

ORIGINAL RESEARCH

## CLINICAL STUDY OF SURGICAL MANAGEMENT OF FRACTURE OF LOWER ONE THIRD OF HUMERUS BY EXTRA ARTICULAR PLATING IN ADULTS

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### ABSTRACT

**Background:** To study the surgical management of fractures of lower one third of humerus by Extra articular distal humerus locking compression plate in adults.

**Materials and Methods:** The present study was done in Govt Medical College /Hospital, Suryapet from December 2021 to May 2022. 20 cases of lower one third humerus shaft fractures were treated with open reduction and internal fixation with Extra Articular Distal Humerus Locking Compression Plates (EADHP).

**Results:** 6 patients were (30%) in the age group of 18-35 yrs & 51-65 yrs each. 14(70%) were Male patients. 13(65%) Left side involved patients. 16(80%) patients sustained injury due to road traffic accident. 12 B1 Type was most common pattern. 18(90%) were closed fractures. 3(15%) were associated with multiple injuries Mean of time for Fracture union in 18 patients (90%) was 13.9 weeks. 3(15%) patients developed post-operative complications. Radial nerve neuropraxia 2(10%) cases and Superficial infection 1(5%) case. Average DASH score was 17.6 with range 12.5 to 33.5 points. Functional outcome as per Mayo Elbow Performance Score was excellent in 18(90%) cases; good in 2(10%) cases.

**Conclusion:** We conclude as per AO principles that early operative intervention with Extrarticular Distal Humerus Locking Compression Plating (EADHP) on postero-lateral column of humerus for these fractures will result in excellent functional outcome.

**Keywords:** Humerus shaft fractures, Extrarticular Distal Humerus Locking Compression Plating (EADHP), DASH Score, and Radial nerve neuropraxia.

## INTRODUCTION

Diaphyseal fractures of the humerus account for 1–3% of all fractures among adults and 20% of all fractures of the humerus.<sup>[1,2,3]</sup> There is a bimodal distribution with respect to the patient's age and gender. Peaks of incidence were described primarily in male patients in the 21 to 30 age and a larger peak in older females 60 to 80 years old.<sup>[4]</sup>

The most common causes of these fractures were falls in the elderly population and sports injuries or road traffic accidents in the younger patients. The patients with an open humeral shaft fractures have often sustained high-energy trauma and have an increased incidence of radial nerve palsy, fracture comminution, ipsilateral upper extremity fractures and systemic injuries. Appropriate treatment should be based on a classification that describes the fracture pattern, easily reproducible and allows development of treatment guidelines.

Over the past two decades, the AO/OTA Classification has been the most accepted classification in the literature. It is reproducible and allows not only descriptive, but also treatment guidelines for each defined fracture type. Extra articular fractures of distal humerus occurs at an anatomical watershed between the humerus shaft and the intercondylar region. These are relatively rare injuries and have been in the limelight owing to a higher incidence of radial nerve injuries, as well as the dilemmas surrounding their management. These injuries are often displaced and have complex fracture pattern with associated comminution. For these fractures many studies exist, that show that best results are achieved if physical therapy is initiated early. Without doubt, the main prerequisite for early postoperative motion is stable fracture fixation and anatomical joint restoration.

However, it is also known that this goal is often difficult to obtain because of Complex joint anatomy, substantial forces across the elbow region, diminished bone mineral quality and lack of primary stability results in increased complication rates and poor results. Treatment of these fractures has evolved from conservative modalities like cast immobilization and functional brace to operative interventions like External fixator application, Intramedullary Nailing and Plate Osteosynthesis. The goal of operative treatment of humeral shaft fractures is to reestablish length, alignment and rotation with stable fixation that allows early motion and ideally early weight bearing on the fractured extremity.<sup>[5]</sup> It depends on a thorough knowledge of anatomy, surgical indications, reduction techniques, proper implants, patient functions and expectations.

External fixator generally is reserved for high-energy gunshot wounds, fractures with extensive soft tissue injuries and fractures with massive contamination. Intra medullary nailing is often difficult to be executed at the distal humerus fractures due to the anatomical zone of transition, where the medullary canal becomes almost flat.

