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Original Article

External fixation in proximal Humerus Fracture in elderly and Co- morbid patients

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Abstract:

Fractures around proximal humerus are common injuries occurring in predominantly elderly female population associated with osteoporosis. Elderly age group associated with comorbidity gives good outcome with minimal intervention with external stabilization of the fracture avoiding major surgical procedure on proximal humerus. **Objective:** to study the outcomes of fixation of proximal humerus fracture by external stabilizing system in elderly, osteoporotic and comorbid patients. **Methodology:** we did study of 30 Neers type 3 and type 4 fracture patients in span of 12 months from fracture in which 17 were female and 13 were male patients. The age group was 50 to 75. The results external fixation of fracture was evaluated as per Neers criteria. **Results:** all 30 patients were followed till fracture got union. In Neers type 3 fracture 13 (81.25%) patients got good results while in type 4 fractures 09 (64.28%) patients got good results. **Conclusion:** external stabilization of Neers type 3 and 4 proximal humerus fracture patients who are elderly, osteoporotic and comorbid shows excellent outcome with this minimally invasive stabilizing system.

Keywords: Proximal humreus fracture, External stabilizing system, Neer's Fracture type

Introduction:

Proximal Humerus fracture seen in Females > Males due to osteoporosis, sedentary life style, low energy trauma, Epilepsy and Impaired balance etc.[1,2] Glenohumaral joint is multiaxial, ball & socket joint. Greater tuberosity is attached to supraspinatores. Lesser tuberosity is attached to subscapularis. Due to muscle forces communited fracture reduction becomes difficult. Ultimately joint stability and movement is compromised, operative management of this fractures is challenging.[1-3] Though availability of locking plates, hemiarthroplasty and other surgical techniques are giving good outcomes but fixation failures are still commonly reported even in the hands of experienced shoulder surgeons.[4-6] External fixation of this fractures, though less commonly reported and still unconventional gives comparatively good outcome and complications as compared to open reduction and plating.[7-9] External fixation of proximal humerus by use of K wires, external stabilizing system, percutaneous intramedullary fixation in elderly osteoporotic patients is very much cost effective, less demanding, and use of easily available instruments can make it popular and affordable procedure in developing countries like India as compared to expensive operative management with locking plates, or arthroplasty options.

Methodology:

Study design: This is single-centered, hospital based, prospective, cross sectional, observational study was conducted in the department of orthopedics at private medical college at Ahmednagar (Maharashtra) over a period of 1 year (August 2020-July 2021).

Sampling technique: Purposive sampling method

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Neer's type III and IV fractures patients in elderly, osteoporotic patients without neurovascular involvements were selected.[10,11] Total number of patients were 30 in age range between 50 to 75 among which 13 were males and 17 were females. Mode of trauma was fall which is domestic as well fall due to road traffic accident. Patients were evaluated as per Neers classification and pre-operative assessment and lab investigation and risk of anesthesia accessed in co-morbid patient.[12-14]

Surgical procedure: Regional anesthesia with patient in supine position. III /IV-part fractures can be easily reduced with traction and manipulation, difficult reductions can be achieved with use of Steinman pin and manipulation with help of image intensifier in antero-posterior, medial lateral and axillary view. First two, 2.5 mm K wire passed from greater tuberosity, passing fracture to distal shaft to engage its medial cortex and two, 2.5 mm K wire passed from humerus, from lateral cortex to medial cortex engaging the fracture. Wires in both regions should be parallel to each other. Fixation should be observed in all direction in C-ARM and should be fixed with help of 3-4mm connecting rods with link joints, both K wire pairs should be connected to separate rod and should be mirror image of each other. Dressing of pin tracks done with betadine, cuff and collar sling given post operatively. Post op x-ray done on 2nd day. Mobilization started immediately as pain subsides.

