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The role of the cast index in predicting clinical outcomes in elderly patients with distal radius fractures

Cumhur Deniz Davulcu[1], Muhammed Yusuf Afacan[1,2]

[1]İstanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of Orthopaedics and Traumatology, İstanbul, Türkiye
[2]İstanbul University-Cerrahpaşa, Institute of Graduate Studies, Department of Anatomy, İstanbul, Türkiye

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Abstract

The utility of the cast index in elderly patients remains underexplored. This study investigates the relationship between the cast index and clinical, radiographic, and functional outcomes in patients aged 65 and older with distal radius fractures treated with closed reduction and casting. A retrospective cohort study was conducted involving 66 elderly patients with distal radius fractures treated conservatively. Patients were categorized into two groups (33 patients in each) based on cast index (Group A≤0.8 and Group B>0.8). Demographic data were collected from the patients' hospital records. Radiographic outcomes (volar tilt, radial inclination, and radial height), clinical metrics (wrist range of motion), and functional scores (MAYO wrist and QuickDASH) were assessed at 12 weeks post-treatment. Patients with a cast index ≤0.8 (Group A) demonstrated significantly better radiographic alignment, including smaller reductions in volar tilt (p=0.001), radial inclination (p=0.002), and radial height (p=0.001). These patients also exhibited greater wrist flexion (p=0.035) and extension (p=0.028), along with superior functional outcomes, as indicated by higher MAYO wrist scores (p=0.001) and lower QuickDASH scores (p=0.002). Subgroup analysis revealed pronounced benefits in simpler fractures (Frykman Types I and II). Group A experienced higher rates of cast-related discomfort, whereas Group B showed increased rates of reduction loss. The cast index is a reliable predictor of outcomes in elderly patients with distal radius fractures treated conservatively. A cast index ≤0.8 correlates with better radiographic, clinical, and functional results, particularly in less complex fractures. These findings support incorporating the cast index into routine assessment to optimize fracture management in this vulnerable population.

Keywords: Distal radius fractures, elderly patients, cast index, clinical outcomes, conservative treatment, radiographic alignment

Introduction

Distal radius fractures are one of the most frequently encountered orthopedic injuries in the upper extremity [1,2], especially in young adult males and older women [3,4], often causing significant disruptions to daily activities and overall quality of life. They represent approximately 18% of all fractures in individuals aged 65 and older [5]. These injuries are particularly common in individuals with reduced bone density, such as those with osteoporosis [6]. While treatment options range from surgical interventions to casting and other conservative methods, determining the most effective approach and identifying reliable indicators of treatment success remain critical challenges in patient care [7].

One such indicator, the cast index, measures the ratio of the sagittal to coronal width of the cast at the fracture site [8]. This simple metric has been proposed as a useful tool for evaluating the quality of fracture reduction and alignment, especially in cases treated conservatively [9]. Research has already shown its value in pediatric forearm fractures, where a lower cast index has been linked to better outcomes, including reduced fracture displacement and improved range of motion [8-10]. However, its potential role in elderly patients with distal radius fractures has not been extensively studied, leaving questions about its broader clinical relevance unanswered.

This study focuses on assessing whether the cast index can reliably predict clinical outcomes in older adults with distal radius fractures who have undergone closed reduction and casting. We hypothesize that patients with a cast index of ≤0.8

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Corresponding Author: Cumhur Deniz Davulcu, İstanbul University-Cerrahpaşa, Cerrahpaşa Faculty of Medicine, Department of Orthopaedics and Traumatology, İstanbul, Türkiye
Email: cumhurdeniz.davulcu@iuc.edu.tr

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will achieve better results in terms of radiographic alignment, reduced fracture displacement, improved wrist range of motion, higher functional and clinical scores, compared to those with a higher cast index. By clarifying this relationship, the study aims to provide evidence for incorporating the cast index into routine treatment protocols for elderly patients, ultimately enhancing the effectiveness of distal radius fracture management with closed reduction and casting.

