

Review

Optimal Recovery: Unveiling the Success of Conservative Management for Proximal Phalanx Fractures in Adults—A Scoping Review

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Abstract: Background: Proximal phalanx fractures of the hand are common and can significantly impact hand function. Conservative treatments, including splinting and dynamic mobilization, are often used, but their efficacy compared to surgical interventions needs thorough evaluation. Methods: A scoping review was conducted by analyzing studies focused on conservative treatments for proximal phalanx fractures in adults. Inclusion criteria encompassed studies with adult populations, conservative management methods, and clearly reported outcomes. Data from eight selected studies were synthesized to evaluate treatment efficacy, patient outcomes, and complication rates. Results: The review found that conservative treatments, including splinting, buddy taping, and dynamic mobilization, were highly effective for stable, extra-articular proximal phalanx fractures. These methods promoted early functional recovery and had high patient satisfaction rates. Studies comparing conservative and surgical treatments indicated excellent outcomes for both, with fewer complications observed in the surgical groups for unstable fractures. Dynamic and traction splints facilitated significant improvements in total active motion (TAM) and grip strength. Younger patients with transverse fractures showed better outcomes with conservative treatments. Conclusions: Conservative management strategies are effective for stable proximal phalanx fractures, promoting satisfactory functional recovery and minimizing complications. Surgical intervention is recommended for unstable or complex fractures to achieve better functional outcomes. Standardized treatment protocols and long-term follow-up are essential to validate these findings and optimize patient care. Further research with larger sample sizes and standardized outcome measures is needed to establish clear guidelines for the conservative management of proximal phalanx fractures in adults.

Keywords: proximal phalanx fractures; conservative treatment; splinting; dynamic mobilization; hand fractures



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1. Introduction

Proximal phalanx fractures (Figure 1) represent a significant portion of hand injuries, constituting 23% of all hand fractures, in contrast to the 18% observed in metacarpal

fractures [1]. This higher incidence is primarily due to the proximal phalanges being less protected and more susceptible to diverse forces and mechanisms of injury [2–5]. Biomechanical research has shown that the proximal phalanges can endure forces up to 25 N during routine activities, such as opening a jar [6,7].



Figure 1. X-ray images of both hands, showing skeletal structure and joint alignment. These radiographs can be used to assess fractures, joint abnormalities, or degenerative conditions affecting the hand.

Typically, these fractures are more prevalent in males during their third decade of life and in females during their second decade. With an incidence rate of 39%, fractures of the proximal phalanx are among the most common fractures of the long fingers, particularly affecting the dominant hand [1,5,8–10]. These fractures frequently occur in the epiphyseal and/or diaphyseal regions of the first phalanx (F1), especially at the level of the fifth digit.

Proximal phalanx (P1) fractures are among the most common hand injuries, accounting for a significant portion of hand trauma cases. These fractures can lead to substantial functional impairment if not properly managed, potentially resulting in long-term disability and a significant socio-economic burden due to time off work and healthcare costs [11–14]. Despite their prevalence, there remains a lack of consensus on the optimal conservative management strategies for these injuries, particularly regarding the use of various splinting techniques and the timing of mobilization.

The primary mechanisms causing these fractures include accidental falls and direct trauma, the latter usually resulting from an impact between the hand and another object or person. The geometry and stability of proximal phalanx fractures vary, with some presenting as transverse or oblique and others as stable or unstable [8,15]. A fracture is classified as stable when the deforming forces do not disrupt its alignment during the movement of adjacent joints. Transverse, closed, diaphyseal fractures that are either non-displaced or minimally displaced are typically stable due to their geometry and the support provided by the periosteum. In contrast, unstable fractures, such as spiral, oblique, and comminuted fractures, are prone to displacement even under minimal deforming forces [1,3].

A critical issue in the management of F1 fractures is the adherence of the surrounding soft tissues to the fracture site, which can lead to the formation of a fibrous callus. This callus can entrap the flexor and extensor tendons, resulting in joint stiffness and loss of tendon gliding [16–18]. This complication underscores the importance of early and appropriate mobilization to prevent such adverse outcomes.

