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Study of Functional Outcome of Surgical Management of Proximal Humerus Fracture by Various Modalities

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I. Introduction

Fractures of the proximal humerus represent approximately 4% of all fractures and 26% of humerus fractures [1]. These are the second most common upper- extremity fracture and the third most common fracture, after hip and distal radial fractures. The fractures can occur at any age, but the incidence rapidly increases with age. The risk factors for proximal humeral fractures are primarily associated with low bone mineral density and an increased risk of falls. The most common mechanism of injury in proximal humeral fractures in elderly patients is a fall from standing height onto an outstretched upper extremity. In patients aged less than 50 years, the mechanism is often related to high-energy trauma, such as significant falls from height, motor vehicle accidents, or athletic injuries. The injury is of great importance when it affects the young and middle age groups of the population. It leads to temporary disability and loss of working hours. Restoration of the function of the limb is of paramount importance. Treatment of proximal humerus fracture has been the subject of much controversy and confusion. This is because of the complexity of these injuries, fracture displacements are without careful radiographic views and associated soft tissue injuries. Further, there has always been diversity of opinion about the care of shoulder fractures, with frequent controversies and lively debate, further more even good anatomical results achieved at operative repair may lead to poor results unless there is meticulous post operative rehabilitation, which can be more challenging in shoulder than operative technique.[2,3,4] Most studies indicate that for the majority of good results of fractures of this region are obtained by conservative methods. Some studies state that operative treatment is better, depending on type of fracture and the quality of the bone. Management of these fractures is associated with some morbidity and undesirable sequelae. They include complication like avascular necrosis, malunion, non-union, infection, neurovascular injury, loss of motion of shoulder from adhesive capsulitis , chronic edema , elbow stiffness and atrophy of the soft tissues of the immobilized limb causing significant disability during healing and afterwards. This study was conducted to study the occurrence, mechanism of injury, displacement of various types of fracture according to Neer's and different modalities of the fixations in proximal humerus fractures. Then to assess and compare the functional outcome and come to conclusion about preferred modality of treatment for proximal humerus fractures.

II. Materials And Methods

This is a prospective study carried out in ACSR Govt. Medical College, Nellore from December 2012 to December 2014, twenty patients of proximal humeral fractures were attended in the casualty and OPD and were admitted in this hospital and were treated surgically.We collected records of the patients by asking the patients history and examining the patients. Essential investigations of all the patients were done. The patients were operated with various modalities of fixation. Patients followed up at regular interval.

III. Inclusion Criteria

1. All adults patients admitted with proximal humerus fractures. [Neer's classification : grade 2 to grade 4].

IV. Exclusion Criteria

1. Skeletally immature patients
2. Pathological fractures,
3. Patients with distal neurovascular deficit,
4. Polytrauma patients with an Injury Severity Score > 16
5. Shaft humerus fractures with proximal extension.

After the admission, all necessary clinical details were recorded in a trauma sheet and Radiologic evaluation of the shoulder were done according to Neer's trauma series which consists of:Atrueanteroposterior(AP)viewofthescapula, A lateral ' Y-view ' of scapula, and Anaxillaryviewand CT shoulder is taken when required. All pre operative investigations are taken and patient taken for surgery when fit.General Anaesthesia was used

Method of Treatment: All the patients were operated on either elective or emergency basis depending on whether fracture is closed or open. All patients were treated by one of the following methods.

1. Closed reduction and Percutaneous K- wires fixation.
2. Open reduction and Internal fixation with K-wire.
3. Open reduction and Internal fixation with ethibond sutures.
4. Open reduction and Internal fixation with Locking Compression Plate .
5. Closed reduction and Internal fixation by Intramedullary Nail.
6. Shoulder Hemiarthroplasty.

Post-operative care :

Post-operatively limb is immobilized in arm pouch, sutures were then removed and if secure fixation was achieved, mobilization was started in the second week with shoulder wheel exercises as per patient's tolerance. Immediate post-op X- Rays were done routine A-P and scapular view to assess the reduction of fracture and stability of fixation.If the bone was severely osteoporotic and fixation was less than rigid, motion was delayed, otherwise redisplacement of the fracture fragments could have occurred. Shoulder wheel exercises were permitted by the second or third week and gentle passive forward flexion and internal and external rotation exercises by the third or fourth week. By the fourth to sixth week, active exercises were started. Patients were discharged with arm pouch and advise to continue pendulum exercises. Patients underwent rehabilitation as per protocol.