Material and Methods

This retrospective cohort study approved by the Clinical Research Ethics Committee with the number E-83045809-804.01-1150500 analyzed the medical records of patients aged 65 years or older who were treated with closed reduction and short-arm casting for distal radius fractures. Patients included in the study were those aged 65 years or older at the time of treatment, who had radiologically confirmed distal radius fractures, were treated with closed reduction and short-arm casting using plaster of Paris and completed follow-up evaluations at a minimum of 6- and 12-weeks post-treatment. Patients with open fractures, additional upper extremity fractures, systemic diseases affecting bone healing such as osteoporosis or rheumatoid arthritis, those treated with fiberglass casting, or those with incomplete medical records were excluded from the study. Frykman classification was used to determine the subtype of the fractures (Figure 1).

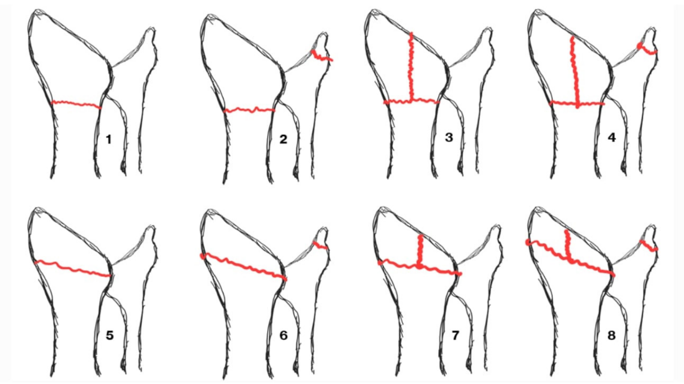

Figure 1. Frykman Classification of distal radius fractures; Type 1: Extraarticular distal radius fracture; Type 2: Extraarticular distal radius fracture with styloid fracture of ulna; Type 3: Intraarticular distal radius fracture involving the radiocarpal joint; Type 4: Intraarticular distal radius fracture involving the radiocarpal joint with styloid fracture of ulna; Type 5: Intraarticular distal radius fracture involving the distal radioulnar joint; Type 6: Intraarticular distal radius fracture involving the distal radioulnar joint with styloid fracture of ulna; Type 7: Intraarticular distal radius fracture involving both the radiocarpal and distal radioulnar joint; Type 8: Intraarticular distal radius fracture involving both the radiocarpal and distal radioulnar joint with styloid fracture of ulna

The casting procedure followed a standardized protocol. Initially, traction was applied to the fractured extremity, followed by closed reduction to align the fracture fragments. The wrist was then immobilized in 20–30 degrees of flexion and ulnar deviation with a short-arm cast made of plaster of Paris. This method was employed to ensure optimal alignment and stability of the fracture fragments. Standard imaging techniques, including anteroposterior and lateral wrist radiographs, were used for radiographic assessments. The same casting method was applied to all patients to minimize variability in treatment.

A uniform rehabilitation protocol was followed for all patients. Within 24 hours of casting, vascular and neurologic examinations were performed to evaluate potential complications such as compartment syndrome or nerve compression. At the first or second week follow-up, clinical examination and control radiography were conducted to assess fracture alignment and identify any signs of displacement. A similar evaluation was performed at 4 weeks to monitor fracture healing and alignment. At 6 weeks, the cast was removed, and a clinical examination was performed to evaluate joint mobility. At this stage, range of motion (ROM) exercises for the wrist were initiated. At 8 weeks, patients began strengthening exercises focusing on wrist and forearm musculature to restore functionality and prevent muscle atrophy. The final evaluation at 12 weeks included a comprehensive clinical examination and functional assessment, and patients were encouraged to resume normal activities while continuing progressive strengthening and mobility exercises.

Fracture displacement was defined as any radiographic loss of alignment exceeding 2 mm in radial height, 5° in volar tilt, or 5° in radial inclination. These criteria were used at each follow-up to determine displacement and its potential impact on outcomes.

Demographic data, including age, gender, side of fracture, fracture characteristics based on Frykman classification (Figure 1), treatment details, and follow-up outcomes, were collected from the medical records. The cast index was calculated as the ratio of sagittal to coronal width of the cast at the fracture site, measured on anteroposterior and lateral wrist radiographs (Figure 2). Patients were categorized into two groups based on the cast index: Group A with a cast index ≤0.8 and Group B with a cast index >0.8.