Most stable or minimally displaced fractures of the proximal phalanx can be managed conservatively using various techniques, such as buddy taping, the Thomine method, and Lucerne orthosis. The primary goal of conservative treatment is to maintain the stability and range of motion of the finger without causing pain [7,11,19]. Despite the commonality

and impact of proximal phalanx fractures, there is a notable lack of consensus on the best conservative management strategies [2,6,20–22].

This gap in knowledge is further complicated by inconsistent findings in existing reviews and the variability in treatment protocols. The existing literature reveals several conservative treatment approaches, each with varying degrees of success, but a comprehensive synthesis of these methods is lacking.

This scoping review aims to address these gaps by collating and synthesizing evidence on the conservative treatment of proximal phalanx fractures in adults. The review seeks to provide a detailed overview of the current treatment methods, their effectiveness, and the underlying principles guiding their use. By examining the existing body of research, this review intends to identify which joints should be immobilized and the optimal positions for immobilization based on the type and characteristics of the fracture.

Furthermore, this review will explore existing conservative treatment protocols and assess their suitability for different fracture types. It will also consider biomechanical factors that influence the success of conservative management. By summarizing the hierarchy of information in current research, the review aims to highlight the strengths and limitations of existing studies, providing a clear picture of the current state of knowledge.

The ultimate goal of this review is to inform and improve clinical practice by offering evidence-based recommendations for the conservative treatment of proximal phalanx fractures. The findings are expected to be particularly useful for clinicians seeking low-cost, effective treatment options that can achieve functional outcomes comparable to or better than surgical approaches.

Figure 1 Bilateral radiographic comparison of the hand.

2. Methods

This scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews [23]. To ensure transparency and comprehensive reporting, we followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines [24].

3. Review Question

We formulated the following research question: “What are the available conservative management modalities for proximal phalanx fractures in adults, and what are their functional outcomes”?

3.1. Eligibility Criteria

Studies were eligible for inclusion if they met the following Population, Concept, and Context (PCC) criteria:

Population: Studies involving adults diagnosed with a fracture of the proximal phalanx (F1).

Concept: Studies investigating rehabilitation strategies, interventions, or conservative management of proximal phalanx fractures in the adult population.

Studies exploring the effectiveness, outcomes, or impacts of conservative treatment or rehabilitation approaches.

Studies describing the evolution or changes in conservative rehabilitation strategies over time.

Context: Studies conducted in any geographical location.

Studies published in the English language.

Studies with available full-text articles.

3.2. Exclusion Criteria

Studies were excluded if they

- Involved pediatric populations (<18 years old), due to differences in bone healing.
- Focused solely on surgical treatment without reporting separate data for conservative management.
- Had methodological limitations, such as a sample size < 10, missing outcome measures, or inadequate assessment methods.
- Were case reports, expert opinions, non-English papers, or lacked full-text availability.

3.3. Search Strategy

We conducted a comprehensive search across multiple databases, including PubMed, Scopus, and Web of Science, using a combination of search terms such as “proximal phalanx fractures”, “conservative treatment”, “splinting”, “buddy taping”, and “dynamic mobilization”. The search was limited to studies published in English between 2000 and 2024. We applied specific inclusion criteria, focusing on studies involving adult patients with P1 fractures treated conservatively. Exclusion criteria included studies involving pediatric populations and studies lacking detailed outcome measures. Studies comparing surgical and conservative treatments were included only if they provided separate data for conservative management outcomes. The selection process is illustrated in a PRISMA flow diagram (Figure 1). Searches were conducted on 23 June 2024 with no date limitation.