Patients were followed from 6 weeks -6months on OPD basis at intervals of 6 Weeks, 12 Weeks, 6 Months. During this period in each visit clinical evaluation of wound healing, pain, shoulder function and range of movements were assessed and recorded. Clinically fracture was consider united when there was no tenderness at the fracture site and full shoulder function is present. Radiologically fracture was regarded as united when there is no visible fracture line.Results were evaluated by the use of Neer's shoulder score based on pain, function, range of motion and anatomy for each case assessed and recorded.

V. Results

Our study includes 20 patients brought to the causality or admitted through outpatient department basis clinical history was elicited. Careful clinical examination of skeletal system and soft tissue injuries was done and recorded. Radiographs of the arm anteroposterior and trauma series were done. Arm was immobilized in a "U' Slab and arm sling. In our series, four were in the age group of less than 20 years (20%), four in the age group of 21-40(20%), nine in the age group of 41- 60(20%), three in the age group of greater than 60 (35%). Eight out of twenty (40%) were males and twelve (60%) were females. In our study most of the patient sustained injury to the right side 11(55%) and involvement of left side is 9(45%). 18 cases(90%) were closed fracture and only two cases(10%) were open fracture. The common type of fracture observed in our series according to Neers's classification is shown in (table 1) The most common mode of injury observed in our series was road traffic accident. It accounted for thirteen of twenty patients(65%).The next common cause was history of fall accounting for six of twenty patients (30%)and one patient had a Electric shock(5%). Distribution of Surgical Treatment of patients studied is shown in (table 2). In our study six patients were treated within six hours after injury, six patients were treated between twelve to twenty four hours after injury and eight patients were treated more than twenty four hours after injury. The average time taken for clinical union was 13.4 weeks (11-16weeks) and for radiological union17.65 weeks (16 to 22 weeks).Radiological union in weeks of patients studied in (table 3) In our study Neers score study was done on patient every 1st week ,fourth week, eight week and finally at fourteen week shown in (table 4) During the follow up period six patients had post-operative infection(30%), nine patients had shoulder stiffness(45%). There were no incidences of Implant loosening, non-union, malunion & osteonecrosis of the proximal humerus. At the end of full functional recovery all patients assessed by Neer's shoulder score had restriction of abduction, forward flexion and external rotation. The average loss of abduction was 54°, forward flexion 46°, external rotation was 28°, internal rotation 31.5°, extension 7°. The average range of movements observed was abduction 126°, forward flexion 180°, extension 45°, external rotation 32°, internal rotation 58.5o. At the end of clinical and radiological union and full functional recovery the results were evaluated by Neer's score.(table 5)

VI. Discussion

Proximal humeral fractures account for almost 4 to 5% of all fractures. These fractures have a dual age distribution occurring either in young people following high energy trauma or in those older than 50 years with low velocity injuries like simple fall.Earlier these fractures were considered simple and were managed by plaster cast technique, slings and slabs,[5] but recent advances in understanding of anatomy, good surgical skills and better instrumentation has lead to various modalities for the treatment of these fractures like percutaneous pinning,[6,7] Intramedullary nailing, plate fixation [8,9]or Prosthetic replacement.Due to awareness of its