Figure 2. Cast Index Measurement; the cast index was determined by calculating the ratio of the sagittal to coronal width of the cast at the fracture site, based on measurements taken from anteroposterior and lateral wrist radiographs; In this figure, the cast index is calculated as X/Y=0.79

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Radiographic outcomes were assessed by measuring volar tilt, radial inclination, and radial height. Radial height was measured on the anteroposterior view as the distance between two parallel lines perpendicular to the long axis of the radius, one drawn on the articular surface and the other at the tip of the radial styloid. Radial inclination was determined as the angle formed between a line along the articular surface of the radius and a tangent line drawn from the radial styloid. The volar tilt was assessed on the lateral view as the angle formed between a line perpendicular to the long axis of the radius and a tangent line along the slope of the dorsal-to-volar surface of the radius. Normal values for radial height, radial inclination, and volar tilt were considered to be 14±1 mm, 22±3°, and 11±5°, respectively which is consistent with the literature [3].

Clinical outcomes included measurements of wrist flexion and extension, while functional outcomes were assessed using the MAYO wrist score and QuickDASH score. Subgroup analyses were conducted to evaluate differences in radiographic and clinical outcomes based on Frykman fracture types [11].

Sample size was determined using power analysis performed with G*Power (Version 3.1.9.6). With a reliability of 95%, an effect size of 0.70, and a power of 0.80, the minimum required sample size was calculated as 66 patients, with 33 in each group. Statistical analysis was performed using IBM SPSS Statistics 24.0 software. Independent t-tests were used to compare continuous variables between groups, while the Mann-Whitney U test was applied for non-parametric data. Categorical variables were analyzed using chi-square tests, and a p-value of <0.05 was considered statistically significant. This study comprehensively evaluated the impact of the cast index on clinical, radiographic, and functional outcomes, while also exploring differences among Frykman fracture types to provide a detailed understanding of the relationship between fracture characteristics and treatment parameters.

Results

A total of 66 patients were included in the study, with 33 patients in Group A (cast index ≤0.8) and 33 patients in Group B (cast index >0.8). The demographic characteristics of the groups were comparable, with no significant differences observed in terms of age, gender, or side of fracture. The mean age of patients was 72.4±5.2 years in Group A and 73.1±6.1 years in Group B (p=0.56). In Group A, 64% of the patients were female and 36% were male, while in Group B, 61% were female and 39% were male (p=0.78). The distribution of fractures based on whether they occurred on the dominant or non-dominant extremity was similar between the groups (p=0.65). According to the Frykman classification, the most common fracture type in both groups was Type III, accounting for 30.3% in Group A and 33.3% in Group B, with no statistically significant difference in fracture type distribution (p=0.84) (Figure 3). Frykman classification distribution of the fractures for the whole group was presented in Figure 4.

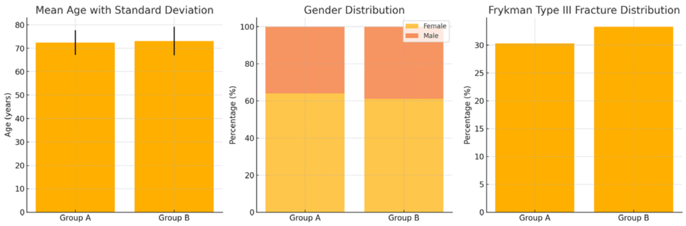

Figure 3. Demographic characteristics of the study population; the graphs illustrate (**A**) the mean age with standard deviation for Group A (cast index≤0.8) and Group B (cast index>0.8), (**B**) the gender distribution as percentages of female and male patients in each group, and (**C**) the percentage distribution of Frykman Type III fractures between the two groups. No statistically significant differences were observed in age (p=0.56), gender (p=0.78), or Frykman Type III fracture distribution (p=0.84) between the groups