Plate Osteosynthesis remains the gold standard for fixation of distal humeral shaft fractures. Plating can be used for distal third shaft fractures with proximal and distal extension and for open fractures. Conventional plating methods like Dynamic Compression plates, like 4.5-mm Limited contact dynamic compression plate (LC-DCP) with 4.5-mm screws with purchase of eight cortices both proximal and distal to the fracture in this area are often challenging due to the presence of osteoporosis and smaller distal fragment engaging less number of screws. Although biomechanically stable, the precontoured Lecestre plate, the lambda plate and recon

plate did not prevail in clinical use, since anatomical contouring was difficult to achieve. Double columnar plating using two 3.5-mm plates in orthogonal (90–90) or parallel (180°) patterns were also generally used, but nonunions and infections due to extensive soft tissue dissection and periosteal stripping is seen with double-plating techniques.<sup>[6,7]</sup>

The Extra articular distal humerus locking compression plate has been specifically designed to address these complex fractures. It is anatomically pre-contoured to be placed posteriorly along the central humeral diaphysis proximally and on the lateral supracondylar ridge distally. The increased locking screw density in the lateral column affords a strong fixation of the distal fragment.

An attempt has been made in this dissertation to evaluate the results of surgical management of fractures of distal one third humerus using extra articular Distal Humerus Locking Compression Plates. Patients selected for this operation were of the age group 18 years and above and with fractures of lower one third humerus shaft who got admitted in Govt Medical College/Hospital, Suryapet.

### **Aims and objectives**

- To study the surgical management of fractures of lower one third of humerus by extra articular distal humerus locking compression plate in adults.
- To study the problems and difficulties encountered in surgical procedure.
- To study the postoperative complications

### **MATERIALS & METHODS**

**Source of Data:** Study includes 20 patients admitted in department of Orthopedics from OPD and casualty of Govt Medical College/Hospital, Suryapet, for fracture of distal third shaft Humerus from December 2021 to May 2022.

**Study Design:** prospective study.

**Sample size:** 20 cases.

**Method of Collection of Data:** History by verbal communication. Clinical examination both local and systemic. Blood investigations like complete blood picture, Bleeding time, Clotting time, Random blood sugar, Renal function test, Serum electrolytes, HIV and HBSAG. Radiological examination: - x-ray arm with shoulder and elbow both AP & Lateral view, chest x-ray PA view ECG recordings Pre anaesthetic checkup. Written and informed consent. Photographic documentation of fracture both preoperative & post-operative. Templating data. Post-operative wound care. Post-operative functional outcome evaluation. To assess the functional outcome of treatment through regular clinical and radiological follow up at 6 weeks, 12 weeks, 24 weeks and 1 year intervals for assessment of pain, range of motion and stability at elbow joint according to mayo elbow performance score, Dash score & any complications.

### **Inclusion Criteria:**

1. All patients 18 years of age and older, with completely deviated lower 1/3<sup>rd</sup> humeral shaft fractures.
2. All fractures without intra articular extension.
3. Patients who are willing to be part of the study.

4. Open fractures with Gustilo Anderson classification type 1 and 2.

**Exclusion Criteria:**

1. All Patients less than 18 years of age.
2. Those whose fracture occurred more than 21 days ago and those with neurovascular-associated injury will be excluded.
3. Patients who are not willing to be part of the study

20 cases of distal humerus fractures were admitted and treated by open reduction and internal fixation with distal humerus extraarticular plate. Preoperatively all patients were immobilized in U slab.

**Pre-Operative Planning:** In every case, high quality radiographs of the whole arm with elbow and shoulder joint in antero-posterior and lateral view were obtained. Evaluation of radiograph was done to determine reduction of fracture fragments, templating and the surgical steps.

**Anaesthesia:** The surgery was performed under General anaesthesia in all 20 cases

**Tourniquet:** Tourniquet was applied as far proximal on the arm as possible.

**Position of the Patient:** The patient was placed in the lateral decubitus position with affected side up and with shoulder at 90 degrees of abduction and elbow at 90 degree of flexion, over bolster.