complexity and complications, these fractures have stimulated a growing interest in finding the optimal treatment. Most of the proximal humeral fractures are non-displaced or minimally displaced and stable. These can be treated non-operatively successfully with early rehabilitation. But severely displaced and comminuted fractures warrant surgical management for optimum shoulder function.In our institution we managed 20 patients with fractures of proximal humerus by open reduction and internal fixation and closed reduction and internal fixation, 8 were treated with k wires and cancellous screws, 7 were treated with locking compression plate, 3 were treated with interlocking nail,1 were treated with ethibond sutures and 1 underwent hemiarthroplasty. The average age incidence in our series of 20 patients analyzed, ranging between 18 to 65 years was 42.75 years, which was consistent with the age incidence in studies done by Neer[4,10] (55.3 yrs) and in other studies the average age was 52 year[11]. Court-Brown et al. [12] reported in their epidemiological study with an average age of 66 years, for men 56 years and for women 70 years. In our series 12 out of 20 patients were below the age of 50 years and hence the average age incidence was 42.7 years in our series. Regarding sex incidence study of literature reveals predominance of proximal humeral fractures in females in an elderly age group.[13] In our series the male to female ratio is 1:1.5, 12 among 20 patients were females. Our study shows that most Proximal humerus fracture are osteoporotic fractures in women over the age of 50. The risk of fracture begins to increase linearly in women in their fifties, this is due to lack of post-menopausal treatment and its awareness The prevalence of PHF increases as the population ages. There are two main types of risk factors for osteoporotic fractures, in particular for PHF. The first risk is fragile bones and the second is the risk of falling. The more fragile the bones are the more severe the fracture is.[1] The mode of injury commonly observed in our series was road traffic accidents accounting for 13 (65%), 6 (30%) patients had an history of fall and 01(5%) had an history of electric shock. Thus showing high velocity injury as the main mechanism. These observations was found to be consistent with the studies in literature[14,11] ,which revealed 19(45%) road traffic accidents,20(50%) history of fall and 01(5%) history of assault out of the forty cases studied. In another study 12(75%) had road traffic accident and 04(25%) had history of fall in a series of 16 cases studied. Comparing our study with the published series, we find that the emergence of high velocity injury due to Road traffic accidents has changed the complete out look towards these fractures. The study of type of fracture in our series revealed 08(40%) were 2 part fractures, 08(40%) were 3 part fractures and 02 (10%) were a 4 part fracture and 02(10%) were fracture with dislocation. Neer [4,10] study shows , 31(26.5%) were 2 part fractures, 43(36.8%) were 3 part fractures and 43(36.8%) were 4 part fractures. In study done by Dolfi Herscovici, 20(50%) were 2 part fractures, 16(40%) were 3 part fractures and 4(10%) were 4 part fractures indicating that the incidence of type of fracture is nearly consistent with the studies in literature.[11] In two part surgical neck fractures, the head was in the neutral position as both the tuberosities were attached to it, and the shaft was pulled medially due to the pull of the pectoralis major. Traction, with flexion and some adduction was required to reduce the fracture. In the case where reduction was not possible, there was found to be soft tissue interposition which was blocking reduction, on open reduction. [15,6,16,17,18] Displaced two part greater tuberosity fractures were usually found retracted posteriorly and superiorly and closed reduction was difficult. It they were reduced anatomically however, a malunion could have occurred that would have later blocked gleno-humeral motion. Hence open reduction and cancellous screw transfixation was carried out with good results.[19,20,16,7] Displaced three part fractures were difficult to reduce and still more difficult to hold reduced (unstable Fracture), probably because if the greater tuberosity was attached to the head, it was pulled into external rotation with the humeral articular surface facing forward. If lesser tuberosity was attached to it, the articular surface was facing posteriorly. The shaft was pulled medially by the pectoralis major and probably the long head of biceps was caught between the fracture fragment and prevented reduction. Moreover, since the fracture usually occurred in osteoporotic bone, vigorous manipulation and repeated attempts at reduction could cause further communition at the fracture site. The similar finding has been found in literature published by various authors.[6,20,21,12,7] In our study we had similar results. Various modes of internal fixation was employed in our series of 20 patients 7(35%) underwent open reduction and internal fixation with buttress plate, 08(40%) underwent fixation with K-wires and cancellous screws, 01(5%) underwent prosthetic replacement and 01(5%) underwent ethibond sutures. In study of literature , study done by Neer , 43(36.8%) underwent open reduction and internal fixation with buttress plate and tension band wiring, 43(36.8%) of 4 part fractures and selected 3 part fractures underwent prosthetic replacement.[4,10] In another series of 15 patients 14(93.3%) underwent internal fixation with K-wires/cancellous screws and only one underwent fixation with AO buttress plate.[60] Many authors in their published literature have mentioned that, in management of displaced proximal humerus, good reduction is mandatory and stable fixation gave good results. They also reported that open reduction and internal fixation in young adults gives better outcome. In older persons the quality of bone and soft tissue disruption should be given importance, and it is better to fix percutaneously.[6,20,16,21,12,17,7] In our series 06(30%) had shoulder stiffness and 06(30%) had post operative infection . Compared to other series [4,10,22] we had stiffness in 30 % of the patients, most of these patients were elderly who were unwilling to undergo rigorous rehabilitation programme. 30% of our patients had post operative infection, 03 of them had superficial infection which

