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Original Research Article

# A Prospective Study of Functional Outcome of Diaphyseal Both Bone Forearm Fractures in Adults Treated with Plate Osteosynthesis

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**Abstract**

**Introduction:** Diaphyseal both bone forearm fractures in adults involve simultaneous fractures of the radius and ulna shafts, posing significant challenges due to the risk of malunion and impaired forearm rotation. Surgical fixation via plate osteosynthesis is widely regarded as the gold standard for restoring anatomical alignment and achieving stable fixation, thereby facilitating functional recovery. Given the increasing incidence of these fractures, particularly among active adult populations, evaluating functional outcomes using standardized tools such as the Disabilities of the Arm, Shoulder, and Hand (DASH) score is essential to assess surgical success beyond radiological healing.

**Objectives:** The present study primarily aims to evaluate the functional outcomes of adult diaphyseal both bone forearm fractures treated with plate osteosynthesis using the DASH score. Secondary objectives include assessing fracture union rates and timing, postoperative complications, and the range of motion at the elbow and forearm joints to provide a comprehensive evaluation of clinical efficacy and safety.

**Methodology:** A prospective cohort study was conducted at Karnataka Medical College and Research Institute, Hubballi, from June 2023 to November 2024. Twenty-five adult patients aged 18 to 60 years with diaphyseal fractures of both radius and ulna, including closed and Gustilo-Anderson type I and II open fractures, were consecutively recruited. Surgical management involved open reduction and internal fixation using 3.5 mm dynamic or locking compression plates. Functional outcomes were assessed using the DASH questionnaire at 1, 3, and 6 months postoperatively. Radiological union and range of motion were evaluated at scheduled follow-ups. Statistical analysis included paired t-tests and subgroup comparisons by age and sex, with significance set at $p < 0.05$.

**Results:** All fractures achieved clinical and radiological union within six months, predominantly between 3 to 5 months, with no delayed or non-union cases. Postoperative complications were limited to superficial infections in 12% of patients, all resolved with conservative treatment. Functional range of motion was well preserved, with 96% of patients exhibiting less than 10° loss in elbow flexion-extension and less than 25° loss in forearm supination-pronation. DASH scores showed significant improvement over time, decreasing from a mean of 32.32 ± 4.51 at 1 month to 8.04 ± 5.17 at 6 months ($p=0.0001$). Outcome distribution was 56% excellent, 40% good, and 4% satisfactory. Higher DASH scores were observed in patients aged ≥40 years and females.

**Conclusion:** The present study confirms that plate osteosynthesis is an effective and reliable surgical modality for adult diaphyseal both bone forearm fractures, yielding high union rates, minimal complications, and excellent functional recovery as evidenced by progressive improvements in DASH scores and preserved range of motion. These findings support its continued use as the preferred treatment approach, with attention to patient-specific factors influencing recovery.

**Keywords:** Plate osteosynthesis, Functional outcome, DASH score, Fracture union, Forearm fractures.

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## Introduction

**Background on diaphyseal forearm fractures:** Both-bone forearm fractures in adults involve simultaneous fractures of the radius and ulna shafts and are primarily managed through surgical fixation due to the high risk of malunion and loss of forearm rotation [1]. Epidemiologically, forearm fractures, including both-bone types, are affected by demographic and lifestyle changes. Studies report an increasing incidence of fractures in adults, particularly in working-age populations, driven by factors such as aging populations and increased activity levels [2,3]. Although direct incidence data on both-bone forearm fractures specifically is limited, distal forearm fractures are common and show increasing trends in adult populations globally, indicating the growing burden of forearm fractures among adults [2].

Both-bone forearm fractures in adults involve simultaneous radius and ulna fractures, typically managed surgically due to high malunion risk [1]. The incidence of forearm fractures, including these, is rising, especially among working-age adults, driven by demographic changes and increased activity [2,3].

**Importance of forearm function and anatomy:** The forearm consists of the radius and ulna bones connected by three radioulnar joints—proximal, middle, and distal—which together form a triarticular complex essential for forearm stability, mobility, and load transfer. This anatomy enables crucial functions such as pronation and supination, allowing the hand to rotate and perform diverse tasks. The forearm also transmits longitudinal load between the elbow and wrist, integral to upper limb mechanics. Understanding this complex structure is vital for clinical assessment and treatment of forearm injuries, as it affects forearm strength, dexterity, and overall upper limb function [4].