**Implants & Screws:** We used the 3.5 mm LCP extraarticular distal humerus plate (EADHP) system. It is a —Jl shaped plate which is precontoured for application on the posterolateral surface of the distal humerus. Plate is available in six different lengths in both left- and right-specific orientations. Depending on plate length, it has between four and 14 elongated comb holes proximally, the plate uses 3.5 mm locking and nonlocking screw options in the humeral shaft. Locking screws create a fixed- angle construct, providing angular stability, whereas the combi-holes can be used to provide inter-fragmentary or dynamic axial compression. Distally, it curves along the lateral supracondylar ridge thus avoiding the olecranon fossa and has five screw holes angled medially for achieving a strong purchase and the two most distal screw holes are angled towards the capitellum and trochlea, which allows longer locking screws to be placed distally. The plate head is tapered to minimize soft tissue irritation.

**Post-Operative Care:** The drain is removed 48 hrs after surgery and active range of motion is begun 7 days after surgery. Functional evaluation: - In our study open reduction and internal fixation for all 20 patients with follow up period of 1 year were evaluated by Mayo Elbow Performance Score and Disabilities Arm Shoulder Hand Score.

**Dash Scoring System:** The Disabilities of the Arm, Shoulder and Hand (Dash) questionnaire is a 30- item questionnaire that looks at the ability of a patient to perform certain upper extremity activities. This questionnaire is a self-report questionnaire that patients can rate difficulty and interference with daily life on a 5 point Likert scale. Please rate your ability to do the following activities in the last week by circling the number below the appropriate response. A Dash score may not be calculated if there are greater than 3 missing items. Dash Disability/Symptom Score = [(sum of n responses) - 1] x 25, where n is equal to the number of completed responses.

**RESULTS****Table 1: Age Wise Distribution of Study Participants (N=20)**

Age Group (Years)	Number Of Cases	Percentage
18-35	6	30%
36-50	4	20%
51-65	6	30%
66-80	4	20%
Total	20	100%

In the present study majority of cases are in 18-35 years and 51-65 years age group.

**Table 2: Sex Wise Distribution of Study Participants**

Sex	Number of Cases	Percentage
Male	14	70%
Female	6	30%
Total	20	100%

In the present study 70% were male patients.

**Table 3: Side of Involvement Wise Distribution of Study Participants (N=20)**

Side	Number of Cases	Percentage
Left	13	65%
Right	7	35%
Total	20	100%

In the present study left upper limb was involved in 65% of cases and right side was involved in 35 % cases.

**Table 4: Mode of Injury Wise Distribution of Study Participants (N=20)**

Mode of Injury	Number of Cases	Percentage
Rta	16	80%
Fall	4	20%
Total	20	100%

In the present study 80% patient's sustained injuries due to road traffic accidents and 20% cases by fall.

**Table 5: AO Classification of Fracture Wise Distribution of Study Participants (N=20)**

Type	Number of Cases	Percentage
12-A1	1	5%
12-A2	3	15%

12-B1	7	35%
12-B2	5	25%
12-B3	2	10%
12-C1	2	10%
Total	20	100%

In this present study majority of cases were of 12-b1 type.

**Table 6: Type of Injury Wise Distribution of Study Participants (N=20)**

Type of Injury	Number of Cases	Percentage
Closed	18	90%
Open	2	10%
Total	20	100%

In the present study 90% cases were closed fractures and only 10% cases were open fractures.

**Table 7: Associated Injuries Wise Distribution of Study Participants (N=20)**

Injury	Number of Cases	Percentage
Isolated Injuries	17	85%
Multiple Injuries	3	15%
Total	20	100%

In the present study 85% cases were isolated distal third humerus fracture and 15% cases had multiple injuries.

**Table 8: Post-Operative Complications Wise Distribution of Study Participants (N=20)**

Complications	Number of Cases	Percentage
Infection	1	5%
Radial Neuro – Praxia	2	10%
No Complica – Tions	17	85%
Total	20	100%

In the present study only 15% patients had complications, remaining 85% cases had no complications.