subsided with systemic antibiotics, 02 patient had pin tract infection, which subsided after removal of 'K' wires, but one patient had deep seated infection, for which repeated debridement and systemic antibiotic was given and infection got under control,but later went for arthritis and failure outcome. In patients complicated with Stiffnes, phase wise physiotherapy was started after clinical union was confirmed. They ended up with satisfactory results .The complications in other series like study done by Neer [4,10] 03 had post operative infection , 04 had malunion ,07 had non union and 08 had avascular necrosis of the humeral head[4,23] . In an other series of 15 patients 02 had implant loosening and 02 had avascular necrosis of the humeral head.[22] Different studies, which have used the Neer's scoring system for assessment of results, demonstrate a fairly similar pattern of results with 70 - 80% patients having satisfactory to excellent results and 20 - 30% having un-satisfactory to failure results. In our series 12 cases of two part,three part and four part fractures and fracture dislocation treated with open reduction and internal fixation, 1 (05%) excellent results, 07 (35%) had satisfactory results, 03 (15%) had unsatisfactory results and 1(05%) was a failure. When compared with other studies in case of Neer's, (63.3%) had excellent and satisfactory results.[4,10] and in other study of 3 part fracture (93.3%) had excellent and satisfactory results all of them had underwent OR & IF with K wires/cancellous screws and one failure in this series was fixation with AO buttress plate. This implies that our results with OR& IF almost correlated with the studies in literature but improved results are seen in minimal fixation techniques. Studies reveal that results of percutaneous pinning are more superior to OR & IF regarding functional outcome. Jaberg and associates study shows, 91.6% of the cases had excellent (70.8%) and satisfactory (20.8%) results with 04 (8.3%) failures . In our series four patients underwent percutaneous pinning two had excellent results one satisfactory and one unsatisfactory. Results pertaining to prosthetic replacement were studied studies reveal that prosthetic replacement is of chores in 4 part fracture and selected 3 part fracture in elderly. Neer study shows (11.6%) had excellent (79%) had satisfactory results only (9.4%) had unsatisfactory and failure. In another study (44.3%) had excellent results, (31.4%) had satisfactory results and (24.3%) had unsatisfactory results. In our series of 20 patients, 01 underwent prosthetic replacement for four part fracture with dislocation which showed satisfactory result. In the overall results analyzed in our series 70% of the patients had excellent and satisfactory results and 30% had unsatisfactory and failure outcome. This was observed to be on par with the studies in literatures[22,11,24,25] The unsatisfactory results in our series was seen mostly in elderly patients who were reluctant or not compatible for rigorous rehabilitation programme. Decreased immunity status lead to infection in few of these patients resulting in unsatisfactory and failure outcome.

VII. Conclusion

The incidence of proximal humeral fractures has increased in last few years due to changes in life style and increase in road traffic accidents. The best management in these injuries is still inconclusive. Studies have shown non-operative and operative treatments, both give favourable results, and the confusion remains.Clinical evaluation, obtaining proper radiological views, age of the patient and activity levels holds the key for realistic approach and proper surgical management of these complex fractures.For complex fracture pattern 3-D CT scan was used to classify fracture according to Neer's classification and to determine the treatment of choice. In younger patients, proximal humeral fractures usually are caused by high- energy trauma(65%). In older patients with osteoporosis, even less severe trauma (fall in 35%) can produce significant injury. They occur more frequently in older patients after the cancellous bone has become weakened by senility and osteoporosis.Fractures of the proximal humerus are complex injuries involving two articulating surfaces, the glenohumeral joint and the subacromial arch. The options as to the management modality used depend on the pattern of the fracture, the quality of the bone encountered, the patient's goals and the surgeon's familiarity with the techniques. Principle of fixation is reconstruction of the articular surface, including the restoration of the anatomy, stable fixation, with minimal injury to the soft tissues preserving the vascular supply, should be applied.Treatment options for these displaced fractures include closed reduction and percutaneous k- wires fixation (20% cases) open reduction and internal fixation with k-wires and cancellous screws (20 % cases), open reduction and internal fixation withlocking compression plate (35%), open reduction and internal fixation with ethibond sutures (5%) , closed reduction and internal fixation by intramedullary nailing (15%) and shoulder hemiarthroplasty (5%).Biologically the technique of closed reduction and percutaneous pinning is good from the standpoint of retaining the vascularity of the humeral head. It can be used for un-displaced or displaced two, three or four part fracture of the proximal humerus without communition, in the younger age groups with good bone quality. In older individuals it is good to fix with percutaneous 'K' wires, keeping in mind about quality of bone (osteoporosis) and also to shorten the period of surgery.Patients who has two part greater tuberosity avulsion fracture can be treated by closed reduction and percutaneous screws fixation or open reduction and internal fixation with ethibond sutures. Patients who have metaphyseal comminution are more appropriately treated by open reduction and Internal fixation with a plate (35% cases). In patients who have a three-part fracture with appreciable displacement of the greater tuberosity, open reduction, limited dissection