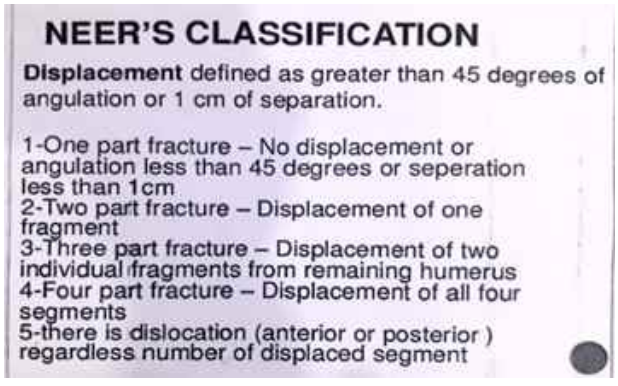


Image 1: Neer's fracture type 3

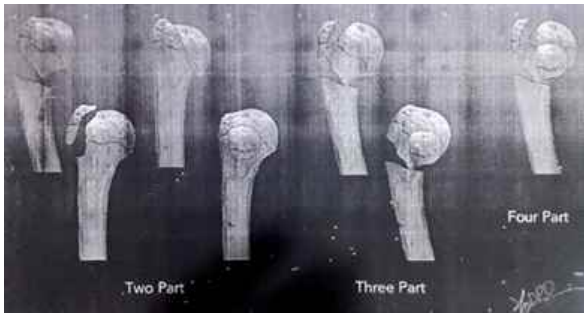
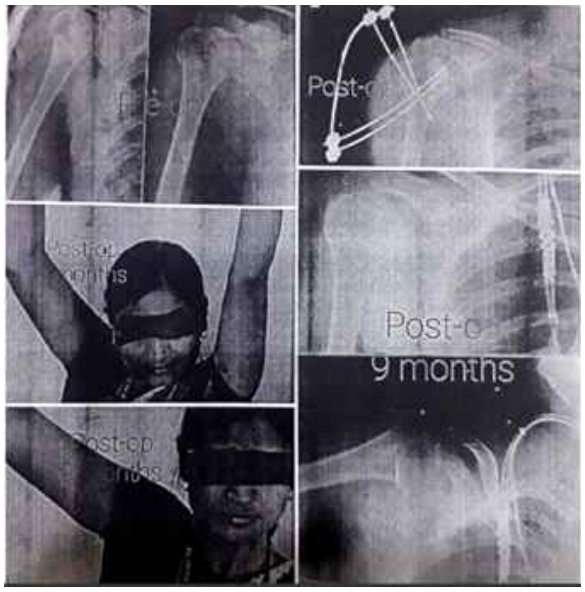


Image 2: Post operative



Results:

Table no. 1: Age & Gender Distribution of the patients (n=30)

Sr. No.	Age Groups	Gender		Total
		Female	Male	
1.	51 – 60 Yrs.	03	01	04 (13.3%)
2.	61 – 70 Yrs.	08	11	19 (63.3%)
3.	=71 Yrs.	06	01	07 (23.3%)
Total		**17 (56.7%)**	**13 (43.3%)**	**30 (100%)**
Chi- Square (X^2): 4.59, df: 02, P:0.10 NS				

Table no. 1 (Chart 1) shows that out of 30 patients 56.7% (17) and 43.3% (13) were males and females respectively but difference between age groups and gender was not statistically significant.(P:0.10)

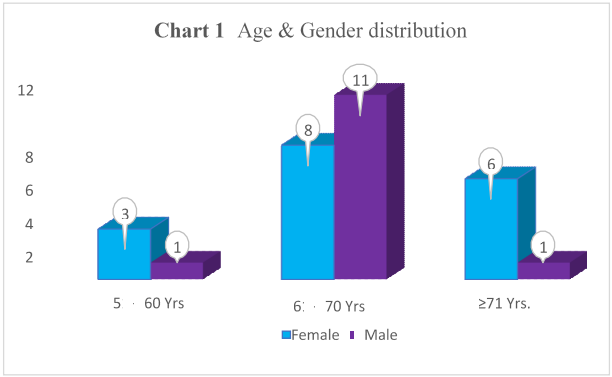


Table no. 2: Age distribution of gender			**Mann Whitney U test**
Parameters/ Gender	**Female (17)**	**Male (13)**	
Mean age ± SD	66.64 ± 5.64	66.15 ± 4.48	P: 0.59 NS
Median	69.0	66.0	
Mini-Max	57.0-75.0	56.0-73.0	

Table no. 2: the mean age of female and male patients was 66.64 ± 5.64 and 66.15 ± 4.48 respectively. On Mann Whitney U test the difference of mean age was not statistically significant (P:0.59)

Table no. 3: Age & Type of Neer's Fracture (n=30)				
Sr. No.	Age Groups	Neer's Type Fracture		Total
		III	IV	
1	51 – 60 Yrs.	02	02	04 (13.3%)
2	61 – 70 Yrs.	12	07	19 (63.3%)
3	=71 Yrs.	02	05	07 (23.3%)
Total		**17 (56.7%)**	**13 (43.3%)**	**30 (100%)**
Chi-Square (χ^2): 2.47, df: 02, P:0.29 NS				

Table no. 3: out of 30 patients 53.3% (16) and 46.6% (14) had Neer's type III and IV type of fracture. No statistical association was observed among different age groups and type of Neer's fracture. Maximum number of Neer's III and IV fracture patients were seen in 61 to 70 years of age group. No statistical association was observed among type of fracture and age groups (P: 0.29).