**Table 9: Time of Fracture Union Wise Distribution of Study Participants (N=20)**

Time of Union (Weeks)	Number of Cases	Percentage
12-16WKS	18	90%
16-24WKS	2	10%
Total	20	100%

In the present study 90% patients had union in 12-16 weeks, 10% patients had union in 16-24 weeks.

**Table 10: Postoperative Pain 15 Days after the Surgery Wise Distribution of Study Participants (N=20)**

Type Of Pain	Number of Patients	Percentage
No Pain	17	85%
Mild Pain	3	15%
Moderate Pain	Nil	Nil
Severe Pain	Nil	Nil
Total	20	100%

In the present study 85% patients were pain free and 15% patients had mild pain postoperatively 15 days after surgery.

**Table 11: Rom of Elbow as Per Mayo Elbow Performance Score Wise Distribution of Study Participants (N=20)**

Range of Motion	Number of Patients	Percentage
>100 <sup>0</sup>	19	95%
50-100 <sup>0</sup>	1	5%
<50 <sup>0</sup>	NIL	Nil
Total	20	100%

In the present study 95% of patients had more than 100<sup>0</sup> range of motion.

**Table 12: Stability of Elbow as Per Mayo Elbow Score Wise Distribution of Study Participants (N=20)**

Stability	Number of Cases	Percentage
Stable	19	95%
Moderately Stable	1	5%
Unstable	Nil	Nil
Total	20	100%

In the present study 95% of patients had stable elbow joint.

**Table 13: Results By Mayo Elbow Performance Score Wise Distribution of Study Participants (N=20)**

Mayo Elbow Grading (Total Score 100)	Number of Cases	Percentage
Excellent(>90)	18	90%
Good(75-89)	2	10%
Fair(60-74)	Nil	Nil
Poor(<59)	Nil	Nil
Total	20	100%

In the present study 90% patients had excellent and 10% patients had good results.

**Table 14: Results By Dash Score Wise Distribution of Study Participants (N=20)**

Dash Score At 1year	Number of Cases	Percentage
0-20	18	90%
21-40	2	10%
41-60	Nil	Nil
61-80	Nil	Nil
81-100	Nil	Nil
Total	20	100%

Results by dash scoring in the present study group show no disabilities in 90% patients.

## DISCUSSION

Distal Third Humerus Shaft Fractures Remain One of the most Challenging Orthopaedic Surgeries. They Are Commonly Multi-Fragmented; Occur In Osteopenic Bone With Peri Articular And Complex Joint Anatomy. Even After Anatomical And Stable Reduction Of Fractures, End Results Are Often Associated With Elbow Stiffness, Nonunion, Mal Union And Pain. A Painless, Stable And Mobile Elbow Joint Is Desirable As It Allows The Hand To Conduct The Activities Of Daily Living.

**Age Distribution:** In Our Series The Mean Of Age Patients Was 48.1 Yrs, Ranging From 18 Yrs To 80 Yrs. John T. Capo et al,<sup>[8]</sup> 2013 (N=21) Series Reported That The Average Age Of The Patients At The Time Of Operation Were 39 Years (Range 19–91 Years). Fawi et al,<sup>[9]</sup> 2014 (N=23) Series Reported That the Mean Age of Patients Was 47.5 Years; Range 18 Years To 89 Years. In Our Study The Mean Of Age Group Belonged To 4<sup>th</sup> Decade. This Is Comparable with That of Fawi et al,<sup>[9]</sup> 2014 and Yashwanth Singh Tanwar et al,<sup>[10]</sup> 2016 Studies. But The Study Conducted By John T Capo et al,<sup>[34]</sup> 2013 The Average Age Group Was 3<sup>rd</sup> Decade.

**Sex Distribution:** Males Are Predominantly Prone To Fracture Shaft Of Humerus Due To High Incidence Of Motor Vehicular Accidents. Our Study, There Were 14(70%) Male Patients and 6(30%) Female Patients.