and internal fixation should be performed.Literature says anatomical neck fractures of proximal humerus account for only 0.54% of proximal humeral fractures. Displaced anatomical neck fractures cause complete disruption of blood supply to the articular segment. The success rate of closed pinning and headless screw fixation is very less. The chance of avascular necrosis of humeral head increases by 5 times in these type of fractures. The only preferred treatment for displaced anatomical neck fracture is primary hemiarthroplasty. The Neer's four part fractures and 4-part fracture dislocation arerare compared to other fractures of proximal humerus. The chances of avascular necrosis is very high. The Neer's primary hemiarthroplasty is preferred treatment.Early open reduction and internal fixation prevents complications like Frozen shoulder, malunion and late osteoarthritis.There is direct relationship between displaced proximal humeral fractures, between fractures severity (i.e. greater displacement, communition) and eventual results. The more the initial insult, worse the prognosis.Rehabilitation is the key to success. After the fracture is stabilized by whatever means, continuous active followed by passive motion should be started. On discharge, the patients must be instructedregarding physiotheraphy exercises to be done several times a day.Results assessed with standard shoulder scoring system of Neer's we have achieved 70% of excellent and satisfactory results,25% unsatisfactory and 5% failure outcome.

Conflict Of Interest

None of the authors has any conflict of interest.