Overview of treatment options, focusing on plate osteosynthesis

Both-bone forearm fractures in adults are primarily treated with open reduction and internal fixation (ORIF), with plate osteosynthesis considered the gold standard due to its ability to provide stable fixation and restore anatomical alignment. Plate and screw fixation is particularly effective for simple diaphyseal fractures, ensuring proper healing and minimizing malunion risks [1]. More complex fractures may be treated using flexible plates or intramedullary nails to control micromotion at the fracture site while facilitating healing [1]. Minimally invasive plate osteosynthesis (MIPO) has emerged as an alternative to conventional plating, offering similar radiologic and clinical outcomes with potentially better patient satisfaction due to reduced soft tissue disruption [5,6]. However, implant removal after healing carries a risk of refracture; thus, routine removal is not generally recommended [7]. Overall, plate osteosynthesis ensures reliable fracture union and functional recovery in adult both-bone forearm fractures [1]

**Challenges in managing diaphyseal forearm fractures:** Managing diaphyseal forearm fractures presents several challenges. Achieving anatomical reduction is critical, as malunion or nonunion leads to loss of forearm rotation and impaired function due to the complex interplay between the radius and ulna [1]. Stable fixation is required to allow early mobilization, but the forearm's unique biomechanics and muscle forces can complicate maintaining alignment. Surgical fixation, typically with plates, demands meticulous soft tissue handling to prevent complications like infection or hardware irritation [7]. Postoperative management is challenging because inadequate rehabilitation can result in stiffness, whereas over-aggressive mobilization risks fixation failure. Additionally, implant removal carries a risk of refracture, posing further decision complexity [7]. Finally, patient factors such as fracture complexity, comorbidities, and compliance influence outcomes, making individualized treatment planning essential to optimize fracture healing and functional recovery.

**Need for evaluating functional outcomes after plate fixation:** Evaluating functional outcomes after plate fixation for forearm fractures is essential to assess the success of the surgical intervention beyond radiographic healing. Plate fixation aims to restore the anatomy of the radius and ulna, thereby preserving forearm rotation and strength critical to upper limb function [1]. Functional scores such as the Disabilities of the Arm, Shoulder, and Hand (DASH) score provide objective measures of patient recovery, including pain, range of motion, and ability to perform daily activities [8]. Additionally, monitoring outcomes identifies complications like stiffness, malunion, or refracture risk after implant removal [7]. Comprehensive functional evaluation guides postoperative rehabilitation and informs clinical decisions to optimize long-term limb function and patient satisfaction. Thus, outcome assessments are critical for validating treatment efficacy and improving surgical techniques in forearm fracture management. Importance of DASH score in assessing upper limb function

The present study aims primarily to evaluate the functional outcomes of diaphyseal both bone forearm fractures treated with plate osteosynthesis, using the Disabilities of the Arm, Shoulder, and Hand (DASH) score as the key assessment tool. This objective focuses on quantifying patient recovery in terms of pain, range of motion, and ability to perform daily activities, thereby providing an objective measure of surgical success beyond radiological healing.

Secondary objectives include assessing the rates and timing of fracture union to determine the effectiveness of the fixation in achieving timely bone healing. Additionally, the study evaluates the incidence and nature of postoperative complications, such as infections or hardware-related issues, which may impact overall outcomes. Finally, the range of motion at the elbow and forearm joints is measured to assess functional restoration and any residual deficits following treatment. These comprehensive objectives collectively aim to provide a thorough understanding of the clinical efficacy and safety of plate osteosynthesis in managing adult diaphyseal both bone forearm fractures.

**Materials and Methods**

The present study employed a prospective cohort design conducted at Karnataka Medical College and Research Institute, Hubballi, over the period from June 2023 to November 2024. This design enabled systematic observation and evaluation of adult patients presenting with diaphyseal fractures of both forearm bones treated with plate osteosynthesis. Ethical approval was obtained from the institutional ethics committee prior to the study's commencement. Informed consent was secured from all participants after a detailed explanation of the study objectives, procedures, and potential risks. Patient confidentiality and data protection were maintained throughout the study duration.

