ORIGINAL ARTICLE

# Cases of fracture both bone forearm fracture

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## ABSTRACT

**Background:** The forearm is a crucial component of the upper limb's anatomy because it enables the hand, the upper limb's effector organ, to carry out multiaxial everyday activities. Poor functional outcome, non-union, and rotational deformity follow conservative reduction of fracture BBFA. Hence, keeping the rotation in place requires precise reduction (supination and pronation). Limited contact dynamic compression plate (LC-DCP) is used by ORIF to do this. LC-DCP is a revolutionary method of fixing plates that reduces bone trauma, preserves blood flow, prevents stress raisers caused by implant removal, and promotes faster healing. To determine the benefits and drawbacks of LCDCP treatment for BBFA diaphyseal fractures, this study is being conducted. **Materials and Methods:** After getting their permission, patients who were admitted to the Vijayanagara Institute of Medical Sciences in Ballari were taken for research. This study, which will run from December 2017 to April 2019, is prospective. **Results:** This study includes 40 BBFA fracture instances. All casings were internally fixed with 3.5 mm LCDCP and publicly decreased. Age ranged from 18 to 60 years, with the second and third decades seeing the highest prevalence of fractures (Average 41). O of 40 patients, 30 patients (or 75% of them) were men and 10 patients (or 25%) were women. Left side affected 24 patients (60%) and right side affected 16 patients (40%). Injury mechanism 20 RTA (50%) and 16 (40%) with 4 (10%) assaults. 4 (10%) patients had delayed union, while 36 (90%) patients achieved good union in <6 months. Anderson's scoring methodology was used to assess the results. With this rating system, 32 (80%) of our patients had great outcomes. Three patients (7.5%) had an unsatisfactory outcome, while five (12.5%) patients had one (radioulnar synostosis). infection on the surface 5 (10%) damaged posterior interosseous nerve 2 (5%) (5% radioulnar synostosis). **Conclusion:** By promoting biological, rigid fixation and early bone union with excellent radiological and functional outcomes in the majority of patients, LC-DCP has been found to be superior to other modes of treatment. It can be regarded as the best implant for fracture fixation of closed both bone diaphyseal fracture forearm in adults.

**Key words:** Forearm fracture, LC-DCP, DCP

## INTRODUCTION

The frequency of forearm fractures is rising more quickly than expected due to factors like a growing population, an increase in the number of automobiles, rapid industrialization, an increase in violent crime, more participation in sports.

The forearm is the essential upper limb anatomical unit that enables the hand, the upper limb's effector organ, to carry out multiaxial daily activities of living.[1]

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These bones help to create the ulnohumeral, radiohumeral, proximal radioulnar, distal radioulnar, and radiocarpal articulations, which are five joints.

The complex anatomical structure of the arm and hand, which involves coordination between muscles, tendons, bones, and joints, is to blame for the high rate of non-union and malunion as well as poor functional outcomes. Pronation and supination, in which the radius rotates around the ulna, are examples of these functions.

The radial bow should be maintained for the good functional outcome.

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Regaining bone length, adequate opposition, and alignment without any malrotation is crucial.

Conservative therapy has led to synostosis, malunion, and non-union, as well as a poor functional prognosis.

Perfect fracture reduction and stiff fixing are therefore necessary and are accomplished via plating.

When using conventional plating, the screw serves as an anchor and presses the plate firmly against the bone. This frictional stress at the bone-plate contact has been found to disrupt the blood vessels, particularly in the periosteum.

Due to this observation, the limited contact dynamic compression plate (LC-DCP) was created, which reduces the bone contact area to roughly 50% of the plate's total undersurface area. Hence, it does not impair periosteal circulation. Hence, there is good fracture healing and low refracture.[2]

The goal of the current study is to offer a good functional outcome and to understand the benefits and challenges of the more recent plate design, the LC-DCP.

Following inclusion and exclusion criteria, 40 cases of fracture BBFA were chosen and treated with LC-DCP at the Vijayanagar Institute of Medical Sciences in Ballari.

To assess the outcomes of open reduction and internal fixation of the Diaphyseal fracture of BBFA with LC-DCP in adults, this study has been undertaken.

The grading system developed by Andersons *et al*. was used to certify the functional outcome. The following variables are taken into account:

- Union of the fracture
- Range of elbow and wrist movement.

In this study, forearm rotation, wrist, and elbow movements, union rate, union time, complications, and functional outcomes are all examined.

## MATERIALS AND METHODS

In this study, 40 patients of both forearm bone fractures were treated at Vijayanagar Institute of Medical Sciences in Ballari from December 2017 to April 2019 using open reduction and internal fixation with 3.5 mm LC-DCP. Following up continued through September 2019.