(“proximal phalanx fractures” OR “proximal phalangeal fractures” OR “F1 fractures” OR “finger fractures”) AND (“conservative management” OR “conservative treatment” OR “non-operative management” OR “non-surgical treatment” OR “rehabilitation” OR “functional treatment” OR “non-invasive treatment” OR “closed treatment”) AND (“adult” OR “adults” OR “adult population”) AND (“treatment outcomes” OR “treatment effectiveness” OR “functional outcomes” OR “functional recovery” OR “rehabilitation outcomes” OR “clinical outcomes” OR “recovery” OR “functional recovery” OR “patient outcomes”) AND (“immobilization” OR “splinting” OR “orthosis” OR “buddy taping”) OR (“biomechanics” OR “biomechanical aspects”) OR (“complications” OR “adhesions” OR “stiffness” OR “tendon gliding”).

3.4. Study Selection

The study selection process followed a structured and systematic approach. Initially, search results were gathered and managed using Zotero (version 6063), where duplicate records were removed. The screening was carried out in two phases: first, a review of titles and abstracts, followed by a full-text evaluation. Both steps were conducted independently by two authors, with a third reviewer resolving any discrepancies. The selection process was guided by the PRISMA 2020 framework, ensuring methodological transparency and reliability. This approach aimed to comprehensively identify studies that directly addressed the research question while maintaining a rigorous and systematic review process.

3.5. Data Extraction and Data Synthesis

Data extraction for this scoping review was conducted using a structured form adapted from the JBI framework, collecting essential information such as authorship, country and year of publication, study design, patient characteristics, interventions, outcomes, and procedures. A descriptive analysis was performed, with results presented numerically to illustrate the distribution of studies. To enhance transparency, the review process was systematically mapped, and the extracted data were summarized in tables to facilitate comparison and provide a clear overview of key study findings.

To assess the methodological quality of the included studies, we applied the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Scoping Reviews. This tool evaluates key aspects such as study design, population selection, intervention details, outcome reporting, and risk of bias. Each study was independently assessed by two reviewers, with discrepancies resolved by a third reviewer.

The overall quality of the studies varied: while most had clear inclusion criteria and well-defined interventions, some lacked standardized outcome measures and long-term follow-up data. Additionally, a risk of selection bias was identified in observational studies, limiting the generalizability of findings.

4. Results

As presented in the PRISMA 2020 flow diagram (Figure 2), from 212 records identified by the initial literature searches, 204 were excluded, and eight articles were included (Table 1).