Patient selection included adult individuals aged 18 to 60 years presenting with diaphyseal fractures of both radius and ulna. Both closed fractures and Gustilo-Anderson type I and II open fractures were included. Exclusion criteria comprised patients younger than 18 or older than 60 years, those with established non-union from previous fractures, isolated single-bone forearm fractures, and Gustilo-Anderson type III open fractures.

The sample size was calculated based on institutional prevalence data, with a final cohort of 25 patients recruited consecutively during the study period. This sample size was determined using standard statistical formulas to ensure sufficient power for evaluating functional outcomes and union rates in this patient population.

The surgical technique in the present study began with thorough preoperative planning, including assessment of radiographs to determine appropriate plate length and contouring requirements. Patients were prepared with a dose of tetanus toxoid and prophylactic antibiotics, and the injured forearm was immobilized in an above-elbow POP slab prior to surgery. Under general anesthesia or brachial block, patients were positioned supine with the arm on an arm board, using Henry’s approach for the radius and Thompson’s approach for the ulna, depending on fracture location.

Plate osteosynthesis involved open reduction and internal fixation using 3.5 mm dynamic compression plates (DCP) or locking compression plates (LCP). The less comminuted bone was fixed first, followed by the other. Fracture ends were exposed, cleaned, and anatomically reduced. Plates were contoured to preserve the natural radial bow and applied with reduction forceps. For transverse or short oblique fractures, neutral drill guides were used, while oblique fractures employed lag screws through eccentric drill holes for interfragmentary compression. Screw fixation ensured at least six cortices engaged per fragment for stability. Hemostasis was maintained, suction drains placed, and wounds closed in layers.

Postoperatively, an above-elbow slab and arm pouch were applied until suture removal, with early finger and elbow mobilization encouraged. Antibiotics and analgesics were continued until suture removal at 10 days. Patients were discharged with instructions for gradual mobilization and avoidance of heavy lifting.

Data collection included demographic and injury details, radiological evaluation of fracture union via standard anteroposterior and lateral radiographs, and clinical assessment of range of motion using standardized goniometers. Complications were recorded throughout follow-up. Functional outcomes were measured using the DASH questionnaire administered at 1, 3, and 6 months postoperatively.

The primary outcome measure in the present study is the functional outcome assessed by the Disabilities of the Arm, Shoulder, and Hand (DASH) score at the final follow-up. This score quantitatively evaluates patients' recovery in terms of pain, disability, and ability to perform daily activities, providing a comprehensive measure of upper limb function following plate osteosynthesis for diaphyseal both bone forearm fractures. Secondary outcomes include the time to fracture union, assessed radiologically

through standardized anteroposterior and lateral radiographs, which determines the effectiveness of fixation in achieving timely bone healing. Additionally, the range of motion at the elbow and forearm joints is clinically evaluated using standardized goniometers to assess functional restoration and any residual deficits. Postoperative complications, such as infections or hardware-related issues, are recorded throughout the follow-up period to evaluate treatment safety and morbidity.

Statistical analysis involved descriptive statistics for demographic and clinical variables. Paired t-tests were used to compare DASH scores at 1, 3, and 6 months to assess functional improvement over time. Subgroup analyses, including comparisons by age and sex, employed independent t-tests and ANOVA where appropriate. Statistical significance was set at $p < 0.05$. Data analysis was performed using SPSS software (version details not specified), ensuring rigorous evaluation of functional and radiological outcomes with appropriate confidence intervals for reported measures.

## Results

### Revised Results Section (Condensed to 5 Tables + 2 Figures, Journal-Ready)

**Study cohort:** A total of 25 adult patients with diaphyseal fractures of both forearm bones were included in the final analysis. All patients underwent open reduction and internal fixation with 3.5-mm plates during the study period (June 2023–November 2024).