John T.Capo et al,<sup>[8]</sup> 2013 (N=21) Series Reported That There Were 12(57.2%) Male Patients and 9 (42.8%) Female Patients. In Our Study Majority Of Patients Were Males, As They Are More Prone To Road Traffic Accidents, Male Gender Was Affected More. Our Study Was Comparable With The Study Of John T Capo et al,<sup>[8]</sup> 2013, Yashwanth Singh Tanwar et al,<sup>[10]</sup> 2016, Vinit Vimal Karn et al,<sup>[11]</sup> 2017 Studies, Which Shows Increased Prevalence Towards The Male Gender.

**Mode of Injury Distribution:** Our Study (N=20) Shows Fractures Attained Due To Road Traffic Accident Were 16 (80%) And Fall While Walking In 4 (20%) Cases.

Yashwant Singh Tanwar et al,<sup>[10]</sup> 2016 (N=20) Series Reported The Most Com- Mon Mode Of Injury Was Road Traffic Accidents 11(55%), Remaining 9(45%) Patients Had Fall.



**Mode of Injury among Study Subjects:** In Our Study Majority Of Injuries Were Due To High Energy Trauma By Road Traffic Accidents. Only Few Cases Are Due To Simple Fall. This Was Comparable With Yashwanth Singh Tanwar et al,<sup>[10]</sup> 2016, Vinit Vimal Karn et al,<sup>[11]</sup> 2017 Series, As There Were Majority Of Injuries Due To Road Traffic Accidents Only.

**Side of Limb Involvement Distribution:** In Our Study (N=20) Left Side Involvement in 13 (65%) Patients and Right Side in- Vovement in 7(35%) Patients.

Fawi et al,<sup>[9]</sup> 2014 (N=23) Series Reported That There Were 12(52.2%) Patients with Right-Sided Injuries and 11(47.8%) Patients Were Left-Sided Injuries.

Sushant Uday Chavan et al,<sup>[12]</sup> 2017 (N=47) Series Reported Left Sided Involvement Was More Frequent Comprising Of 31 (65.9%) Cases And Right Sided Involvement In 16 (34.1%) Cases.

**Side of Limb Involvement Among Study Subjects:** In Our Study The Majority Of Injuries Were On The Non Dominant Left Arm. Our Study Was Comparable With Sushant Uday Chavan et al,<sup>[12]</sup> 2017 Series, Where Majority Of Injuries Were On The Non Dominant Left Arm. But Fawi et al,<sup>[9]</sup> 2014 Series Showed That Out Of 23 Cases In Their Study, 12 Cases Were Of Dominant Arm Right Sided And 11 Cases Were Left Sided Injuries.

**Type of Injury Distribution:** In Our Study (N=20) There Were Only 2(10%) Patients with Open Injuries, Remaining Were 18(90%) Closed Fractures.

John A. Scolaro, Md et al,<sup>[13]</sup> 2014 (N=40) Series Reported That There Were 13(32.5%) Open Injuries, Remaining 27 (68.5%) Were Closed Fractures.

**Fracture Classification Types According To Ao/Ota Classification Distribution:** In Our Study (N=20) There Were 1 (5%) Fracture of 12 A1 Type, 3(15%) Fractures Were 12 A2 Type, 7(35%) Fractures Were 12 B1 Type, 5(25%) Fractures Were 12 B2 Type, 2(10%) Fractures Were 12 B3 Type and 2(10%) Fractures Were 12 C1 Type. 12 B1 Was The Most Common Type Of Our Study.

Fawi et al,<sup>[9]</sup> 2014 (N=23) Series Reported That There Were 17 (73.92%) Fractures of 12-A2 Type, 3(13.04%) Fractures of 12-C2 Type and 3(13.04%) Fractures of 13- A2 Type Injuries. 12 A2 Type Was The Most Common Type Of Fracture.