This is a prospective time bound study. Sample size is 40 patients.

### Inclusion Criteria

The following criteria were included in the study:

- Patients of both sexes are included in the study
- Patients with closed diaphyseal fractures of both bones of forearm
- Patients fit for surgery
- Provided informed consent.

### Exclusion Criteria

The following criteria were excluded from the study:

- Open fractures
- Patients with both bone fractures of forearm with compartment syndrome needing fasciotomy
- Both bone fractures of forearm needing vascular repair
- Children below 18 years of age.

### Evaluation

The outcomes are assessed using Anderson's criteria for assessing fractures of the forearm bones. The outcomes are contrasted with those of prior research.

The Vijayanagar Institute of Medical Sciences, Ballari's Ethics Committee has granted its approval. At admission, a thorough history was obtained from the patient and/or their attendants to determine the mechanism of the injury and the gravity of the trauma. The patients were then given a full clinical evaluation to determine both their overall health and the extent of any local injuries.

The vital signs were noted together with the patient's overall state. A thorough inspection was conducted to rule out fractures in additional locations. Swelling, deformity, and loss of function were discovered during a local assessment of the damaged forearm. Any nerve damage was examined and noted.

The distal vascularity was determined by radial artery pulsations, capillary filling, pallor, and paresthesia at finger tips. Palpation demonstrated aberrant mobility, crepitus, and shortening of the forearm.

Anteroposterior and lateral images of the damaged forearm were radiographed. Each view includes the wrist and elbow joints. The limb was then strapped into a plaster of paris slab above the elbow to immobilize it.

Following regular tests to determine the patient's preparedness for surgery, the patient was taken for surgery. Hb%, CBC, Urine for sugar, RBS, Blood urea, Serum creatinine, ECG, and chest X-ray are the tests that were performed.

Radius was addressed by either the Volar Henry or Dorsal Thompson incision. A minimum of 6 cortices were engaged with screw fixation in each fragment using a narrow 3.5 mm LC-DCP.

### Position

- Patient is supine on the operating table
- Pneumatic tourniquet is recommended

- For Henry's approach - the arm is placed on an arm board with elbow straight and forearm in supination position
- For Thompson approach - the arm on the arm board, elbow flexion and forearm in mid pronation position.

### Type of Anesthesia

General anesthesia was used in 12 cases and brachial block in 28 cases.

### Operative Procedure

After administering anesthesia, the operating region was painted and covered. For proximal and mid shaft fractures of the radius, the Dorsal Thomson/Volar Henry's technique was used; it was favored for proximal fractures while the Volar Henry's approach was chosen for distal fractures. Directly over the subcutaneous boundary, Ulna was approaching.

After locating the fracture ends, the periosteum was raised and the fracture ends were cleared of any soft tissue encroachment. The fracture was kept in place and decreased with the aid of reduction clamps. If necessary, the plate was then applied following contouring.

The plate was set on the volar aspect for distal radial fractures, dorsolateral for the distal two thirds, and dorsally for upper third radial fractures. A plate was placed across the posteromedial surface of ulna fractures.[3]

The first screw is introduced into the fragment using the neutral drill guide, which forms an acute angle with the fracture close to the plate. The other fragment is directed there by the resulting space between the underside of the plate and the fracture plane. The neutral drill guide's arrow points towards the direction of the fractures. To drill a hole through both cortices and with the proper depth gauge, a 2.5 mm drill bit is utilized. Before screw insertion, a 3.5 mm drill tap is used to determine the screw's length.[3]

After the pieces have been modified, a screw hole for axial compression is bored into the piece, creating an acute angle close to the plate. Here, the fracture line that needs to be squeezed is indicated by an arrow on the load guide. A lag screw will be placed for axial compression at this location. The near cortex is then over drilled (3.5 mm) to produce a gliding hole before the lag screw is installed. The remaining screws are inserted along with the lag screw.

The eccentrically positioned screw's head is moved toward the center of the plate by the contour formed by the plate and the screw head, which also moves the fragment in the same direction.

Long screws or a lengthier plate were applied to porotic, comminuted, and/or tiny bones.

After methodically securing hemostasis and achieving stable fixation, the wound is meticulously closed over a vacuum drain before a sterile dressing is applied [Figures 1 and 2].

