mobilization, scheduled physiotherapy, proper follow-up are the pivotal factors in bringing better outcome.

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