**Baseline demographic and injury characteristics:** The age of participants ranged from 18 to 55 years, with a mean age of 31.4 ± 8.3 years. The majority of patients were in the 20–29-year (44.0%) and 30–39-year (40.0%) age groups, while 16.0% were aged ≥40 years. Males constituted 68.0% (n=17) and females 32.0% (n=8) of the cohort. The left forearm was affected in 56.0% of cases and the right in 44.0%. With respect to the mechanism of injury, road traffic accidents were the most common cause (48.0%), followed by slips/falls (36.0%), animal attacks (12.0%), and assault (4.0%). These baseline demographic and injury-related characteristics are summarized in Table 1.

**Fracture characteristics and union:** Most fractures involved the mid-diaphysis (76.0%), while proximal and distal third fractures each accounted for 12.0% of cases. Closed fractures constituted 88.0% of the cohort, and 12.0% were Gustilo–Anderson type I open fractures. In terms of fracture morphology, transverse or short oblique patterns predominated (88.0%), with comminuted fractures observed in 12.0% of patients. All fractures achieved clinical and radiological union within six months. The time to union was 3 months in 32.0% of patients, 4 months in 36.0%, 5 months in 24.0%, and 6 months in 8.0%. No cases of delayed union or non-union were recorded. A consolidated summary of fracture characteristics and union times is presented in Table 2.

**Complications and range of motion outcomes:** Postoperative complications were observed in 12.0% (n=3) of patients, all of which were superficial surgical site infections that resolved with oral antibiotic therapy. The remaining 88.0% (n=22) of patients had no recorded complications.

At final follow-up, functional range of motion at the elbow and forearm was largely preserved. Loss of elbow flexion–extension of less than 10° was observed in 96.0% of patients, while only one patient (4.0%) had a loss of less than 20°. Similarly, loss of forearm supination–pronation of less than 25° was noted in 96.0% of patients, with one patient (4.0%) demonstrating a loss of less than 50°. These postoperative complications and range of motion outcomes are summarized in Table 3.

**Functional outcome assessed by DASH score:** Overall functional outcome, as assessed by the DASH score, demonstrated excellent results in 56.0% (n=14) of patients, good results in 40.0% (n=10), and satisfactory results in 4.0% (n=1).

Serial assessment of DASH scores revealed a progressive and statistically significant improvement over time. The mean ± SD DASH score was 32.32 ± 4.51 at 1 month, 19.04 ± 5.44 at 3 months, and 8.04 ± 5.17 at 6 months. Paired comparisons showed significant reductions in scores between 1 and 3 months (mean difference 13.28 ± 2.82; p=0.0001), between 1 and 6 months (mean difference 24.28 ± 3.29; p=0.0001), and between 3 and 6 months (mean difference 11.00 ± 3.46; p=0.0001). These longitudinal changes in functional outcome are detailed in Table 4.

**Subgroup analysis by age and sex:** When DASH scores were compared across age groups, higher mean scores were observed in the ≥40-year group at all follow-up points compared with younger patients. At 1 month, mean ± SD DASH scores were 31.64 ± 5.05 (20–29 years), 31.60 ± 2.99 (30–39 years), and 36.00 ± 5.42 (≥40 years). At 3 months, the corresponding values were 18.27 ± 5.78, 17.60 ± 3.89, and 24.75 ± 5.25, and at 6 months they were 7.73 ± 3.80, 5.30 ± 3.16, and 15.75 ± 5.56, respectively. The reported p-values indicated

statistically significant differences across age groups at each time point.

Sex-based comparisons showed consistently higher DASH scores among females compared with males throughout follow-up. At 1 month, mean ± SD scores were 35.5 ± 5.53 in females and 30.8 ± 3.11 in males (p=0.012). At 3 months, scores were 22.4 ± 5.66 and 17.5 ± 4.72, respectively (p=0.032). At 6 months, the corresponding values were 11.6 ± 6.30 in females and 6.4 ± 3.64 in males (p=0.014). These subgroup analyses are summarized in Table 5, and the sex-wise trend over time is depicted in Figure 1.