### Post-operative Care

Following surgery, an arm pouch and an above-elbow slab were placed over the injured forearm. The patient was told to move their fingers while maintaining the limb in an elevated position. After 24–48 h, the suction drain was removed. After 2 days following surgery, the wound was examined, and on the 2$^{nd}$ post-operative day, a check X-ray with anteroposterior and lateral views was taken. Up until the moment of suture removal, the patient received antibiotics and painkillers. Suture/staples removed on the 10$^{th}$ post-operative day Subsequently, the patient was released with the forearm in an arm pouch and was instructed to move their shoulders, elbows, wrists, and fingers. Individuals were told not to use their injured forearm or lift heavy objects.

### Physiotherapy[4]

For 2–3 days, a posterior plaster splint was worn for comfort. Both active and active-assisted range-of-motion exercises for the shoulder and hand were advised for the patient.

Exercises for pronation, supination, and elbow range of motion were started as soon as the pain and edema in the forearm had subsided, usually 3–4 days later. It was anticipated that motion would recover quickly due to the fixation's stiffness. These isotonic workouts are really necessary for the fantastic result. Physiotherapy aids in the healing of fractures by increasing blood flow, preventing muscle tethering to the bone and soft tissue contracture. As a result, rigid fixation physiotherapy produces remarkable outcomes.

### Follow-up

For the first 3 months, all patients were monitored at monthly intervals, and an evaluation using the "Anderson *et al*. grading system" was conducted.[5]

In addition to noting wrist and elbow movements, the union underwent a radiological evaluation.

When there was periosteal callus over the fracture site and trabeculation spreading across the fracture line, the fracture was said to be unified [Figures 3 to 5].

## RESULTS

40 cases of both forearm bones being fractured make up the current study. Every casing was internally fitted with 3.5 mm LC-DCP and visibly reduced. The research was conducted between December 2017 and April 2019.

These patients ranged in age from 18 to 60 years, with an average age of 34.4 years and a fracture rate that was highest in the second and third decade [Table 1].

Out of 40 patients in the study, 24 (60%) had fractures of the left forearm and 16 (40%) had fractures of the right forearm [Table 2].

In the current study, there were 10 patients (50%) who had traffic accidents, 8 patients (40%) who had fallen, and only 2 patients (10%) who had been assaulted [Table 3].

### Fracture Characteristics

#### *Clinical*

All the 20 patients selected were closed injuries.

The majority of the fractures were seen in both bones' middle diaphysis. 26 patients (65%) had diaphyseal fractures, 8 patients (20%) had fractures in the proximal third, and 6 patients (15%) had fractures in the lower third of the forearm's two bones [Table 4].

Majority (62.5%) of the fractures were transverse/short oblique. About 35% of fractures were comminuted and only 2.5% of segmental fractures were present [Table 5].

6 (15%) of the patients had associated injuries [Table 6].

### Statistics of Surgery

In 12 of the 40 cases, general anesthesia was utilized, while brachial blocks were applied to the other 28 patients.

In 10 cases, the volar Henrys method for the radius was used, and in 30 patients, the dorsal Thompson technique.

Subcutaneously, one approached the ulna. In every instance, a pneumatic tourniquet was employed.

Follow-up ranged from 5 months to 24 months.

### Duration of Surgery and Tourniquet Time

In our study, we found that the average procedure lasted 80 min, with a range of 60–95 min. The average tourniquet time was 49 min, although it might have been as long as 60 min.

### Duration of Fracture Union

Since there were no subjective symptoms and the fracture line was not evident on radiographs, the fracture was said to be unified.

Fractures that healed after 6 months without the need for additional surgery were deemed to have delayed union. Non-union was defined as a fracture that did not heal after 6 months or that required an additional surgical procedure to heal.

36 (90%) patients had sound union in <6 months, 4 (10%) patients had delayed union [Table 7].

### Complications

#### *Intraoperative complications*

Intraoperative problems were not reported in any cases.

#### *Postoperative complications*

##### *Superficial infections*

The superficial infection spread to five patients. Following a culture and sensitivity report, the infection was treated with the proper medications.

### Posterior Interosseous Nerve Injury

Patient experienced temporary posterior interosseous nerve damage immediately following surgery (Proximal radius fracture repair). Individuals who received treatment with a static cockup splint healed in around 6 weeks.

### Radioulnar Synostosis

Three patients developed proximal radioulnar synostosis and resulted in poor functional outcome [Table 8].

### Criteria for Evaluation of Results

Anderson *et al*. scoring system (1975).[4]

We had 33 (82.5%) patients with great results using the Anderson *et al*. grading system, 4 (10%) patients with satisfactory results, and 3 (7.5%) patients with disappointing results (radioulnar synostosis) [Tables 9 and 10].