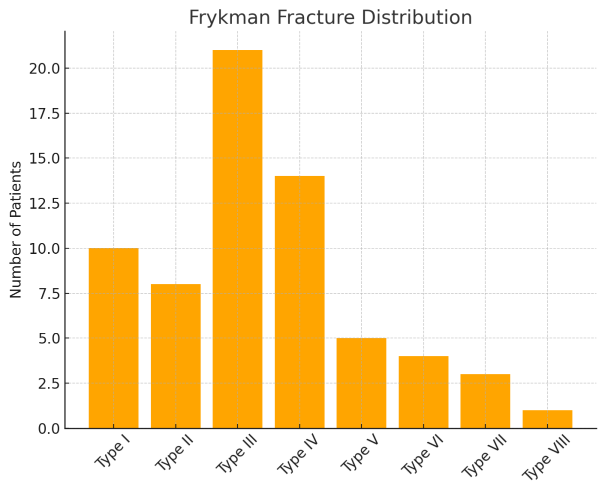

Figure 4. The distribution of distal radius fractures in the entire study population according to Frykman classification; the bar graph illustrates the number of patients for each Frykman fracture type (I–VIII), highlighting the predominance of Type III fractures in the study groups

Radiographic outcomes at 12 weeks post-treatment demonstrated significant differences between the groups. The mean volar tilt was 6.8±1.7° in Group A compared to 4.2±1.9° in Group B (p=0.003), indicating better maintenance of alignment in Group A. Radial inclination was 21.5±2.6° in Group A and 18.2±2.8° in Group B (p=0.001), while radial height was 12.5±1.4 mm in Group A and 10.3±1.7 mm in Group B (p=0.002). When comparing the initial post-casting measurements, volar tilt was 7.0±1.5° in Group A and 7.2±1.6° in Group B (p=0.28), radial inclination was 20.8±2.2° in Group A and 21.0±2.5° in Group B (p=0.52), and radial height was 13.0±1.3 mm in Group A and 12.8±1.4 mm in Group B (p=0.44). The delta values, reflecting changes between initial measurements and those at 12 weeks, were also significantly different. Group A demonstrated smaller decreases in volar tilt (0.2±0.4° vs. 3.0±0.6°, p=0.001), radial inclination (0.7±0.5° vs. 2.8±0.7°, p=0.002), and radial height (0.5±0.3 mm vs. 2.5±0.5 mm, p=0.001), further emphasizing the superiority of lower cast indices in preserving alignment.

In terms of range of motion, Group A demonstrated significantly greater wrist flexion and extension compared to Group B. The mean flexion was 61.5±6.3° in Group A and 56.5±6.8° in Group

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B (p=0.035), while the mean extension was 57.0±6.2° in Group A and 52.0±6.0° in Group B (p=0.028). For Frykman Types I and II fractures, which were less frequent, Group A exhibited superior motion outcomes, with a mean flexion of 64.0±5.8° and extension of 59.0±5.9°, compared to 58.0±6.2° and 53.0±5.8°, respectively, in Group B (p=0.008 for flexion, p=0.010 for extension). For Frykman Types III and IV fractures, which were more common, Group A showed a mean flexion of 60.0±6.0° and extension of 56.0±6.1°, while Group B showed flexion of 55.5±5.9° and extension of 51.5±5.7°. These differences in the more complex fractures were not statistically significant (p=0.07).

Functional outcomes also favored Group A, as demonstrated by significantly better MAYO wrist scores and lower QuickDASH scores. The mean MAYO wrist score was 85.5±6.8 in Group A compared to 78.0±7.5 in Group B (p=0.001). Similarly, the mean QuickDASH score was 14.0±5.0 in Group A compared to 21.5±5.5 in Group B (p=0.002). For Frykman Types I and II fractures, Group A had a mean MAYO wrist score of 89.0±5.5 and a QuickDASH score of 11.0±4.0, compared to 80.0±6.0 and 19.0±4.5 in Group B (p=0.003 and p=0.002, respectively). In Frykman Types III and IV fractures, the differences between the groups were less pronounced, with Group A having a mean MAYO wrist score of 83.0±6.5 and a QuickDASH score of 16.5±4.5, compared to 77.0±6.8 and 22.5±5.0 in Group B. These differences in complex fractures were not statistically significant (p=0.067 for MAYO, p=0.072 for QuickDASH).

Complications with cast-related discomfort and skin irritation were reported in 18.2% of patients in Group A, compared to 6.1% in Group B (p=0.041). No cases of early cast removal or recasting occurred in Group A, while 9.1% of patients in Group B required such interventions because of loss of reduction (p=0.038). Despite these differences, no surgical interventions were required for any patients in either group by the end of the 12-week follow-up. Table 1 summarizes the most important results.

