

Nail with locking screw vs. DCP Fixation for Radius Ulna Fractures A prospective study

¹Dr Ashish kaushal, ²Dr Mayank

¹GUIDE, Professor, Department of orthopaedics, GRMC gwalior, Mp

²Pg Resident gwalior, Mp

Corresponding Author

Dr Ashish kaushal

GUIDE, Professor, Department of orthopaedics, GRMC gwalior, Mp

Article Received:02-04-2025

Article Accepted:20-05-2025

©2025 Biomedical and Biopharmaceutical Research. This is an open access article under the terms of the Creative Commons Attribution 4.0 International License.

ABSTRACT

Introduction: Both bone forearm fractures are more commonly seen in childrens and elderly population. In a randomized prospective study to compare the functional and radiological outcome of Nail with locking screw and Dynamic Compression plate(DCP) used in fixation of both bone forearm fractures Methods:46Patientswith Both bone forearm fracture streated with Nail with locking screw and DCP in last 1 year were enrolled in the study. Intraoperative variables-surgical time, blood loss, fluoros copy time and post-operative variables-unionrate, changein functional outcome in terms of Grace- Ewersmann criteria & Radiological findings were studied and compared between both the groups.

Results: The average age of the patients was 35 years .Out of 46 patients 30 males and 16 females patients were there In our series we found that patients with DCP had increased intraoperative blood loss, longer durationof surgery, and required longer time for mobilization while patients who underwent nail with locking screw had lower intraoperative blood loss, shorter duration of surgery, and allowed early mobilization. The patient streated with Nail with locking screw started early ambulation

Conclusions: Nail with locking screwis better than DC Pin both bone forearm fractures in terms of decreased blood loss, reduced duration of surgery, early weight bearing and mobilization, reduced hospital stay, decrease drisk of infection and complications

Keywords: Both bone forearm fractures, Dynamic Compression Plate (DCP), Nail with locking screw, Internal fixation, Functional outcome, Radiological outcome, Grace-Eversmann criteria, Surgical time, Blood loss, Early mobilization

INTRODUCTION

Both bone forearm fractures are commonly witnessed in trauma. These fractures are more common in children and elderly The goal of treatment of diaphyseal fractures of both bones of forearm in adults is to regain length, axial and rotational stability.1 Open reduction and internal fixation (ORIF) with compression plates achieve a high percentage of union in about 96 to 98% of cases.2–4 Fixation with a limited contact dynamic compression plate is considered to be more biological.However it produces extenstive soft tissue damage and the fracture haematoma is disturbed. The complications reported are, compartment syndrome, infection, nonunion, cross union, malunion, and nerve injuries.Refractures after extraction of the plate have also been described.

Intramedullary nailing with Kirschner wires, Steinman pins, and Rush pins have been tried with disappointing results and a high rate of nonunion precludes its routine use.Unlocked closed intramedullary nailing (prebent triangular, square nails) respects the soft tissues and vascular supply compared with open reduction. The distinct advantage of locked intramedullary nailing technique is the capacity of preventing shortening in metaphyseal, comminuted, and segmental diaphyseal forearm fractures, but the procedure is technically demanding and injury to posterior interosseous nerve is reported. Superiority and clinical benefits of these new implant in both bone forearm fractures has not been established due to lack of adequate comparitive studies so, we conducted this prospective randomization trail to compare radiological and functional outcome of gadegone nail and DCP in both bone fractures in adults The primary outcomes were mobility (pronation , Supination) were assesed by Grace - Ewersmann criteria and secondary outcomes were bony union , complications

Nail with locking

Screw

- Uses an intramedullary flexible nail for stabilization.
- Minimally invasive technique.
- Best suited for simple, transverse, or short oblique fractures
- Preserves soft tissue and periosteal blood supply
- Provides stable fixation
- Healing by secondary intention



DCP (Dynamic Compression Plate) Fixation

- - Open reduction and internal fixation using plates and screws.
- - Provides rigid stability and excellent alignment.
- - Best for comminuted, unstable, or malaligned fractures.
- - Healing by primary intention