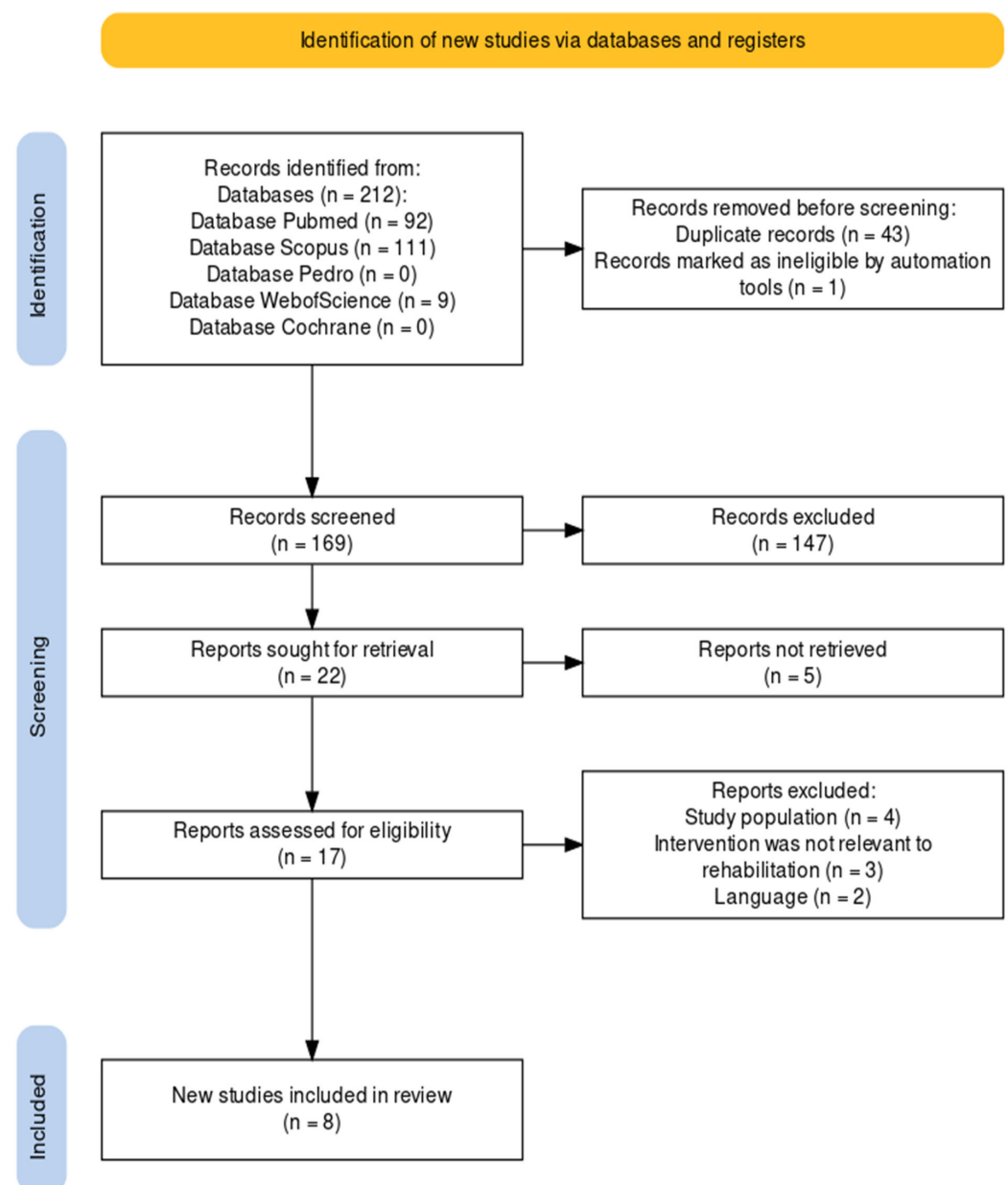


Figure 2. Preferred reporting items for systematic reviews and meta-analyses 2020 (PRISMA) flow diagram.

Table 1. Main characteristics of included studies.