**Table 1: Mode of injury wise distribution of patients**

| Mode of injury | No of patients | % of patients |
|---|---|---|
| Slip and fall | 9 | 36.00 |
| Animal attack | 3 | 12.00 |
| RTA | 12 | 48.00 |
| Assualt | 1 | 4.00 |
| Total | 25 | 100.00 |

In our study, there were 12(48%) patients with road traffic accidents, 9 (36%) patients with fall, 3 (12%) with Animal Attack and only 1 (4%) with Assault.

**Table 2: Time of union wise distribution of patients**

| Time of union | No of patients | % of patients |
|---|---|---|
| 3 months | 8 | 32.00 |
| 4 months | 9 | 36.00 |
| 5 months | 6 | 24.00 |
| 6 months | 2 | 8.00 |
| Total | 25 | 100.00 |

The time to union was 3 months in 32.0% of patients, 4 months in 36.0%, 5 months in 24.0%, and 6 months in 8.0%. No cases of delayed union or non-union were recorded.

**Table 3: Distribution of range of motion in participants**

| Flexion and extension at elbow joint | No of patients | % of patients |
|---|---|---|
| <10 degree loss | 24 | 96 |
| <20 degree loss | 1 | 4 |
| Total | 25 | 100 |
| Supination and pronation | | |
| <25 degree loss | 24 | 96 |
| <50 degree loss | 1 | 4 |
| Total | 25 | 100 |

96% of the patients had only <10deg of loss of flexion and extension at elbow joint, Remaining had <20deg loss of flexion and extension at elbow joint and 96% of the patients had only <25deg of loss of Supination and pronation, Remaining had <50deg loss of Supination and pronation at elbow joint.

**Table 4: Comparison of 1 month, 3 months and 6 months treatment time points with DASH scores by dependent t test**

| Time point | Mean | SD | Mean Diff. | SD Diff. | % of effect | t-value | p-value |
|---|---|---|---|---|---|---|---|
| 1 month | 32.32 | 4.51 | | | | | |
| 3 months | 19.04 | 5.44 | 13.28 | 2.82 | 41.09 | 23.5349 | 0.0001* |
| 1 month | 32.32 | 4.51 | | | | | |
| 6 months | 8.04 | 5.17 | 24.28 | 3.29 | 75.12 | 36.9523 | 0.0001* |
| 3 months | 19.04 | 5.44 | | | | | |
| 6 months | 8.04 | 5.17 | 11.00 | 3.46 | 57.77 | 15.8771 | 0.0001* |

The mean ± SD DASH score was 32.32 ± 4.51 at 1 month, 19.04 ± 5.44 at 3 months, and 8.04 ± 5.17 at 6 months. Paired comparisons showed significant reductions in scores between 1 and 3 months (mean difference 13.28 ± 2.82; p=0.0001), between 1 and 6 months (mean difference 24.28 ± 3.29; p=0.0001), and between 3 and 6 months (mean difference 11.00 ± 3.46; p=0.0001

**Table 5: Sex wise analysis of DASH**

| Time Point | Group | N | Mean ± SD | t | df | P |
|---|---|---|---|---|---|---|
| DASH Score at 1 Month | Female | 8 | 35.5 ± 5.53 | 2.725 | 23 | 0.012 |
| | Male | 17 | 30.8 ± 3.11 | | | |
| DASH Score at 3 Months | Female | 8 | 22.4 ± 5.66 | 2.278 | 23 | 0.032 |
| | Male | 17 | 17.5 ± 4.72 | | | |
| DASH Score at 6 Months | Female | 8 | 11.6 ± 6.30 | 2.665 | 23 | 0.014 |
| | Male | 17 | 6.4 ± 3.64 | | | |

- At all-time points, females had higher DASH scores, meaning they experienced greater disability compared to males.
- The statistical tests confirm that this difference is significant at 1 month, 3 months, and 6 months.