MATERIALS AND METHOD

46 adult patients with both bone forearm fractures who were surgically managed with DCP and nail with locking screw were enrolled in the study. Intraoperative variables like surgical time, blood loss and postoperative variables like union rates, functional outcome on the basis of grace evermann criteria & radiological findings were studied and compared between these two groups

The study was done prospectively in JA Group of hospitals, Gwalior (MP)

The cases were selected on random basis those having both bone forearm fractures

The fracture pattern included for study was both bone forearm fractures on the basis of inclusion and exclusion criteria

Inclusion criteria

- Skeletally mature patients
- Age >18 years
- Patients medically and surgically fit for surgery
- Patients with complete clinical records
- Patients who given consent for surgery
- Pre ambulatory patients

Exclusion criteria

- Patients age <18 years
- Medically unfit patients
- Refusal to consent
- Pathological fractures

Pre-op assessment and planning

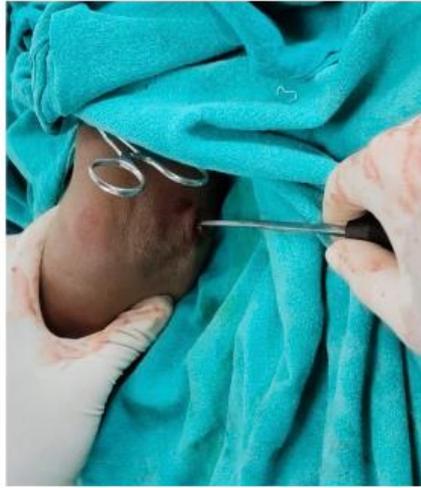
- All the patients were prepared for surgery.
- Patients signed an informed consent.
- All patients in the study underwent routine preoperative preparation.
- They were administered similar antibiotics at the start of the surgery.
- A tourniquet was applied over the arm and inflated after exsanguinating the extremity to the appropriate level to achieve a bloodless field in both groups.

Operative procedure

- - Nail of appropriate length is selected
- - We prefer ulnar fracture first because it might help in restoring length and alignment of forearm

Nail insertion for ulna

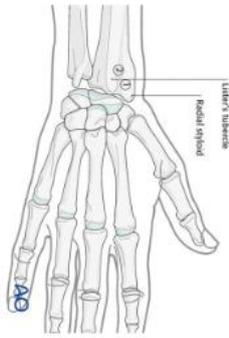
Nail is introduced through tip of olecranon (ulna) and negotiated till subchondral bone through radial styloid or radial side of Lister's tubercle in radius and negotiated till subchondral bone



screw locking in ulna

Nail insertion for radius

Nail is introduced through Styloid process of radius or lateral to Lister's tubercle negotiated till subchondral bone



screw locking in radius

Dynamic Compression Plating

- Internal fixation after open reduction of the radius was done via the routine approaches for radius (Henry's approach for volar exposure and Thompson's approach for dorsal exposure) and a universal ulnar approach was used for the open reduction and fixation of the ulnar fracture.
- A tourniquet was applied throughout the surgery, and the patient was taken in supine position with the arm abducted. A dynamic compression plate was used in all the cases for both the bones.