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References

[1]. Court-Brown CM, Garg A, McQueen M, et al. The epidemiology of proximal humeral fractures. Acta Orthop Scand 2001 ; 72 : 365-371.
[2]. Terry Canale's Campbell's Operative Orthopaedics , Vol-3: 9th edition, 1998 Mosby Publishers, USA Pg 2286-2296
[3]. Bucholz and Hecman' s Rockwood and Green Fractures in Adults V ol-1: 5th Ed 2001, Lippincott Williams and Wilkins Company, USA Pg 10055-1107
[4]. Neer C.S: Displaced Proximal humeral fractures Part –I Classification and Evaluation JBJS (am) 1970:52:1077-1089
[5]. G. Tytherleigh strong, "The Epidemiology of Humeral shaft fracture" JBJS 1998; March Vol. 80B, No. 2.
[6]. M Pritsch, A. Greental, "Closed pinning for humeral fractures" JBJS 1997; 79B: Supp III.
[7]. Herbert Resch, "Percutaneous pinning of 3-4 part fractures of the proximal humerus. JBJS March 1997.
[8]. Dimakopoulos P, Potamitis N, Lambiris E, et al. Hemiarthroplasty in the treatment of comminuted intraarticular fractures of the proximal humerus. Clin Orthop. Aug 1997;(341):7-11.
[9]. C. Michael Robinson, Richard S. Page, "Hemiarthroplasty for treatment of proximal humeral fractures" JBJS Am 2003;85: 1215-23.
[10]. Neer C.S: Displaced proximal humeral fractures Part-II Treatment of three and four part displacement JBJS (am) 1970:52:1090-1101.
[11]. Dolfi Herscovici Jr,Darrick.T, Saunders,Marie.P.Johnson,et al : Per-cutaneous fixation of proximal humeral fracturesClin.Orthop2000:375:97-104.
[12]. Richard F Kyle, "Current techniques in proximal fractures" JBJS 1997; 79B: Supp IV.
[13]. Steven .H.Rose Joseph Melton Bernard.F.Morrey et al Epidemiological features of humeral fractures Clin. Orthop-1982:168:24-30.
[14]. Kojy, Yamamoto R: Surgical Treatment of complex fractures of the proximal humerus. Clin.Orthop-1996:327:225-237.
[15]. Y . Bellumore P . Determe P . bonnevialle, - Preliminary results of internal fixation combined with distal-proximal Kapandji nailing in fractures of the head and tuberosities of the humerus-JBJS(BR) 1997:79 B. Suppl.
[16]. Lill H, Korner J, Glasmacher S, Hepp P, "Crossed screw osteosynthesis of proximal humerus fractures". Unfallchirarg. 2001 Sep; 104(9):852-9.
[17]. Takeuchi R, Koshino T "Minimally invasive fixation for unstable two-part proximal humeral fractures: surgical techniques and clinical results using J- nails". Jorthop Trauma. 2002 Jul; 16(6):403-8.
[18]. Michael A Wirth MD, Kirk L Jenson, - Fractures dislocation of the proximal part of the humerus with retroperitonial displacement of the humeral head, JBJS-Vol 79-A, No. 5 May 1997.
[19]. Rockwood and Matsen "The shoulder", W.B. Saunders Company, 1993; 2nd edition. 337-379.
[20]. Darder A. Darder AJ, "Four part displaced proximal humerus fractures; operative treatment using Kirschner wire and a tension band" J. Orthop. Trauma 1993; 7(6):497-505.
[21]. Lill H, Heep P, Rose T, "The angle stable locking-proximal-humerus plate for proximal humeral fractures using a small anterior-lateral deltoid-splitting- approach". Zenthralbl Chir. 2004 Jan; 129(1) : 43-8
[22]. Richard .J Hawkins , Robert.H.Bell, Kevin Gurr: the three part fractures of proximal part of humerus JBJS (am) 1986: 68-A: 1410-14.
[23]. Bigliani LU, McCluskey GM 3rd. Prosthetic replacement in acute fractures of the proximal humerus. Semin Arthroplasty. Oct 1990;1(2):129-37.
[24]. Jaberg H,Warner JJ, Jakob RP, et al. Percutaneous stabilization of unstable fractures of the humerus. J Bone Joint Surg Am 1992;74:508-515.
[25]. Kojy, Yamamoto R: Surgical Treatment of complex fractures of the proximal humerus. Clin.Orthop-1996:327:225-237.

Cases:

Case Of Or&If With Locking Compression Plate

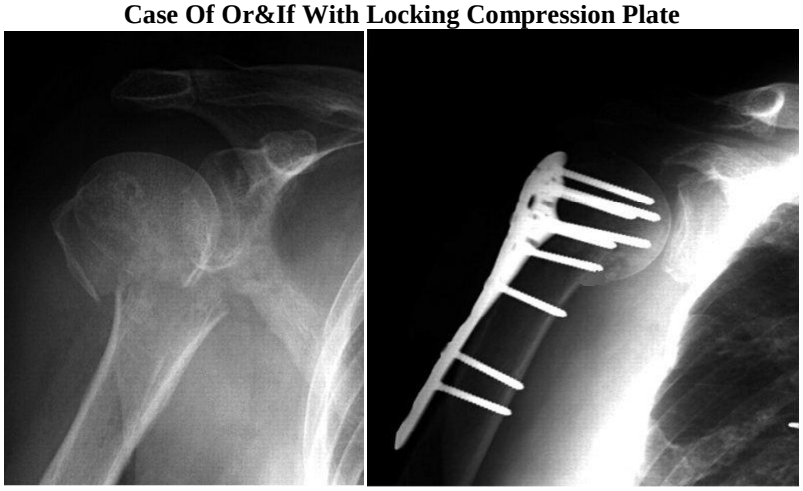

FIG 1: pre op x-ray: three part fracture**FIG 2:** follow up x-ray at 16 weeks revealing fracture union