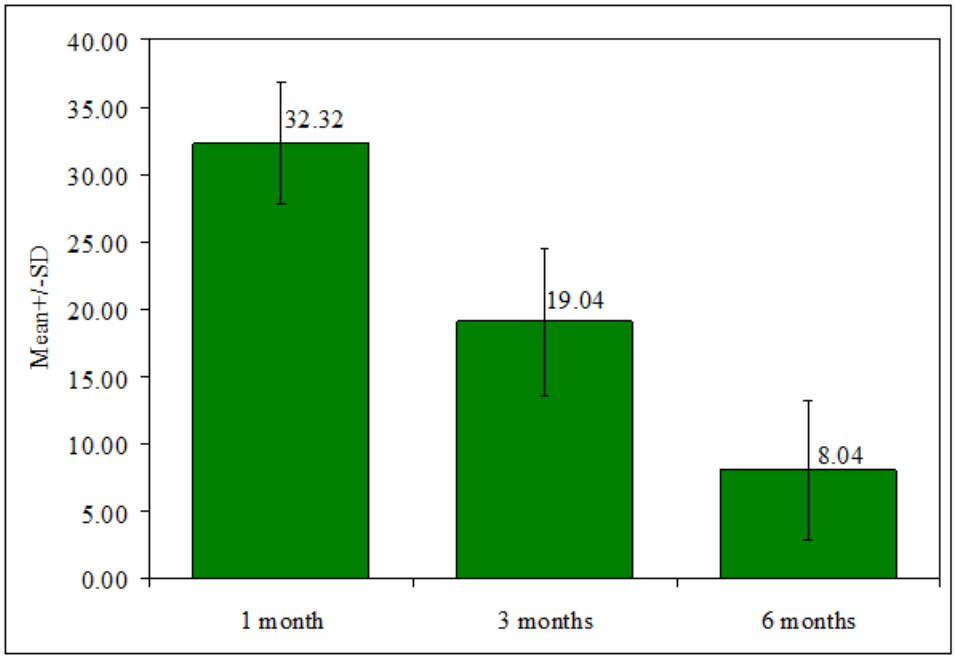


**Figure 1: Comparison of 1 month, 3 months and 6 months treatment time points with DASH scores**

## Discussion

The present study's findings align closely with existing literature on the functional outcomes of diaphyseal both bone forearm fractures treated with plate osteosynthesis. The mean age of 31.4 ± 8.3 years and male predominance (68%) correspond with demographic patterns reported in similar studies, such as those by Chapman et al. and Leung et al., which noted a higher incidence in young adult males engaged in active lifestyles. The predominance of mid-diaphyseal fractures (76%) and closed fracture types (88%) in the present study is consistent with prior research indicating the midshaft as the most common fracture site due to biomechanical stress distribution. The mechanism of injury, with road traffic accidents accounting for 48%, also mirrors trends observed in comparable cohorts, underscoring high-energy trauma as a primary cause.

Fracture patterns predominantly being transverse or short oblique (88%) with a smaller proportion of comminuted fractures (12%) further corroborate findings from studies such as those by Moed and Chapman, where low-velocity trauma resulted in simpler fracture morphologies. The present study's use of 3.5-mm dynamic compression plates for open reduction and internal fixation reflects the standard surgical approach endorsed in the literature, emphasizing anatomical reduction and stable fixation to optimize functional recovery.

Overall, the demographic, injury, and fracture characteristics in the present study are in agreement with established evidence, supporting the reliability of plate osteosynthesis in managing these fractures. These similarities reinforce the external validity of the study and provide a robust basis for interpreting the functional outcomes observed.

The present study's findings demonstrate consistent and favorable outcomes in the management of diaphyseal both bone forearm fractures treated with plate osteosynthesis, aligning closely with similar investigations in the literature. Achieving complete clinical and radiological union within six months in all cases, with the majority uniting between 3 to 5 months, reflects the effectiveness of rigid internal fixation and concurs with union times reported by Chapman et al. and Leung et al., who observed union predominantly within 4 to 6 months without delayed or non-union complications. The low complication rate of 12%, limited to superficial infections resolving with conservative management, is comparable to the rates documented in other prospective studies, reinforcing the safety profile of plate osteosynthesis when adhering to meticulous surgical technique and postoperative care.