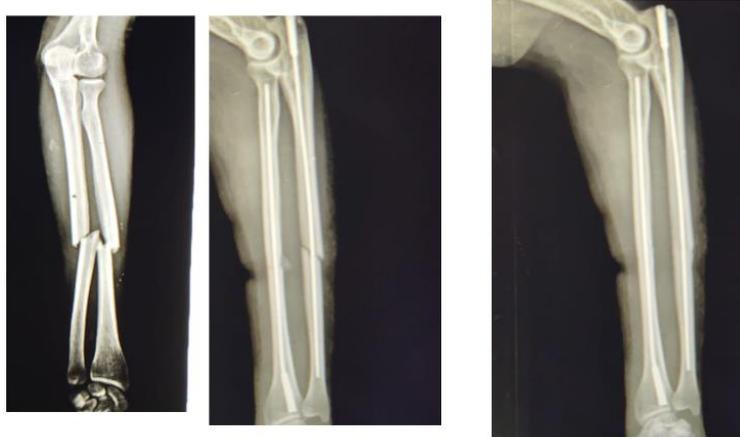
Postoperative management

- Postoperatively, patients in the nail group were given immobilization with the above elbow slab for three weeks, following which they were started on physiotherapy for elbow range of motion and wrist range of motion.
- Patients in the plate group were mobilized as and when tolerated by them.
- All the patients were started on a similar anti-biotic regimen of intravenous antibiotics for three days postoperatively, followed by oral anti-biotics till suture removal.
- Dressing of the suture site was done on days two and six for all the patients.

Follow up

- Cases was reviewed at four weeks, eight weeks, twelve weeks, and twenty-four weeks to assess the fracture clinically and radiologically.
- The function of the forearm, elbow, and wrist was noted
- Radiological assessment was done from AP and lateral radiographs and assessment of union of fracture and loss of reduction.

- Functional evaluation will be done by Grace-Eversmann criteria was used to determine the outcome and was measured at the follow-ups. It Comparing the ratio of Pronation -Supination to uninjured arm Average union time was 12-16 weeks in nails and 13-17 months in DCP



- 1.Preop xray of both bone forearm fracture 40 year old male
2. postopxray day 1
3. post op xray after 3 months of union



- 1.Preop xray of both bone forearm fracture 60 year old male
2. immediate post op xray day 1
3. xray after 4 months of union



1. Preop xray of both bone forearm fracture 55 year old male
2. immediate post op xray day 1
3. xray after 3 months of union

Table 1. Grace-Eversmann criteria.

	Union	Pronation supination comparison ration with the uninjured arm
Excellent	+	90-100%
Good	+	80-89%
Acceptable	+	60-79%
Unacceptable	-	<60%

RESULTS

- The average age of the patients was 35 years. Out of 46 patients 30 males and 16 females patients were there Baseline characteristics in both the groups were comparable (Table 1). The mean time taken for surgery from skin incision to skin closure; and the mean total blood loss was significantly higher in DCP group compared to Intramedullary nail group.
- In our series we found that patients with DCP had increased intraoperative blood loss, longer duration of surgery, and required longer time for mobilization while patients who underwent IM Nail had lower intraoperative blood loss, shorter duration of surgery, and " allowed early mobilization. The outcome of IM Nail was, Mean duration of surgery which was 58.3 minutes from anaesthesia to finish time ranging from 35-80 minutes. Mean hospital stay was 3.2days ranging from 2days to 05 days .The average blood loss was about 16ml, while the outcome of DCP group was mean duration of surgery wich was 95.7 minutes and mean hospital stay was 6.3ays and the average blood loss was about 121 ml.

Parameter	Nail with Locking Screw	Both Bone DCP Group
Mean Duration of Surgery	58.3 minutes (range: 35–80 minutes)	95.7 minutes
Mean Hospital Stay	3.2 days (range: 2–5 days)	6.3 days
Average Blood Loss	16 ml	121 ml

Our current study included subjects distributed amongst two groups between 18 years and 60 years.

Grace–Eversmann Criteria	Intramedullary Nail Group (n = 23)	DCP Group (n = 23)
Excellent	17 (73.9%)	8 (34.8%)
Good	5 (21.7%)	4 (17.4%)
Acceptable	1 (4.3%)	9 (39.1%)
Unacceptable	0 (0.0%)	2 (8.7%)
Total	23 (100%)	23 (100%)

Grace-Eversmann criteria was used to perform a clinical evaluation for these patients; Since the Intramedullary Nail group had much higher excellent + good outcomes (73.9% + 21.7% = 95.6%) compared to the DCP group (only around 52.2% excellent + good) The calculated p-value for this data is 0.008. Interpretation:

• Since $p < 0.05$, this means there is a statistically significant difference between the Intramedullary Nail group and the DCP group based on Grace–Eversmann criteria outcomes at the end of one year

IM nail with locking screw is better than DCP in both bone in terms of decreased blood loss, reduced duration of surgery, early mobilization, reduced hospital stay, decreased risk of infection and decreased complications. However, more prospective randomized controlled trial with large sample size should be conducted to find the answer to this complex issue.

