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Research Article

Is High Volar Angulation in Fifth Metacarpal Neck Fractures Functionally Tolerable? A Retrospective Series of Conservative Treatment Outcomes

Gokhan Sayer, Mustafa Pehlivan, Zeki Gunsoy

Department of Orthopedics and Traumatology, Health Science University Bursa City Hospital, Bursa, Türkiye

Abstract

Aim: This study aimed to evaluate the clinical and functional outcomes in cases with a volar angulation of 45° or more who were treated conservatively for fifth metacarpal neck fractures.

Material and Methods: The study included 49 male patients diagnosed with a fifth metacarpal neck fracture and treated conservatively with a volar angulation greater than 45° between September 2021 and September 2024. All patients were treated with an ulnar gutter splint. At the final follow-up, assessments included the Visual Analog Scale (VAS), Quick Disabilities of the Arm, Shoulder and Hand (Q-DASH), Functional Scoring System (FSS), range of motion (ROM) of the metacarpophalangeal (MP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints, and grip strength.

Results: The average age of the patients was 33.75 ± 9.50 years, with a mean follow-up duration of 19.93 ± 4.31 months. The most common injury mechanism was punching (69.4%), and the right hand was affected in 85.7% of cases. The mean VAS score was 0.12 ± 0.48, the mean Q-DASH score was 1.48 ± 2.52, and the mean FSS score was 29.53 ± 0.98. The average ROM measured was MP: 91.3 ± 3.8°, PIP: 107.6 ± 5.9°, and DIP: 84.6 ± 5.6°. The mean grip strength was 44.18 ± 7.64 kg.

Conclusion: This study demonstrates that for fifth metacarpal neck fractures with an angulation of 45° or more, conservative treatment can achieve good functional outcomes and maintain ROM.

Keywords: Fifth metacarpal neck fracture, conservative treatment, angulation, hand surgery

INTRODUCTION

Fifth metacarpal neck fractures (5MNFs), also called “boxer’s fractures,” account for approximately 20% of all hand fractures (1). They typically occur as a result of axial loading mechanisms such as punching and are particularly common among young male individuals (2,3).

In conservative treatment, immobilization can be accomplished using a functional brace or casting, with or without closed reduction, whereas surgical treatment offers options such as closed or open fixation (4–6). The most critical parameters in treatment selection are shortening, rotational deformity, and angulation (7). The effect of post-fracture volar angulation on functional outcomes has been a subject of debate for a long time (8). Traditional approaches recommend surgical intervention for volar angulation exceeding 30°–45°, due to concerns regarding extensor mechanism imbalance, reduced grip strength, and potential cosmetic deformity (9, 10). However, contrary to this perspective, several studies have reported that satisfactory clinical outcomes can still be achieved with conservative treatment even with volar angulation up to 60°–70° (11, 12).

CITATION

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Corresponding Author: Gokhan Sayer, Department of Orthopedics and Traumatology, Health Science University Bursa City Hospital, Bursa, Türkiye

E-mail: gkhnsyr38@gmail.com

This study aims to evaluate the clinical and functional outcomes of conservatively treated fifth metacarpal neck fractures (5MNF) with volar angulation of 45° or greater. We hypothesize that the adverse effects of increased angulation may not be clinically or functionally significant. The study seeks to contribute to the re-evaluation of the commonly accepted surgical threshold of 30°–45° angulation in the current literature.

MATERIAL AND METHODS

1. Study Design

This study was designed as a retrospective case series. The research was conducted with the approval of the institutional ethics committee (May 28, 2025; 2025-11/2). Written informed consent was obtained from all participants included in the study.

2. Patient Selection

Patients who presented to our clinic with a fifth metacarpal neck fracture between September 2021 and September 2024 were retrospectively reviewed.

Inclusion criteria: 1) Age 18 years or older, 2) Treatment with conservative methods (splinting or casting), 3) Evidence of fracture union with ≥45° volar angulation on the final follow-up radiograph, 4) Minimum follow-up duration of one year

Exclusion criteria: 1) Open fractures, 2) Multiple phalangeal or metacarpal fractures, 3) Concomitant upper extremity fractures, 4) History of previous upper extremity fractures, 5) Systemic diseases that could cause rheumatologic, neurologic, or peripheral neuropathic conditions (e.g., thyroid disorders, diabetes), 6) Inability to follow up regularly. After applying the inclusion and exclusion criteria, a total of 49 hands from 49 patients were included in the evaluation.