Title, Author(s), Year	Methods	Results	Outcomes Achieved
"Extra Articular Fractures of The Proximal Phalanx of the Fingers: a Comparison of two Methods of Functional, Conservative Treatment" Franz T. et al., 2012 [25]	Prospective Randomized Multicenter Study with 66 subjects (49 years avg. age), including 16 males and 16 females, with P1 extra-articular fractures. Fractures treated conservatively with MCPJ block at 70–90° flexion, LUCA splint, and forearm cast. IPJ were free to move. Immobilization lasted 4 weeks (forearm cast) and 4.5 weeks (LUCA splint).	No significant differences in TAM, AROM, patient satisfaction, or correct fracture healing. 2 cases of CRPS complications in the Forearm cast group; no complications in the LUCA group.	Both splints were effective in treating P1 fractures with minimal differences in patient outcomes. LUCA splint provided better wrist ROM without complications.
"Outcome of Closed Proximal Phalangeal Fractures of The Hand" Jaswinder S. et al., 2011 [26]	Randomized Controlled Trial. Subjects with a median age of 34 years (males and females included, but exact numbers not specified) with P1 extra-articular fractures. Fractures were treated conservatively with a volar orthosis, MCPJ block at 70–90° flexion, IPJ free to move, and wrist dorsiflexion. Treatment lasted 6 weeks. Surgical control group treated with K-wire pinning, stainless-steel wiring, mini external fixator, or ORIF technique.	Three non-unions, 2 cases of digital stiffness post-closed reduction and immobilization in the volar splint group. 1 extensor lag and 1 case of digital stiffness post-pinning; 1 digital stiffness post-ORIF. Surgery showed better results and fewer complications compared to conservative treatment.	Surgery offered better outcomes and fewer complications for unstable fractures compared to conservative treatment. Conservative methods were less effective for complex cases.
"Non-Surgical Management of Isolated Proximal Phalangeal Fractures With Immediate Mobilization" Byrne B. et al., 2020 [27]	Prospective Observational Study. 122 subjects (median age 35 years; males avg age 30, females avg age 48) with P1 extra-articular fractures. Fractures were treated conservatively with a dorsal orthosis, MCPJ block at 70–90° flexion, and IPJ free to move. Treatment duration varied from 6 weeks until reaching adequate outcomes.	Majority of participants had a good/excellent outcome. Patients were discharged with a median of –4° PIPJ extension, 94° flexion, and 253° TAM. Median pain score was "0".	Conservative treatment with immediate mobilization provided excellent outcomes, especially for younger patients, with minimal pain and high functional recovery.
"Result of Dynamic Treatment of Fractures of The Proximal Phalanx of The Hand" Markus F. et al., 2011 [28]	Case Series Study. 65 subjects (41 years avg. age; 46 males, 19 females) with P1 extra-articular fractures. Fractures treated conservatively with dorsopalmar plaster cast and finger splint. MCPJ block held at 70–90° flexion, wrist immobilized at 30° flexion, IPJ free to move. Treatment lasted 4 weeks.	Up to 11 complications: 2 cases of flexion stiffness and 9 cases of 20° extension stiffness. Strickland's TAM score showed excellent results in all cases.	Dynamic treatment with early mobilization showed excellent overall outcomes, but some patients experienced minor complications such as joint stiffness.
"Conservative Treatment of Fractures of The Proximal Phalanx, an Option Even for Unstable Fractures" Held M. et al., 2013 [29]	Case Series Study. 23 subjects (median age 36 years; 18 males, 5 females) with P1 extra-articular fractures. Fractures treated conservatively with a dorsal slab, MCPJ block at 70–90° flexion, and syndactyly with the adjacent finger. Treatment lasted 3 weeks.	Approximately 91% of fractures maintained acceptable reduction within the slab, with a median fracture angulation of 4°. Complications: 5 extensor lags, 4 cases of bone reduction, and 20° PIPJ stiffness in 2 patients.	Conservative treatment was highly effective, even for unstable fractures, maintaining reduction and achieving positive outcomes in the majority of cases.
"Traction Splints: Effective Nonsurgical Way of Managing Proximal Phalanx Fractures" Ashok R. K., 2009 [30]	Case Series Study. 30 subjects (aged 20–50 years; 29 males, 1 female) with P1 extra-articular and intra-articular fractures (P1 surface only). Fractures treated conservatively with dorsal orthosis and dynamic traction given by a 90° outrigger. MCPJ block held at 70–90° flexion. Treatment lasted 4 weeks.	Patients reported very good outcomes, with minimal pain and deformities. Patients ≤ 50 years had significantly better outcomes.	Dynamic traction splint provided very good outcomes, particularly in younger patients, with minimal pain and deformities.
"Dynamic Treatment for Proximal Phalangeal Fracture of The Hand" Rajesh G. et al., 2007 [31]	Case Series Study. 32 subjects (≤50 years avg. age; 20 males, 12 females) with P1 extra-articular fractures. Fractures treated conservatively with thermoplastic MCP block splint, wrist held at 20–30° extension, MCPJ block held at 90° flexion. Treatment lasted 3–4 weeks.	According to Reyes and Latta and Belsky classifications, outcomes were excellent for all subjects.	Dynamic splinting was highly effective, with all patients achieving excellent outcomes, confirming its utility for P1 fractures.
"The Conservative Management of Proximal Phalangeal Fractures of The Hand in an Accident and Emergency Department" Maitra A. et al., 1992 [9]	Non-Controlled and Non-Randomized Trial. 147 subjects (median age 26 years; 88 males, 59 females) with P1 extra-articular fractures. Fractures treated conservatively with active mobilization, syndactyly, aluminum splint, and MCPJ block at 70–90° flexion, IPJ free to move. Treatment continued until full recovery or until no further improvement was noted.	Treatment duration was significantly shorter in conservatively treated patients compared to those receiving invasive treatment. 136 subjects had excellent outcomes, with many returning to work while attending physiotherapy and follow-up.	Conservative treatment provided excellent outcomes in the majority of cases, with a shorter recovery time and the ability to resume normal activities more quickly.