REFERENCES

1. Schemitsch EH, Richards RR. The effect of malunion on functional outcome after plate fixation of fractures of both bones of the forearm in adults. *J Bone Joint Surg Am.* 1992;74:1068–78.
2. Anderson LD, Sisk D, Tooms RE, Park WI., 3rd Compression-plate fixation in acute diaphyseal fractures of the radius and ulna. *J Bone Joint Surg Am.* 1975;57:287–97.
3. Chapman MW, Gordon JE, Zissimos AG. Compression- plate fixation of acute fractures of the diaphyses of the radius and ulna. *J Bone Joint Surg Am.* 1989;71:159–69.
4. Hadden WA, Reschauer R, Seggi W. Results of AO plate fixation of forearm shaft fractures in adults. *Injury.* 1985;15:44–52.
5. Perren SM. The concept of biological plating using the limited contact – dynamic compression plate (LCD-DCP).Scientific background, design and application. *Injury.* 1991;22(suppl 1):1–41.
6. Leung F, Chow SP. Locking compression plate in the treatment of forearm fracture A prospective study. *J Ortho Surg [Hong kong]* 2006;14:291–4.
7. Dodge HS, Cady GW. Treatment of fractures of the radius and ulna with compression plates; A retrospective study of one hundred and nineteen fractures in Seventy-eight Patients. *J Bone Joint Surg Am.* 1972;54:1167–76.
8. Stern PJ, Drury WJ. Complications of plate fixation of forearm fractures. *Clin Orthop Relat Res.* 1983;175:25–9.
9. Rosson JW, Shearer JR. Refracture after the removal of plates from the forearm.An avoidable complication. *J Bone Joint Surg Br.* 1991;73:415–7.
10. Hidaka S, Gustilo RB. Refracture of bones of the forearm after plate removal. *J Bone Joint Surg Am.* 1984;66:1241–2.
11. Smith H, Sage FP. Medullary fixation of forearm fractures. *J Bone Joint Surg Am.* 1959;39:91–8.
12. Crenshaw AH, Zinar DM, Pickering RM. Intramedullary nailing of forearm fractures. *Instr Course Lect.* 2002;51:279–89.

13. Langkamer VG, Ackroyd CE. Internal fixation of forearm fractures in the 1980s: Lessons to be learnt. *Injury*. 1991;22:97–102.
14. Rosson JW, Shearer JR. Refracture after the removal of plates from the forearm. An avoidable complication. *J Bone Joint Surg Br*. 1991;73:415–7.
15. Hidaka S, Gustilo RB. Refracture of bones of the forearm after plate removal. *J Bone Joint Surg Am*. 1984;66:1241–2.
16. Smith H, Sage FP. Medullary fixation of forearm fractures. *J Bone Joint Surg Am*. 1959;39:91–8.
17. Crenshaw AH, Zinar DM, Pickering RM. Intramedullary nailing of forearm fractures. *Instr Course Lect*. 2002;51:279–89.
18. Langkamer VG, Ackroyd CE. Internal fixation of forearm fractures in the 1980s: Lessons to be learnt. *Injury*. 1991;22:97–102.
19. Moerman J, Lenaert A, De Coninck D, Haeck L, Verbeke S, Uyttendaele D, et al. Intramedullary fixation of forearm fractures in adults. *Acta Orthop Belg*. 1996;62:34–40.
20. Gao H, Luo CF, Zhang CQ, Shi HP, Fan CY, Zen BF. Internal fixation of diaphyseal fractures of the forearm by interlocking intramedullary nail: Short-term results in eighteen patients. *J Orthop Trauma*. 2005;19:384–91.
21. De Pedro JA, Garcia-Navarrete F, Garcia De Lucas F, Otero R, Oteo A, Lopez-Duran Stern L. Internal fixation of ulnar fractures by locking nail. *Clin Orthop Relat Res*. 1992;283:81–5.