Table 1. Comparison of radiographic, clinical, functional outcomes, and complications between Group A (cast index≤0.8) and Group B (cast index>0.8)

Parameters	Group A (Mean±SD)	Group B (Mean±SD)	p-value
Volar tilt (°) at 12 weeks	6.8±1.7	4.2±1.9	**0.003**
Radial inclination (°) at 12 weeks	21.5±2.6	18.2±2.8	**0.001**
Radial height (mm) at 12 weeks	12.5±1.4	10.3±1.7	**0.002**
Volar tilt (°) initial	7.0±1.5	7.2±1.6	0.280
Radial inclination (°) initial	20.8±2.2	21.0±2.5	0.520
Radial height (mm) initial	13.0±1.3	12.8±1.4	0.440
Δ volar tilt (°)	0.2±0.4	3.0±0.6	**0.001**
Δ radial inclination (°)	0.7±0.5	2.8±0.7	**0.002**
Δ radial height (mm)	0.5±0.3	2.5±0.5	**0.001**
Flexion (°) in all group	61.5±6.3	56.5±6.8	**0.035**
Extension (°) in all group	57.0±6.2	52.0±6.0	**0.028**
Flexion (°) in Frykman types I-II group	64.0±5.8°	58.0±6.2°	**0.008**
Extension (°) in Frykman types I-II group	59.0±5.9°	53.0±5.8°	**0.010**
Flexion (°) in Frykman types III-IV group	60.0±6.0°	55.5±5.9°	0.070
Extension (°) in Frykman types III-IV group	56.0±6.1°	51.5±5.7°	0.070
MAYO wrist score in all group	85.5±6.8	78.0±7.5	**0.001**
QuickDASH score in all group	14.0±5.0	21.5±5.5	**0.002**
MAYO wrist score in Frykman types I-II group	89.0±5.5	80.0±6.0	**0.003**
QuickDASH score in Frykman types I-II group	11.0±4.0	19.0±4.5	**0.002**
MAYO wrist score in Frykman types III-IV group	83.0±6.5	77.0±6.8	0.067
QuickDASH score in Frykman types III-IV group	16.5±4.5	22.5±5.0	0.072
Cast-related discomfort/skin irritation (patients)	6	2	**0.041**
Early cast removal/recasting (patients)	0	3	**0.038**

Discussion

This study demonstrated that a lower cast index (≤0.8) was associated with significantly better clinical, radiographic, and functional outcomes in elderly patients with distal radius fractures treated with closed reduction and casting. Group A (cast index ≤0.8) showed superior maintenance of radiographic alignment, with significantly smaller decreases in volar tilt, radial inclination, and radial height at the 12-week follow-up compared to Group B (cast index >0.8). Clinically, Group A exhibited greater wrist flexion and extension, as well as better functional outcomes, evidenced by higher MAYO wrist scores and lower QuickDASH scores. Subgroup analyses revealed that these differences were more pronounced in Frykman Types I and II fractures, while outcomes in the more complex Frykman Types III and IV fractures showed smaller, and non-significant differences but still better results with Group A. Furthermore, Group A patients experienced more frequent cast-related discomfort and skin irritation, but it was required recasting in more cases of group B due to loss of reduction. We deduced that higher cast index is linked to more loss of reduction, while lower CI increase the tightness of cast which may cause discomfort and skin irritation. These findings underscore the importance of the cast index in predicting successful outcomes in the conservative management of distal radius fractures in the elderly.