In Our Study The Majority Of Fractures According To Ao Classification Were Spiral Wedge Fractures And They Were Graded As 12 B1. Fawi et al,<sup>[9]</sup> 2014 Series Re- Ported That There Were Majority Of Oblique Fractures (12 A2) Type In Their Series. But Where As Yashwanth Singh Tanwar et al,<sup>[10]</sup> 2016 Series And Jain et al,<sup>[14]</sup> 2017 Series Reported That Spiral Wedge Fractures(12 B1) Were Their Major Fractures In Their Respective Study.

**Time Interval from Injury to Surgery Distribution:** In Our Study (N=20) the Mean Interval from Injury to Surgical Fixation of Fractures Was 2.3 Days (Ranges from 1-7 Days).

Fawi et al,<sup>[9]</sup> 2014 (N=23) Series Reported That The Mean Interval From Injury To Surgery Was 4.2 Days (Ranges From 1-11 Days). In Our Study All Fractures Were Acute Fractures And All Were Managed By Open Re- Duction And Internal Fixation By Extra Articular Plating System. Majority of Cases Were Operated On the Third Day after Injury with Mean Time Interval between Injury And Surgery Was 2.3 Days. Fawi et al,<sup>[9]</sup> 2014 Series Reported The Mean Time As 4.2 Days. Their Study Excluded Two Patients With Non-Union And Two Patients With Failed Conservative Management, As They Were Taken For Surgery After At A

Later Stage. Yashwant Singh Tanwar et al,<sup>[10]</sup> 2016 Series Reported The Mean Interval As 1.8 Days And Excluded Two Non-Union Cases Following Conservative Management And Which Were Operated At 3 And 4 Month Interval, Respectively.

**Associated Injuries Distribution:** In Our Study (N=20) There Were 3 (15%) Patients with Multiple Injuries and 17(85%) Patients with Isolated Distal Third Shaft Fracture. In Our Study There Was One Patient With Ipsilateral Distal End Radius Fracture, One Patient With Ipsilateral Tibia Fracture, And One Patient With Ipsilateral Proximal Radius Fracture. Yashwanth Singh Tanwar et al,<sup>[10]</sup> 2016 Series Reported That There Were Three Patients Who Sustained Additional Injuries; Two Had An Ipsilateral Radial Fracture, While One Had An Ipsilateral Tibial Shaft Fracture. Jain et al,<sup>[14]</sup> 2017 Series Re-Ported That Multiple Injuries Were Seen In 10 Patients. Eight Patients Had Associated Long Bone Fractures, Of Which Five Patients Had Lower Extremity Fractures And Three Patients Had Ipsilateral Upper Extremity Fractures, Two Patients With Blunt Abdominal Trauma, One With Spine Injury And Another With Blunt Chest Trauma And Associated Spine Injury.

**Time of Fracture Union Distribution:** In Our Study (N=20) Mean Time to Radiographic Fracture Union Was 13.9 Weeks (Range 12-24 weeks).

Fawi et al,<sup>[9]</sup> 2014 (N=23) Series Reported the Average Time To Radiographic Union As 15.7 Weeks (Range 9–34 Weeks).

Our Results Were Comparable With Fawi et al,<sup>[9]</sup> 2014 Series And Yashwanth Singh Tanwar et al,<sup>[10]</sup> 2016. But Jain et al,<sup>[14]</sup> 2017 Series Reported That There Was Delayed Union Rate As Four Patients Had Failure Of Cortical Screws In The Proximal Fracture Fragment, Of Which Two Required Revision Fixation With Bone Grafting. Another Non- Union Was Seen Following A Surgical Site Infection, Which Healed After Wound Lavage And Bone Grafting.

**Complications Distribution in the Present Study:** In Our Study (N=20) 1(5%) Patient Had Superficial Infection Which Subsided By Higher Antibiotics for 8 Weeks. 2(10%) Patients Had Post-Operative Radial Nerve Neuropraxia. Of These Two Patients One Patient Was Recovered In 6 Weeks And Another Patient Recovered In 3 Months. There Were No Single Patient Needing Re-Operation.