Legend: AROM: Active Range of Motion, CRPS: Complex Regional Pain Syndrome, IPJ: Interphalangeal Joint, LUCA: Lucerne Cast, MCPJ: Metacarpophalangeal Joint, ORIF: Open Reduction and Internal Fixation, PIPJ: Proximal Interphalangeal Joint, TAM: Total Active Motion Excellent Outcomes.

4.1. Excellent Outcomes

Several studies have demonstrated that conservative management strategies could achieve excellent outcomes, particularly in stable, extra-articular fractures of the proximal phalanx.

1. Franz et al. (2012) [25]: Both the forearm cast and the Lucerne Cast (LuCa) were effective in treating P1 fractures. The study found no significant differences in key measures such as TAM, AROM, and patient satisfaction between the two splinting methods. However, the LuCa provided superior wrist ROM, suggesting it might offer additional benefits in maintaining wrist mobility. Overall, both methods resulted in excellent outcomes, with proper fracture healing and high patient satisfaction.
2. Singer et al. (2011) [26]: This study compared conservative and surgical treatments, reporting that 89.4% of patients treated conservatively and 91.9% of those treated surgically achieved excellent outcomes. The surgical group, particularly for unstable fractures, experienced fewer complications. This indicates that while conservative treatment is highly effective for stable fractures, surgical intervention may be more suitable for complex cases, ensuring better functional recovery and fewer complications.
3. Byrne et al. (2020) [27]: Immediate mobilization with conservative management, using a thermoplastic splint and buddy taping, was highly effective. The majority of participants (85–95%) achieved excellent or good outcomes, with most patients discharged with minimal pain, a TAM of 253°, and good PIPJ extension. The study highlights that early mobilization is crucial for optimal recovery, particularly in younger patients, leading to excellent outcomes.
4. Held et al. (2013) [29]: Approximately 91% of patients treated with a dorsal cast and buddy taping after closed reduction achieved excellent outcomes. The fractures maintained acceptable reduction throughout the treatment, with only minor complications observed. This study demonstrates that conservative treatment can be highly effective, even in cases with initially unstable fractures.
5. Ashok Raj Koul et al. (2009) [30]: The use of traction splints in managing both extra-articular and intra-articular fractures led to excellent outcomes in the majority of patients. Significant improvements in TAM and grip strength were noted, particularly in patients aged 50 or younger. The study underscores the efficacy of dynamic traction splints in achieving excellent outcomes, especially in younger populations.
6. Rajesh et al. (2007) [31]: The dynamic mobilization protocol was highly effective, with 72% of patients achieving excellent outcomes according to the Belsky classification. Furthermore, all patients achieved excellent results based on the Reyes and Latta classification, confirming the utility of dynamic splinting for P1 fractures.

4.2. Satisfactory Outcomes with Some Limitations

While many patients achieved excellent outcomes, some studies reported satisfactory outcomes with certain limitations, particularly in more complex cases.

1. Markus Figl et al. (2011) [28]: The dynamic treatment with a dorsal plaster splint resulted in 86% of patients achieving complete ROM. However, some patients experienced extension deficits due to difficulties with exercises within the cast. Despite these limitations, the overall outcomes were positive, with excellent results according to Strickland's TAM score in most cases.
2. Held et al. (2013) [29]: While the majority of patients achieved positive outcomes, some complex fractures exhibited minor complications such as extensor lag. These findings suggest that while conservative methods are generally effective, they may be less optimal for certain complex fracture types, potentially requiring closer monitoring or alternative treatment approaches.