Achieving and maintaining proper alignment during conservative management of distal radius fractures remains a cornerstone of effective treatment. Alemdaroğlu et al. demonstrated that the three-point index reliably predicts re-displacement in extra-articular fractures, emphasizing the critical role of casting technique and ulnar deviation in preventing alignment loss [12]. Similarly, Kamat et al. highlighted that a CI≤0.8 significantly reduces re-displacement rates in pediatric forearm fractures, underscoring its utility in maintaining alignment [8]. Singh et al. recommended incorporating CI and related indices into clinical decision-making frameworks to improve outcomes [13]. Mimura et al., however, indicated that while cast molding quality has no clinical effect on preventing fracture displacement, factors like patient age, original displacement and intraarticular fractures carry more weight in those cases [14]. Sengab et al. also found no significant influence of CI<0.8 on re-displacement risk in pediatric fractures [15]. In the context of this study, our findings resonate with the conclusions of Alemdaroğlu, Singh and Kamat et al., as patients in Group A (CI≤0.8) showed superior radiographic alignment at follow-up, reflected in better volar tilt, radial height, and radial inclination compared to Group B. These results further validate the utility of CI as a predictor of successful outcomes in elderly patients, particularly in simpler fracture types (Frykman Types I and II). However, in line with Mimura et al., the less pronounced predictive value of CI in Frykman Types III and IV fractures suggests that additional factors or interventions may be necessary to maintain alignment in these complex cases.

Functional recovery following distal radius fractures is heavily influenced by the preservation of alignment. Zhu et al. found that surgical management improved grip strength and decreased DASH scores compared to non-surgical methods [7]. However, Yang et al. demonstrated that cast immobilization could achieve similar functional outcomes in less complex cases, reducing costs and complication risks [16]. Perugia et al. reinforced the importance of restoring volar tilt and ulnar variance for functional recovery [3], while Gutiérrez-Espinoza et al. noted modest but significant functional benefits of surgical approaches over conservative management [17]. In our study, Group A patients demonstrated superior functional recovery, evidenced by higher MAYO wrist scores and lower QuickDASH scores, particularly in Frykman Types I and II fractures. These findings align with Yang et al., indicating that conservative management can achieve favorable outcomes when alignment is preserved [16]. However, consistent with Zhu et al. and Gutiérrez-Espinoza et al., the functional outcomes were still good but less favorable in more complex fracture types (Frykman III and IV), where surgical intervention may offer additional benefits [7,17].

The complexity of a fracture influences the effectiveness of CI as a predictive tool. Perlus et al. demonstrated that dorsal distraction plating offers excellent outcomes for severely comminuted fractures, enabling early weightbearing with low complication rates [18]. Tai et al. emphasized that bone cement augmentation with volar locking plates may enhance stability in elderly patients with osteoporotic and complex fractures [5]. Kralj et al., however, suggested that wrist positioning during casting is more critical than CI in preventing re-displacement in pediatric fractures [19]. Our findings align with these observations. While a low CI predicted better outcomes in simpler fractures (Frykman Types I and II), it was less effective in complex fractures (Frykman Types III and IV). These results support the conclusions of Perlus et al. and Tai et al., indicating that alternative strategies, such as surgical stabilization, may be necessary in such cases.

Complications arising from casting and splinting are diverse, ranging from re-displacement to skin-related issues. High or low CI values have also been consistently associated with increased complication risks. Turgut et al. reported a significant association between lower CI values (<0.775), tight cast syndrome, and higher CI values (>0.875), loss of reduction in pediatric fractures [20]. Similarly, Ravier et al. found that improper cast molding, reflected in high CI values and excessive padding, increased displacement risks [21]. Complications such as allergic contact dermatitis have also been documented as a case caused by undercast cotton padding in a patient treated for a distal radius fracture [22]. Seeley et al. highlighted the role of simulation-based training in improving casting proficiency, reducing complications, and optimizing outcomes [23]. In our study, Group A (CI<0.8) experienced a higher cast-related discomfort and skin issues while Group B (CI>0.8) experienced a higher loss of reduction rates. These findings corroborate those of Turgut et al. and Ravier et al., emphasizing the critical importance of proper casting techniques and underscoring the need for careful material selection and vigilance in post-application follow-ups to prevent such complications [20,21]. Incorporating alternative materials, such as fiberglass or hypoallergenic padding, may mitigate these risks in sensitive patients [22]. Implementing standardized training protocols, as suggested by Seeley et al., may further improve casting outcomes and minimize complications [23].

The type of material used in casting can significantly impact outcomes. Bullen et al. demonstrated that plaster of Paris provides better molding and alignment compared to polyester casts [24], while Labronici et al. showed strong agreement between CI and gap index in assessing cast quality and predicting re-displacement [10]. In this study, the consistent use of plaster of Paris facilitated optimal casting outcomes because of allowing molding and adjusting CI, supporting the findings of Bullen et al. This reinforces the importance of selecting appropriate materials to achieve and maintain proper alignment.