Functional, Clinical, and Radiological Evaluation

At the initial presentation, patients' demographic data were recorded, and they were scheduled for regular follow-up examinations throughout treatment. All patients were followed up with an ulnar gutter splint. Follow-up radiographs were obtained at the second and fourth weeks. At the fourth week, splint treatment was discontinued, and patients were instructed to begin a home exercise program. Afterward, they were routinely followed up at three-month intervals.

At the final follow-up, the fracture healing angle (degree of angulation) on the affected side was measured using 30° oblique hand radiographs. Angulation was calculated based on the angle between the longitudinal axes of the metacarpal shaft and the distal fragment. All radiological measurements were independently performed by two orthopedic surgeons involved in the study (Z.G. and M.P.), and the average of their measurements was used for statistical analysis.

At the same follow-up visit, patients' Visual Analog Scale (VAS), Quick Disabilities of the Arm, Shoulder and Hand (Q-DASH), and Functional Scoring System (FSS) scores were recorded. Additionally, the range of motion (ROM) of the metacarpophalangeal (MP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints was assessed, and grip strength measurements were performed. Grip strength (GS) was measured using a hand dynamometer. Three measurements were performed for each hand, and the average value was recorded in kilograms (kg). A 30-second rest period was allowed between each measurement.

The Functional Scoring System (FSS) is a 15-item questionnaire developed by Öztürk et al. (10) for functional assessment. It evaluates functional capacity related to hand use in daily living activities. Each item is scored as 0 (has difficulty), 1 (sometimes has difficulty), or 2 (no difficulty). The total score ranges from 0 to 30, with higher scores reflecting better functional ability (Table 1).

Based on the data collected, the functional and clinical measurements of the fractured limb were analyzed.

Statistical Analysis

The data from the study were analyzed using SPSS software version 26.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics for continuous variables are displayed as mean ± standard deviation (SD) and minimum–maximum values.

RESULTS

The study included 49 patients, all of whom were male. The average age was 33.75 ± 9.50 years, and the mean follow-up duration was 19.93 ± 4.31 months. In 85.7% of the patients, the right hand was affected, and the most common injury mechanism was punching (69.4%) (Table 2).

All patients had a healing angle greater than 45°, with a mean angulation of 56.28 ± 6.15°. None of the patients showed rotational deformity severe enough to cause finger overlap. In the clinical evaluation, the mean VAS score was 0.12 ± 0.48, the Q-DASH score was 1.48 ± 2.52, and the FSS score was 29.53 ± 0.98. The average ROM values were MP: 91.3 ± 3.8°, PIP: 107.6 ± 5.9°, and DIP: 84.6 ± 5.6° (Figure 1). The mean grip strength was measured as 44.18 ± 7.64 kg (Table 3).

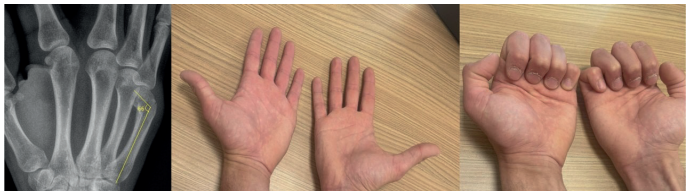

Figure 1. Radiographic and clinical images of a patient with a fifth metacarpal neck fracture treated conservatively.

Table1: Functional Scoring System			
Item	Yes	Sometimes	No
1. Do you have any difficulty holding a glass?	0	1	2
2. Do you have any difficulty opening a jar?	0	1	2
3. Do you have any difficulty opening and closing the water tap?	0	1	2
4. Do you have any difficulty using knife and fork?	0	1	2
5. Do you have any difficulty bathing?	0	1	2
6. Do you have any difficulty shaving?	0	1	2
7. Do you have any difficulty opening a window or a door?	0	1	2
8. Do you have any difficulty tying your shoes?	0	1	2
9. Do you have any difficulty driving?	0	1	2
10. Do you have any difficulty carrying a box or a parcel?	0	1	2
11. Do you have any difficulty carrying a sack?	0	1	2
12. Do you have any difficulty writing?	0	1	2
13. Do you have any difficulty using public transportation?	0	1	2
14. Do you have any difficulty with sports?	0	1	2
15. Do you have any difficulty using hand tools (hammer, screwdriver, etc.)?			
Assessment: 26–30 points: very good; 21–25 points: good; 11–20 points: inadequate; 0–10 points: very bad.			