Range Of Motion At Full Follow Up

FIG 3: Forward Flexion**FIG 4 :** Abduction **FIG 5 :** External Rotation

FIG 6 : Internal Rotation

Another Case Of Crif With K-Wires

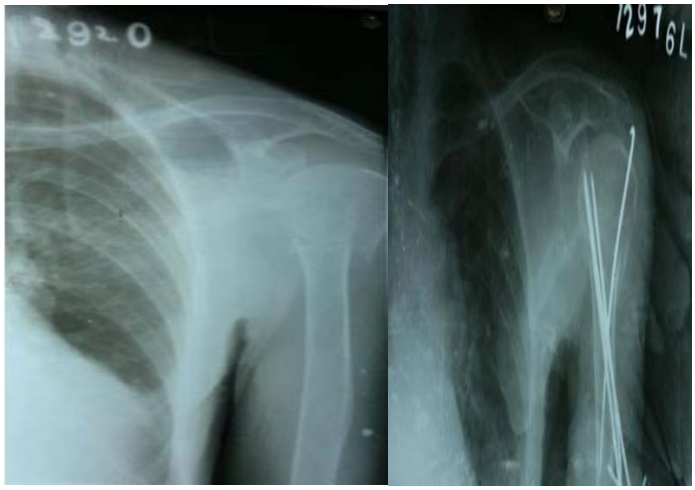

FIG7: Pre-op x-ray: two part fracture**FIG 8:** Fixation with K-wires

Range Of Motion At Full Follow Up

Fig 9: Forward Flexon **Fig 10 :** Abduction **fig11:** External Rotation **Fig 12:** Int. Rotation

Case Of Cr&If With Intramedullary Nailing

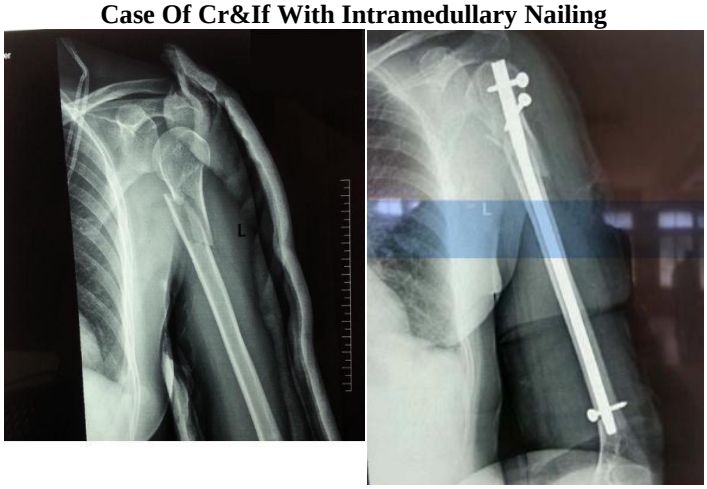

FIG 13: Pre-op x-ray:two part fracture**FIG 14:** Fixation with Intramedullary nail

Range Of Motion At Full Follow Up



Fig 15: Forward Flexion**Fig 16:**Abduction**Fig 17:**External Rotation

Fig 18:Internal Rotation

Case Of Prosthetic Replacement


Fig 19:PREOP X-Ray: Four part # with dislocation**FIG 43:**post op x-ray with prosthesis insertion

Tables

Table 1

Neers type of #	No. of patients	%
2 parts	8	40
3 parts	8	40
4 parts	2	10
Fracture with dislocation	2	10
Total	20	100

Table 2

Surgical Treatment	Number of patients (20)	%
ORIF with LCP	7	35
Percutaneous pinning	4	20
ORIF with I.M Nail	3	15
ORIF with K wires	2	10
ORIF with K wires and Cancellous screws	2	10
Shoulder Hemiarthroplasty	1	5
ORIF with Ethibond sutures	1	5

Table 3

Radiological union in weeks	Number of patients	%
16-18	15	75
19-20	4	20
>20	1	5
Total	20	100

Table 4

Neer's Score	1st week	4th week	8th week	Final
<70	20(100%)	17(85%)	5(25%)	1(5%)
70-79	0	3(15%)	12(60%)	5(25%)
80-89	0	0	3(15%)	10(50%)
90&above	0	0	0	4 (20%)
Total	20(100%)	20(100%)	20(100%)	20(100%)
Mean ± SD	52.10±6.50	62.00±7.23	71.95±7.82	80.95±8.41

Table 5

Results	Number of Patients	%
Excellent	4	20
Satisfactory	10	50
Unstaisfactory	5	25
Failure	1	5
Total	20	100