This study has several notable strengths that enhance the validity and relevance of its findings. Firstly, the use of a standardized casting protocol ensured consistency in fracture reduction and immobilization techniques across all patients, minimizing variability in treatment. Additionally, the rehabilitation process was uniformly applied, providing a controlled framework to evaluate outcomes. The inclusion and exclusion criteria were rigorously defined, focusing on a homogeneous population of elderly patients treated with plaster of Paris casting for distal radius fractures. By excluding patients with open fractures, systemic conditions affecting bone healing, or incomplete medical records, the study maintained a high level of internal validity and minimized potential confounding factors. Furthermore, the comprehensive assessment of outcomes, including radiographic parameters (volar tilt, radial inclination, radial height), clinical metrics (wrist range of motion), and functional scores (MAYO wrist score, QuickDASH), allowed for a multidimensional evaluation of treatment effectiveness. This holistic approach provides a more nuanced understanding of the relationship between the cast index and patient outcomes. Lastly, the study's focus on the elderly population, a group often underrepresented in orthopedic research, addresses a significant gap in the literature. By investigating the role of the cast index in a demographic particularly vulnerable to distal radius fractures, this study offers valuable insights that can inform clinical practice and improve care for this population.

This study has several limitations that should be acknowledged. The retrospective design inherently limits the ability to establish causality and is subject to biases such as incomplete or inaccurate medical records. The exclusive use of plaster of Paris casts also limits the applicability of findings to other commonly used materials, such as fiberglass, potentially narrowing the clinical relevance. Lastly, uncontrolled external variables, such as patient adherence to rehabilitation protocols, variations in comorbidities, or unreported complications, may have influenced the outcomes and were not accounted for in the analysis. Addressing these limitations in future prospective studies will help validate and expand the findings of this research.

Conclusion

This study highlights the importance of the cast index as a reliable predictor of clinical, radiographic, and functional outcomes in elderly patients with distal radius fractures treated with closed reduction and casting. Patients with a CI≤0.8 demonstrated significantly better radiographic alignment, greater wrist range of motion, and improved functional scores compared to those with a higher cast index. These findings were particularly evident in simpler fracture types (Frykman Types I and II), emphasizing the critical role of achieving optimal cast alignment in these cases. Given the scarcity of studies addressing the impact of the cast index in elderly populations, this research fills a critical gap in the literature and provides evidence for incorporating the cast index into standard treatment protocols for distal radius fractures in older adults. While these findings are promising, the limitations of this retrospective study underscore the need for prospective studies with larger, more diverse populations and long-term follow-up to further validate the clinical utility of the cast index. By optimizing fracture management, the adoption of this metric has the potential to improve functional recovery and quality of life in this vulnerable patient population.

Considering the superior radiographic, clinical, and functional outcomes associated with a CI≤0.8, we recommend incorporating the cast index into routine practice when applying casts in elderly patients, especially in the early stages of fractures, despite the potential for increased skin-related complications, as the benefits in fracture stability and functional recovery outweigh these risks.

Conflict of Interests
The authors declare that there is no conflict of interest in the study.

Financial Disclosure
The authors declare that they have received no financial support for the study.

Ethical Approval
This study was approved by the İstanbul University-Cerrahpaşa Rectorate Clinical Research Ethics Committee with number E-83045809-804.01-1150500 at 12.11.2024.

References

1. Testa G, Panvini FMC, Vaccalluzzo MS, et al. Surgical treatment of periarticular distal radius fracture in elderly: a systematic review. Medicina (Kaunas). 2024;60:1671.
2. Luokkala T, Laitinen MK, Hevonkorpi TP, et al. Distal radius fractures in the elderly population. EFORT Open Rev. 2020;5:361-70.
3. Dario P, Matteo G, Carolina C, et al. Is it really necessary to restore radial anatomic parameters after distal radius fractures?. Injury. 2014;45:S21-6.
4. de Bruijn MAN, van Ginkel LA, Boersma EZ, et al. Cast immobilization duration for distal radius fractures, a systematic review. Eur J Trauma Emerg Surg. 2024;50:1621-36.
5. Tai T-H, Chu P-J, Lu K-Y, et al. Current management and volar locking plate fixation with bone cement augmentation for elderly distal radius fractures-an updated narrative review. J Clin Med. 2023;12:6801.
6. Gullborg EJ, Kim JH, Ward CM, Simcock XC. Optimizing treatment strategies for distal radius fractures in osteoporosis: a comparative review. Medicina (B Aires). 2024;60:1848.