Table 2. Demographic and Clinical Characteristics of the Patients	
Variables	Values
Age, years (mean ± SD)	33.75 ± 9.50
Gender, n (%)	
Male	49 (100)
Side, n (%)	
Left	7 (14.3)
Right	42 (85.7)
Dominance status, n (%)	
Dominant	45 (91.8)
Non-dominant	4 (8.2)
Mechanism of injury, n (%)	
Punching	34 (69.4)
Fall	9 (18.4)
Traffic accident	6 (12.2)
Follow-up, months (mean ± SD)	19.93 ± 4.31
SD: Standard Deviation, BMI: Body Mass Index	

Table 3. Functional and Radiological Outcomes	
Parameter	Values (Mean ± SD)
Healing angle (degrees)	56.29 ± 6.15
VAS	0.12 ± 0.48
Q-DASH	1.48 ± 2.52
FSS	29.53 ± 0.98
Grip Strength (kg)	44.18 ± 7.64
ROM (degrees)	
MP	91.3 ±3.8
PIP	107.6 ± 5.9
DIP	84.6 ± 5.6
SD: Standard Deviation, VAS: Visual Analog Scala, Q-DASH: Quick Disabilities of the Arm, Shoulder and Hand, FSS: Functional Scoring System, ROM: Range Of Motion, MP: Metacarpophalangeal joint, PIP: Proximal Interphalangeal joint, DIP: Distal Interphalangeal joint	

DISCUSSION

A key finding of this study is that patients with 5MNF treated conservatively, despite exhibiting significant fracture angulation, showed favorable clinical outcomes, including low pain scores, high functional capacity, and maintained joint ROM. France et al. demonstrated that satisfactory functional outcomes could be achieved in 15 patients with fracture angulation of 70° or more (13). Similarly, Müller et al. reported that good joint ROM was observed in 94% of patients with angulation up to 70°, and no significant correlation was found between the degree of angulation and functional outcomes (12). In the present study, despite a mean healing angulation of 56.28°, patients exhibited favorable VAS, Q-DASH, and FSS scores, with clinically preserved ROM and grip strength. These findings are consistent with the current literature and support the effectiveness of conservative treatment even in cases with marked angulation.

Surgical indications for 5MNF are typically based on the degree of angulation, presence of rotational deformity, and cosmetic concerns (14). Many studies in the literature have reported favorable functional outcomes following surgical treatment in patients with angulation of 45° or more (6, 15). However, in a prospective comparative study conducted by Çepni et al., although the return-to-work time was shorter in surgically treated patients, no significant difference was found between surgical and conservative treatments in terms of functional and clinical outcomes (16). In the present study, all patients with an angulation of 45° or greater were treated exclusively with conservative methods. Despite this, functional scores and joint ROM were found to be clinically satisfactory. This may be due to the patients' adaptation to the angulated alignment and the absence of significant rotational deformities.

There is no consensus in the literature regarding the threshold of angulation that necessitates surgical intervention in managing these fractures (17). In a survey study conducted by Sahu et al. involving 158 upper extremity surgeons, 21.3% of the participants reported preferring surgery at 40° of volar angulation, 26.9% at 50°, and 33.7% at 60°. These discrepancies among surgeons highlight the significant heterogeneity in clinical decision-making regarding the management of 5MNF (18). In the present study, despite an average angulation of 56.4°, conservative treatment alone resulted in low pain levels, high functional scores, and preserved joint ROM. These findings suggest that treatment decisions for such fractures should not be based solely on the degree of angulation.

This study has several limitations. The retrospective case series design and the absence of a comparison group limit the interpretability of the findings. Additionally, the sample included only male patients, which may limit the generalizability of the results. Additionally, functional parameters such as grip strength and joint ROM may vary depending on patient motivation, potentially affecting measurement accuracy. Moreover, cosmetic satisfaction and extension lag were not evaluated; including these parameters could provide a more comprehensive perspective on the patients' functional and aesthetic outcomes.

This study demonstrated that conservative treatment can achieve low pain levels, satisfactory functional outcomes, and adequate joint ROM in fifth metacarpal neck fractures with marked angulation. To verify the long-term validity of these results, further prospective, randomized studies with larger patient cohorts are necessary.

Ethics Approval

This study was designed as a retrospective case series. The research was conducted with the approval of the institutional ethics committee (May 28, 2025; 2025-11/2).

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