## DISCUSSION

Forearm fractures are common in orthopedic practice because they play a crucial role in the communication between the hand and arm. However, they present a challenge to the surgeon because the multiple muscle forces acting on the fracture tend to push it out of its proper anatomical and functional position. These factors make anatomic reduction and rigorous fixation necessary to achieve functional rehabilitation of the upper limb.

According to Knight and Purvis, closed reduction and its upkeep are challenging.[6] 46 Nails placed inside the body frequently fail. Nonetheless, there are few benefits, including hospital stays, closed nailing, and little tissue dissection. Therefore, plating is your best option. There are various plate varieties available. Despite having few drawbacks, DCPs produce good outcomes. Following plate removal, osteoporosis and refracture are highly prevalent because these plates impede periosteal circulation. PC-fixators have not received much attention, and according to Leung and Chow they do not have any advantages over LC-DCPs.[2]

Hence, the LC-DCPs are the best implants for diaphyseal fracture of both bones forearm at present.

Due to their reduced interference with periosteal circulation, LC-DCPs have a number of benefits. The outcomes are

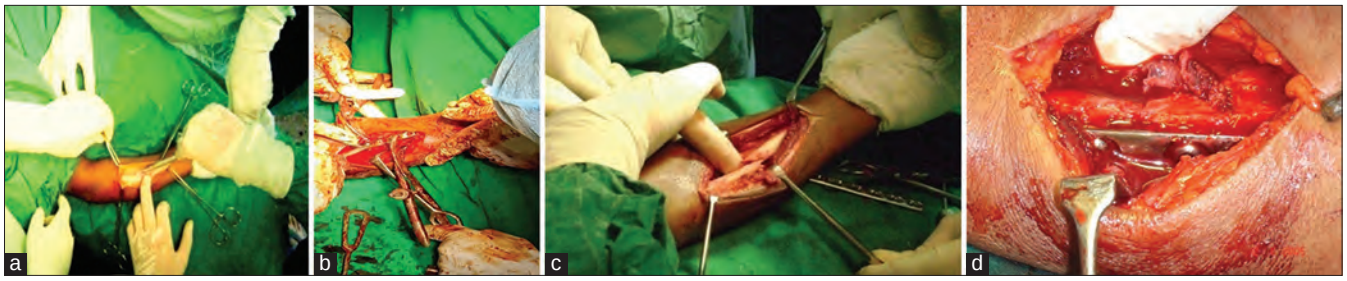


**Figure 1:** Operative procedure-1 (a) Incision, (b) Reduction of fracture, (c) Exposure of bone, (d) Application of plate and compression

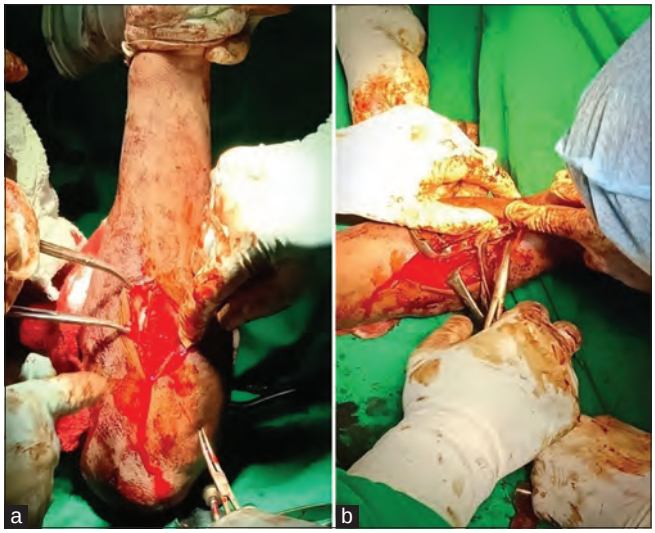


**Figure 2:** Operative procedure-2 (a) Exposure of ulna, (b) Fixation of plate to ulna

**Table 1:** Age distribution

| Age | Number of patient's (%) |
|---|---|
| 18–20 | 7 (17.5) |
| 21–30 | 10 (25) |
| 31–40 | 11 (27.5) |
| 41–50 | 8 (20) |
| 51–60 | 4 (10) |
| Total | 40 (100) |

**Table 2:** Side affected

| Side affected | Number of patient's (%) |
|---|---|
| Left | 24 (60) |
| Right | 16 (40) |
| Total | 40 (100) |

positive. Osteoporosis and refracture following removal are both quite rare, and the rate of union is very high.

The goal of the current study was to evaluate the effectiveness of LC-DCP in the management of fractures of the two forearm bones. Twenty patients with fractures to both forearm bones received treatment with 3.5 mm LC-DCP for internal fixation and open reduction.