7. Zhu C, Wang X, Liu M, et al. Non-surgical vs. surgical treatment of distal radius fractures: a meta-analysis of randomized controlled trials. BMC Surg. 2024;24:205.

8. Kamat AS, Pierse N, Devane P, et al. Redefining the cast index: the optimum technique to reduce redisplacement in pediatric distal forearm fractures. J Pediatr Orthop. 2012;32:787-91.

9. Roussos D, Gonzalez L, Litrenta J. Does a good cast index always reflect a good cast?. Bull Hosp Jt Dis. 2022;80:286-90.

10. Labronici PJ, Ferreira LT, Dos Santos Filho FC, et al. Objective assessment of plaster cast quality in pediatric distal forearm fractures: Is there an optimal index?. Injury. 2017;48:552-6.

11. Frykman G: Fracture of the distal radius including sequelae--shoulder-hand-finger syndrome, disturbance in the distal radio-ulnar joint and impairment of nerve function. A clinical and experimental study. Acta Orthop Scand. 1967:3+.

12. Alemdaroğlu KB, Iltar S, Aydoğan NH, et al. Three-point index in predicting redisplacement of extra-articular distal radial fractures in adults. Injury. 2010;41:197-203.

13. Singh S, Bhatia M, Housden P. Cast and padding indices used for clinical decision making in forearm fractures in children. Acta Orthop. 2008;79:386-9.

14. Mimura T, Yamazaki H, Hayashi M, et al. The predictive factors of displacement of adult distal end radius fracture treated with casting. J hand Surg Asian-Pacific Vol. 2021;26:525-34.

15. Sengab A, Krijnen P, Schipper IB. Risk factors for fracture redisplacement after reduction and cast immobilization of displaced distal radius fractures in children: a meta-analysis. Eur J Trauma Emerg Surg. 2020;46:789-800.

16. Yang Q, Cai G, Liu J, et al. Efficacy of cast immobilization versus surgical treatment for distal radius fractures in adults: a systematic review and meta-analysis. Osteoporos Int. 2023;34:659-69.

17. Gutiérrez-Espinoza H, Araya-Quintanilla F, Olguín-Huerta C, et al. Effectiveness of surgical versus conservative treatment of distal radius fractures in elderly patients: a systematic review and meta-analysis. Orthop Traumatol Surg Res. 2022;108:103323.

18. Perlus R, Doyon J, Henry P. The use of dorsal distraction plating for severely comminuted distal radius fractures: a review and comparison to volar plate fixation. Injury. 2019;50:S50-5.

19. Kralj R, Pešorda D, Keretić D, et al. Secondary displacement in distal forearm fractures in children: adequate positioning of the wrist in the cast is more important than cast index. J Pediatr Orthop B. 2023;32:145-51.

20. Turgut A, Erkuş S, Koca A, et al. Analysis of the factors causing tight cast syndrome after closed reduction and casting of pediatric distal radius fractures. Acta Orthop Traumatol Turc. 2018;52:329-33.

21. Ravier D, Morelli I, Buscarino V, et al. Plaster cast treatment for distal forearm fractures in children: which index best predicts the loss of reduction?. J Pediatr Orthop B. 2020;29:179-86.

22. Değer G, Demirdas AB, Akbaba D, Afacan MY. Allergic contact dermatitis in the right forearm following splint application for distal radius fracture: a rare case of plaster cotton allergy. Cureus. 2024;16:e51802.

23. Seeley MA, Fabricant PD, Lawrence JTR. Teaching the basics: development and validation of a distal radius reduction and casting model. Clin Orthop Relat Res. 2017;475:2298-305.

24. Bullen M, Kinealy J, Blanchard R, et al. Comparison of the moulding ability of plaster of Paris and polyester cast material in the healthy adult forearm. Injury. 2017;48:2586-9.