John T. Capo et al,<sup>[8]</sup> 2013 (N=21) Series Reported That There Was 1(4.7%) Patient Who Showed Postoperative Sensory Ulnar Neuropathy That Recovered Completely, and 1(4.7%) Patient Developed Elbow Stiffness As Well As Heterotopic Ossification As A Result Of Concomitant Proximal Ulnar And Radial Fractures Due To A Gunshot Wound. 1(4.7%) Patient With An Open Fracture Developed Osteomyelitis, Which Was Treated With Debridement, Antibiotics And Retention Of The Hardware. (14.1%).

In Our Study There Were 15% Cases Who Had Complications During Post-Operative Period. John T. Capo et al,<sup>[8]</sup> 2013 Series Reported That There Were 14.1% Cases Who Had Complications. Whereas Fawi et al,<sup>[9]</sup> 2014 Series And Sushant Uday Chavan et al,<sup>[12]</sup> 2017 Series Reported Their Complication Rates As 4.3% And 2.1% Respectively.

**Functional Results By Dash Score Among Study Groups:** In Our Study (N=20) The Mean Dash Score After 1 Year Was 17.6 Ranging From 12.5 To 33.5.

John A. Scolaro et al,<sup>[13]</sup> 2014 (N=40) Series Reported That The Average Quick Dash Score Was 17.5 (Range, 2.6-56.8).

Yashwant Singh Tanwar et al,<sup>[10]</sup> 2016 (N=20) Series Reported That The Mean Dash Score At 1 Year Was 17.6 Ranging From 13.3 To 38.3 Points. In Our Study The Mean Dash Score Was 17.6 Points. Our Results Were Comparable With Yaswant Singh Tanwar et al,<sup>[10]</sup> 2016 Whose Dash Score Was 17.6. Whereas John A. Scolaro et al,<sup>[13]</sup> 2014 Series Quick Dash Score And Sushant Uday Chavan et al,<sup>[12]</sup> 2017 Series Reported Mean Dash Scores Were 17.5 And 18.5 Points Respectively.

**Functional Results by Mayo Elbow Performance Score:** In Our Present Study, Performed Open Reduction And Internal Fixation With Extra Articular Distal Humerus Plating For All 20 Patients With Follow Up Period Of 12 Months And Results Were Evaluated By Mayo Elbow Performance Score. In Our Study (N=20) Results Were Graded As Excellent 18 (90%) Cases, Good 2(10%) Cases. All Patients Had Good Range Of Elbow Movements.

Jain et al,<sup>[14]</sup> 2017 (N=26) Series Reported The Results With Meps Scale (Average: 96.1); Range (80–100) Was Excellent 81% Cases (N = 21) And Good 19% Cases (N= 5). In Our Study The Mean Meps Was 94.75 (Ranges From 80-100) With Excellent Results 90% Cases And 10% Cases Had Good Results. Whereas Jain et al,<sup>[14]</sup> 2017 Series Reported Their Mean Meps As 96.1 (Range 80-100) And 81% Cases Had Excellent Results And 19% Cases Had Good Results And Vinit Vimal Karn et al,<sup>[11]</sup> 2017 Series Reported The Mean Meps Was 95.5% (Ranges 80-100) And 95% Cases With Excellent Results And 5% Cases Good Results. There Were No Poor Results In Our Study Group.

## CONCLUSION

Distal humerus shaft fractures are complex fractures and represent 1-3% of all fractures. These fractures require careful evaluation and preoperative planning for good functional outcome. Early operative intervention with extra articular distal humerus Locking Compression Plates (EADHP) provides good anatomical reduction and stable internal fixation in these fractures and facilitates early mobilization preventing elbow stiffness. In our series we treated 20 patients of lower one third humerus shaft fracture with open reduction and internal fixation with Extraarticular Distal humerus Locking Compression Plates (EADHP) and functional outcome was Excellent in 90 % patients. There were only minor complications noted. We conclude as per AO principles that early operative intervention with Extrarticular Distal Humerus Locking Compression Plating (EADHP) on poster lateral column of humerus for these fractures will result in excellent functional outcome.

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