**Table 3:** Mode of injury

| Mode of injury | Number of patient's (%) |
|---|---|
| RTA | 20 (50) |
| Fall | 16 (40) |
| Assault | 4 (10) |
| Total | 40 (100) |

RTA: Road traffic accident

**Table 4:** Level of fracture

| Level of injury | Number of patient's (%) |
|---|---|
| Diaphyseal fractures | 26 (65) |
| Proximal third fractures | 8 (20) |
| Lower third fractures | 6 (15) |
| Total | 40 (100) |

**Table 5:** Type of the fracture

| Type of fracture | Radius | Ulna | Percentage |
|---|---|---|---|
| Transverse/short oblique | 25 | 25 | 62.5 |
| Comminuted | 15 | 13 | 35 |
| Segmental | 0 | 2 | 2.5 |
| Total | 40 | 40 | 100 |

**Table 6:** Associated injuries

| Associated injury | Number of case (%) |
|---|---|
| Fracture femur (right) | 1 (2.5) |
| Fracture BB (right) leg with fracture radius (right) | 1 (2.5) |
| Fracture ulna same side | 1 (2.5) |
| Ribs (left) side# | 1 (2.5) |
| Humerus fracture (right) | 1 (2.5) |
| Volar barton fracture | 1 (2.5) |
| Total | 6 (40) |


**Figure 3:** Clinical photographs. Case 1 – (a) Pre-operative X-ray, (b) Post-operative X-ray, (c) X-ray after 8 weeks, (d) Elbow 90° flexion, (e) complete elbow flexion, (f) Pronation, (g) Supination, (h) Wrist palmar flexion, (i) Wrist dorsiflexion

**Table 7:** Duration of fracture union

| Time of union | Number of case (%) |
|---|---|
| <4 months (16 weeks) | 23 (57.5) |
| 4–6 months (16–24 weeks) | 13 (32.5) |
| 6 months 1 year (24–36 weeks) | 4 (10) |
| Total | 40 (100) |

**Table 8:** Complications

| Complications | Number of case (%) |
|---|---|
| Superficial infection | 5 (12.5) |
| Posterior interosseous nerve injury | 2 (5) |
| Radioulnar synostosis | 3 (7.5) |
| Total | 10 (25) |

We assessed our findings and contrasted them with those from numerous other researches that used diverse therapeutic techniques.

Our analysis is as follows:

### Age Distribution

Our findings are comparable to the study made by Charnley in 1964 witnessed 50% of patients between second and third decade and an average of 44.8 years.[7]

**Table 9:** Criteria for evaluation of results

| Results | Union | Flexion/ extension at elbow joint | Supination and pronation |
|---|---|---|---|
| Excellent | Present | <100 loss | <25% loss |
| Satisfactory | Present | <200 loss | <50% loss |
| Unsatisfactory | Present | >200 loss | >50% loss |
| Failure | Nonunion with/without loss of motion | | |