Functionally, the preservation of range of motion, with 96% of patients exhibiting less than 10° loss in elbow flexion-extension and less than 25° loss in forearm supination-pronation, supports the restoration of near-normal biomechanics, consistent with findings by Moed and Grace et al., who emphasized the importance of anatomical reduction and stable fixation in maintaining forearm rotation. The progressive and statistically significant improvement in DASH scores over 6 months, from a mean of 32.32 at 1 month to 8.04 at 6 months, highlights substantial functional recovery, paralleling outcomes in similar cohorts where early mobilization and structured rehabilitation facilitated gradual restoration of upper limb function.

Collectively, the present study corroborates existing evidence that plate osteosynthesis offers reliable union rates, low morbidity, and excellent functional outcomes in adult diaphyseal both bone forearm fractures, underscoring its role as the preferred surgical modality for these injuries.

The present study's functional outcome distribution, with 56% of patients achieving excellent results, 40% good, and 4% satisfactory based on DASH scores, aligns well with similar investigations in the literature that report high rates of favorable recovery following plate osteosynthesis for diaphyseal both bone forearm fractures. This outcome profile corroborates findings by Chapman et al. and Leung et al., who documented predominantly excellent to good functional results using comparable fixation techniques and assessment tools. The progressive improvement in DASH scores over time in your study reflects the expected trajectory of functional recovery facilitated by rigid fixation and structured rehabilitation. Subgroup analysis in the present study revealing significantly higher DASH scores—indicating greater disability—in patients aged ≥40 years and females throughout follow-up is consistent with prior research that identifies age and sex as influential factors in recovery. Older patients often experience slower or less complete functional restoration, potentially due to diminished bone healing capacity and comorbidities, while females may demonstrate differing recovery patterns possibly related to physiological or psychosocial factors. These findings underscore the importance of tailored postoperative management and highlight demographic considerations in prognostication.

Overall, the present study's outcomes reinforce the established efficacy of plate osteosynthesis in restoring upper limb function after diaphyseal both bone forearm fractures, while also emphasizing the nuanced impact of patient-specific factors on functional recovery, consistent with existing evidence.

**Strengths and Limitations:** The present study's prospective cohort design constitutes a significant strength, allowing for systematic data collection and temporal assessment of functional outcomes following plate osteosynthesis in diaphyseal both bone forearm fractures. This approach enhances the reliability and validity of the findings by minimizing recall bias and enabling standardized follow-up at predefined intervals. However, the study is limited by its relatively small sample size of 25 patients, which may restrict the generalizability of results and the statistical power to detect subtle differences or rare complications. Additionally, the follow-up duration of up to six months, while sufficient to assess early union and functional recovery, may not capture long-term outcomes such as late complications, implant-related issues, or sustained functional deficits. Future studies with larger cohorts and extended follow-up periods are warranted to confirm these findings and provide a more comprehensive evaluation of the durability of functional outcomes and complication profiles.

**Recommendations**

The present study recommends the use of plate osteosynthesis as the preferred surgical treatment for adult diaphyseal both bone forearm fractures due to its high union rates, low complication incidence, and excellent functional outcomes as measured by DASH scores. Emphasis should be placed on meticulous surgical technique adhering to anatomical principles, including preservation of the radial bow and stable fixation with adequate screw purchase. Early postoperative mobilization and structured rehabilitation protocols are critical to optimize range

of motion and functional recovery. Consideration of patient-specific factors such as age and sex is important for prognostication and tailoring postoperative care. Future research should explore multicenter trials and long-term functional outcomes to further validate these recommendations.

## Conclusion

The present study demonstrates that plate osteosynthesis for adult diaphyseal both bone forearm fractures yields excellent functional outcomes, as evidenced by significant improvements in DASH scores over a six-month follow-up period. The majority of patients achieved excellent (56%) or good (40%) results, indicating substantial recovery in upper limb function. All fractures attained clinical and radiological union within six months, with no cases of delayed union or non-union reported, underscoring the effectiveness of stable internal fixation. Postoperative complications were minimal, limited to superficial infections in 12% of patients, all resolved with conservative management. Range of motion was well preserved, with most patients experiencing less than 10° loss in elbow flexion-extension and less than 25° loss in forearm supination-pronation. These findings affirm the reliability and safety of plate osteosynthesis as a preferred surgical modality for these fractures, providing both high union rates and favorable functional recovery.

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