Table no. 4: Age distribution of Fracture Group			Mann Whitney U test
	III (16)	IV (14)	
Mean age ± SD	65.37 ± 4.68	67.64 ± 5.44	P: 0.15 NS
Median	65.0	69.50	
Mini-Max	56.0-72.0	57.0-75.0	

Table no. 4 the mean age of the type III and IV fracture patients was 65.37 ± 4.68 and 67.64 ± 5.44 respectively. The Difference of mean age among fracture groups was found to be non-significant (P:0.15)

Table no. 5: Type of Neer's Fracture & Gender Distribution of the patients (n=30)				
Sr. No.	Neer's Type Fracture	Gender		Total
		Female	Male	
1	III	08	08	16 (53.3%)
2	IV	09	05	14 (46.7%)
Total		**17 (56.7%)**	**13 (43.3%)**	**30 (100%)**
Fisher's Exact Test: 0.48 NS				

Table no. 5 show that out of 16 Type III fracture 50% were females while out of 14 type IV fracture 64.28% were females. On Fisher's Exact test no statistical association was found between gender and type of Neer's fracture. (P: 0.48)

Table no. 7: Type of Neer's Fracture and Outcome (n=30)						
Sr. No.	Neer's Type Fracture	Outcome				Total
		Excellent	Satisfactory	Unsatisf actory	Failure	
1	III	07	06	02	01	16 (53.3%)
2	IV	05	04	03	02	14 (46.7%)
Total		**12**	**10**	**05**	**03**	**30 (100%)**
Chi-Square (x^2):01.13, df: 03, P:0.76 NS						

Table no. 8 (Chart 2) Out of 16 type III fracture 07 had excellent surgical outcome while out of 14 type IV fracture only 05 has excellent outcome. The statistical difference in between surgical outcome and type of Neer's fracture was not significant (P: 0.76)

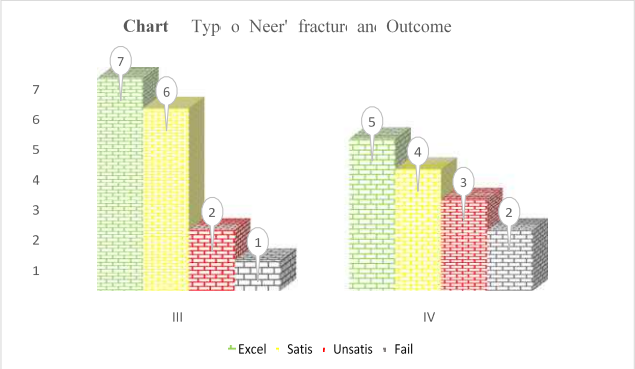


Table no. 8: Type of Neer's Fracture & Comorbidities (n=30)													
Sr. No.	Neer's # Type	CKD	Convulsion	DM	Epilepsy	Head injuries	Hemiplegia	IHD	Other kidney disease	Obesity	Osteoporosis	Renal Failure	Total
1	III	00	01	05	00	01	01	03	01	01	03	00	16 53.3%
2	IV	01	00	03	01	00	02	02	01	02	01	01	14 46.7%
Total		01	01	08	01	01	03	05	02	03	04	01	30 100%
Chi-Square (? 2): 7.26, df: 10 P:0.70 NS													

Table no. 8: No statistical significance (P:0.70) was observed between comorbidities and type of Neer's Fracture.

Discussion:

For proximal humerus fractures we have both conservative and operative options. Conservative treatment has disadvantage of early mobilization, pain, stiffness and decreased Rom as well malunion and nonunion.[8,9] Though the recent studies have shown good long term results of open reduction by PHILOS plate in open reductions,[8, 15, 16] disadvantages are failure to achieve rigid fixation due to decreased bone density in cancellous bone of proximal humerus, Osteoporosis, disturbed cortico medullary ratio, comorbidity gives limitation of results in ORIF with loosening of implants, nonunion and avascular necrosis of communited humerus head, prolonged operative time and intra operative blood loss as well old age anesthesia complications are also associated which further augments stiffness around shoulder in spite of good open reduction.

In populated countries like India where affordability of major surgery is also a issue, minimal fixation with appropriate anesthesia can reduce the cost of

surgery and also can preserve blood supply of head of humerus. K wires in External fixation system causes minimal soft tissue trauma and infection. Almost nil neuro vascular injury, multiple K wires in multiple planes with pressure & tensile strength of wire, fixation to external rods gives the system the natural rotational stability, which favors early painless mobilizations and less morbidity after fracture treatment with mostly intact rotator cuff and favorable functional outcome.

Conclusion:

External stabilizing system fixation for proximal humerus Neers type 3 and 4 fractures can be good alternative, affordable, favorable treatment option in elderly, communited, comorbid, osteoporotic patients with excellent to good outcome with minimal complications and expenses as well hospital stay. For statistical significance need larger sample size.

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