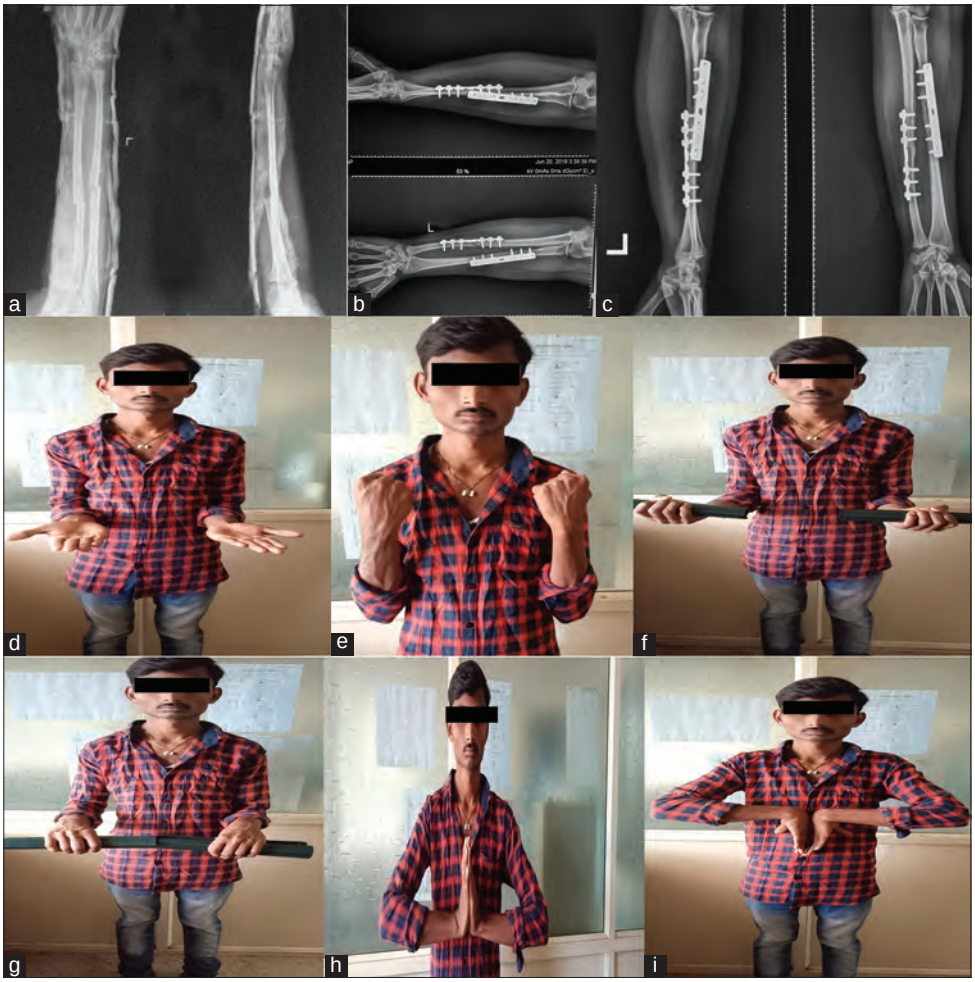


**Figure 4:** Clinical photographs. Case 2 - (a) Pre-operative, (b) Post-operative, (c) After 10 weeks, (d) Elbow extension, (e) Elbow flexion, (f) Supination, (g) Pronation, (h) Wrist – dorsiflexion, (i) Wrist-palmar flexion

**Table 10:** Functional results

| Results | Number of case (%) |
|---|---|
| Excellent | 32 (80) |
| Satisfactory | 5 (12.5) |
| Unsatisfactory | 3 (7.50 |
| Total | 40 (100) |

**Table 11:** Level of fracture comparison with literature

| Series | Proximal third (%) | Middle third (%) | Distal third (%) |
|---|---|---|---|
| Dodge[8] | 7.14 | 71.42 | 21.44 |
| Sarmiento *et al*.[51] | - | 84.6 | 15.4 |
| Chapman *et al*.[10] | 13 | 59 | 28 |
| Present study | 20 | 65 | 15 |

In 1972, Dodge and Cady found 24 years as the average age in their series.[8]

Moed *et al*. (1986) found the average age was 22 years.[9]

In 1989, Chapman *et al*. series showed average age of 33 years (13–79).[10]

In 1992, Schemitsch and Richards found 24 years as average (16–83).[11]

In 2003, Leung and Chow accounted an average of 36 years (11–90 years).[2]

In the present study, fracture was common in second and third decade with average age of 34.6 years (18–60 years).

### Sex Distribution

Men are affected more in the majority of the series. In the Burwell *et al*. series, there were 30.67% women and 69.33% men.

About 89% of the participants in Dodge and Cady study were men, while 11% were women.[8]

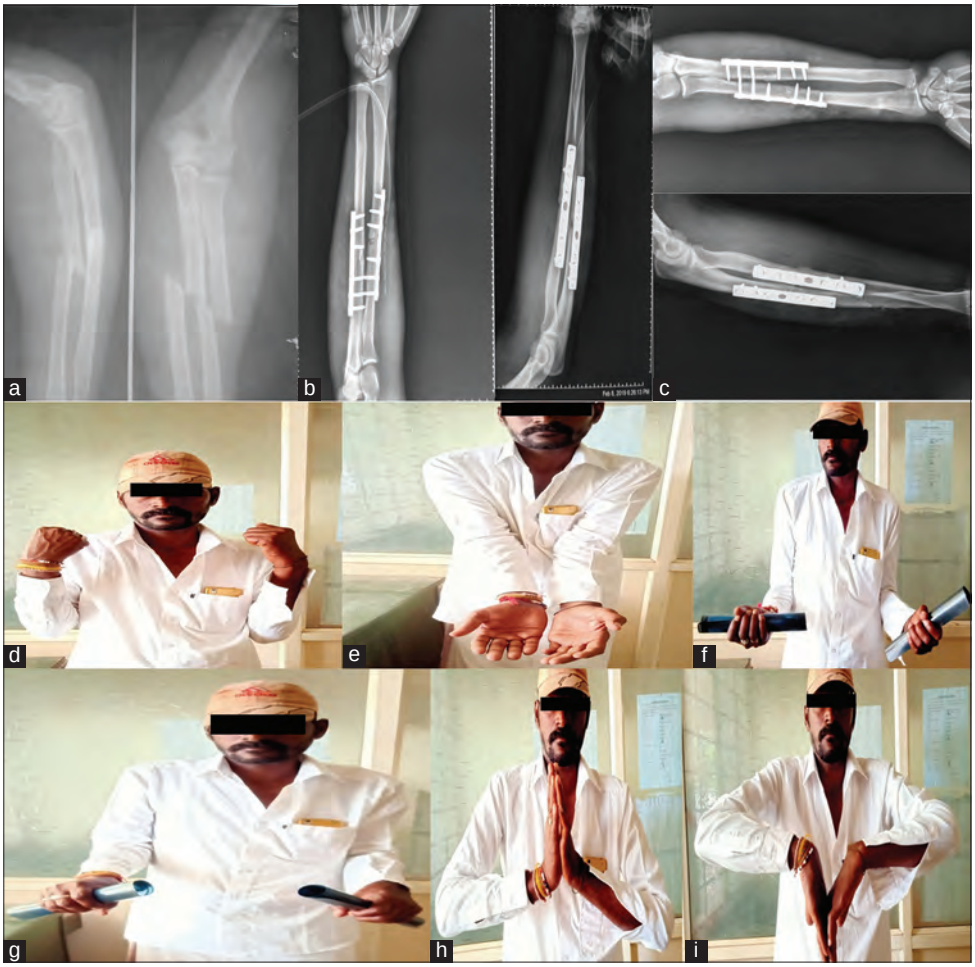


**Figure 5:** Clinical photographs. Case 3 - (a) Pre-operative, (b) Post-operative, (c) After 12 weeks, (d) Elbow flexion, (e) Elbow extension, (f) Supination, (g) Pronation, (h) Wrist dorsiflexion, (i) Wrist palmar flexion

**Table 12:** Complications comparison with literature

| Complications | Anderson *et al*.[5] | Chapman *et al*.[10] | Present study |
|---|---|---|---|
| Superficial infection (%) | 2.9 | 2.5 | 12.5 |
| Nonunion (%) | 2.9 | 2.3 | - |
| Postinterosseous nerve injury (%) | 2 | 1.5 | 5 |
| Radio-ulnar synostosis (%) | 1.2 | 2.3 | 7.5 |

**Table 13:** Time for union comparison with literature

| Series | Union times (weeks) | Range (Weeks) | Union (%) |
|---|---|---|---|
| Anderson[5] | 7.4 | 5–10 | 97 |
| Chapman *et al*.[10] | 12 | 6–14 | 98 |
| Leung and Chow[2] | 17 | 8–36 | 100 |
| McKee *et al*.[16] | 10.7 | 5–18 | 97.3 |
| Present study | 14.2 | 8–28 | 100 |

Chapman remarked that there were 78% men and 22% women.[10] 67% men and 33% women made up William's series.[12]

The Leung and Chow series featured 17.4% women and 82.6% men.[2]

In our study, there were 75% male patients and 25% female patients, which was similar to other studies.

### Mode of Injury

According to Moed *et al*., 50% of his patients were related to RTA, 20% to workplace accidents, 14% to falls, 12% to direct blows, and 4% to gunshot wounds.[9]

Thomas Grace *et al*. reported that 29% (45%) of patients with automobile/motorcycle accidents in the fall had gunshot wounds, while the remaining patients had various sorts of injuries that were more diverse.[13]

Smith reported that RTA caused roughly 45% of his cases, falls caused 36%, and industrial accidents caused 19%.[14]

**Table 14:** Functional outcome comparison with literature

| Series | Excellent (%) | Satisfactory (%) | Unsatisfactory (%) | Failure (%) |
|---|---|---|---|---|
| Anderson *et al*.[5] | 50.9 | 34.9 | 11.3 | 2.9 |
| Chapman *et al*.[10] | 86 | 7 | 12 | 5 |
| Leung and Chow[2] | 98 | 2 | - | - |
| Burwell and Charnley[7] | 77 | 23.8 | 10.8 | 1.4 |
| Present study | 80 | 12.5 | 7.5 | - |

**Table 15:** Duration of follow up comparison with literature

| Series | Range | Average |
|---|---|---|
| Anderson *et al*.[5] | 4–9 years | 3 years |
| Chapman *et al*.[10] | 6–48 months | 12 months |
| Moed *et al*.[9] | 12 months–9 years | 3 years |
| Leung and Chow[2] | 14–40 months | 22 months |
| Present study | 5–24 months | 12 months |

In the present study, RTA caused 50%, fall caused 40%), and assault caused 10% of patients.

### Extremity Affected

In the right forearm, both bones are fractured roughly 50% of the time, according to Burwell and Charnley.[7]

Around 5.5% of right extremity fractures involved both bones, according to Chapman.[10]

Our estimate of 40% incidence of both bones breaking in the right extremity is comparable to earlier research.

This might be the case because during assaults, a person will often try to defend themselves with their left limb, and during falls, a person may land with their left hand first because they are holding something in their right hand or using it to hold something.

Yet, pinpointing the precise sequence of events in RTA or fall is seldom easy.

The findings of this study, however, are comparable to those of earlier investigations.

### Level of Fracture

In every documented series, the proximal third has the lowest incidence of fracture and the intermediate third the greatest.

About 84.6% of fractures on both bones were in the middle third, according to Sarmiento *et al*. Just 15.4% of cases involved lower third fractures on both bones.[15]

Dodge and Cady GW recorded 71.5% fracture in the middle third of both bones, 21.5% fracture in the distal third, and 7% fracture in the proximal third.[8]

Around 59% and 40% of fractures were found in the middle third of the radius and ulna, 13% and 21% in the proximal third of the radius and ulna, and 28% and 12% in the lower third of the radius and ulna, respectively, according to Chapman *et al*.[10]

In our study, 15% of fractures were in the lower third, 20% were proximal, and 65% were in the intermediate third. The distal third showed the least [Table 11].

### Complications

There were five incidences of superficial infection in the current study. They received the proper antibiotic treatment, and the wound healed without any issues. The posterior interosseous nerve was affected in two cases. The nerve damage in this case resolved on its own through conservative treatment.

As for proximal radio-ulnar synostosis, we had three cases. This issue, in our opinion, has more to do with the level of the fracture and the degree of comminution than it does with the fixing technique [Table 12].

### Time for Union

Except in the study of Anderson *et al*.,[5] where he claims a union time of 7.4 weeks, it is typically around 12 weeks in the majority of the published data (average). Age, general health, fixation rigidity, and infection presence all affect when union occurs. Moreover, there is interobserver variation in the time of union.

Union is defined as the absence of pain at the fracture site, the removal of the fracture line, and the creation of a callus.

The factors Anderson used to evaluate the union were taken into consideration. With a range of 8–28 weeks, our series showed an average union time of 14.2 weeks. The junction of the radius and ulna was perfect.

The findings of our recent study are comparable to those of earlier research [Table 13].

### Functional Results

The two factors affecting the functional result are fracture union and range of motion. Early mobilisation thereby reduces vascularity, soft-tissue contracture, and muscle tethering.

The functional outcome was measured using the Anderson's *et al*. rating system.[5]

Anderson *et al*. reported that 37 (34.3%) out of 54 (50.9%) cases were excellent.

12 (11.3%) were not satisfied, 2 (2.9%) were unsuccessful.[5]

About 36 (86%) of the cases were described by Chapman *et al*. as good, 3 (7%) as satisfactory, and 1 (2%) is considered inadequate while 2 (5%) is a failure.[10]

About 98% of instances were rated as good by Leung and Chow, and 2% had adequate outcomes.[2]

We had 32 (80%) instances of great results in the current study, 5 (12.5%) cases of satisfactory results, and 3 (7.5%) instances of bad results [Table 14].

### Duration of Follow-Up

We had a follow-up, which ranged from 5 months to 24 months with an average mean of 12 months, which is comparable to Chapman series but other series had longer follow-up [Table 15].

## CONCLUSION

LC-DCP it promotes early bone union and biological fixing of the bone. Using it to comminuted, segmental, and short oblique fractures is simpler.

The nearest screw should be at least 10 mm away from the fracture line, and at least three cortices must be fastened on either side of the fracture line.

The rate of complications will be reduced by using two distinct incisions for the radius and ulna and by keeping the natural bends of the radius.

After firm fixation of fractures with complete anatomical reduction using 3.5 mm LC-DCP and screws, immediate mobilization is permitted.

Due to the unique design of the LC-DCP, there is less periosteal circulation disruption than with the DCP, which promotes early union and reduces the risk of post-operative osteoporosis.

Vascular harm to the plated bone part is reduced.

The majority of instances yield fantastic functional outcomes.

With uncomplicated types of fractures, an early return to light duty is possible, and post-operative plaster is less usually needed.

After a well-done surgery, complications are small and simple to fix.

They should be utilized as the implant of choice for all closed displaced diaphyseal fractures of both bones of the forearm until newer implants are developed and thoroughly evaluated, such as the adaptable LC-DCP.

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