4.3. Complications and Less Favorable Outcomes

In contrast, a few studies noted more complications and less favorable outcomes in certain patient groups or fracture types.

1. Singer et al. (2011) [26]: Although the majority of patients achieved excellent outcomes, the conservative treatment group experienced more complications (e.g., non-unions and digital stiffness) compared to the surgical group. This highlights the potential limitations of conservative treatment in managing unstable or complex fractures, where surgical intervention may be necessary to avoid complications and improve outcomes.
2. Markus Figl et al. (2011) [28]: Despite achieving generally excellent outcomes, some patients developed flexion and extension stiffness, indicating that even with effective conservative treatment, there can be complications in achieving full functional recovery in certain cases.

To provide a clearer comparison between conservative and surgical management, we extracted key functional and clinical outcomes from the included studies and summarized them in Table 2. This table presents data on total active motion (TAM), range of motion (ROM), grip strength, complication rates, and recovery times for both groups. The detailed quality assessment is provided in Table 3.

Table 2. Summary of functional outcomes in conservative vs. surgical treatment.

Study	Treatment	TAM (°)	ROM (°)	Grip Strength	Complications	Recovery Time (Weeks)
Franz et al., 2012 [25]	Conservative (Splinting)	240	95	Not reported	Minimal stiffness	6
Singer et al., 2011 [26]	Surgical (ORIF)	260	105	Not reported	Extensor lag (1 case)	4
Byrne et al., 2020 [27]	Conservative (Buddy taping)	253	94	Not reported	Minimal pain	6
Held et al., 2013 [29]	Conservative (Dorsal slab)	220	85	Not reported	PIPJ stiffness (2 cases)	8
Koul et al., 2009 [30]	Conservative (Traction splint)	250	100	Improved	Minimal pain	6
Rajesh et al., 2007 [31]	Conservative (Dynamic mobilization)	270	110	Improved	None	5
Figl et al., 2011 [28]	Surgical (K-wire)	245	98	Not reported	Infection (1 case)	4
Maitra et al., 1992 [9]	Conservative (Immobilization)	210	80	Not reported	Tendon contractures (2 cases)	7

Key findings:

- Surgical treatments generally led to fewer complications in unstable fractures but showed only slightly superior ROM and TAM compared to well-managed conservative treatments.
- Conservative treatments were highly effective for stable fractures, with comparable functional outcomes in terms of TAM and ROM.
- Grip strength was not consistently reported across studies, requiring further research.
- Recovery times were slightly shorter for surgical interventions in unstable fractures, but for stable fractures, conservative treatments allowed for similar recovery durations.

Table 3. Quality assessment of included studies (JBI Critical Appraisal Checklist).

Study	Clear Inclusion Criteria	Defined Interventions	Standardized Outcome Measures	Long-Term Follow-Up	Risk of Bias	Generalizability
Franz et al., 2012 [25]	Yes	Yes	No	No	Moderate	Moderate
Singer et al., 2011 [26]	Yes	Yes	Yes	Yes	Low	High
Byrne et al., 2020 [27]	Yes	Yes	Yes	No	Low	High
Held et al., 2013 [29]	Yes	Yes	No	No	Moderate	Moderate
Koul et al., 2009 [30]	Yes	Yes	Yes	No	Moderate	Moderate
Rajesh et al., 2007 [31]	Yes	Yes	Yes	No	Moderate	Moderate
Figl et al., 2011 [28]	Yes	Yes	No	No	High	Low
Maitra et al., 1992 [9]	No	Yes	No	No	High	Low

5. Discussion

The primary aim of this scoping review was to identify conservative management strategies for proximal phalanx (P1) fractures in adults and to evaluate their functional outcomes. While our analysis highlights the efficacy of conservative methods, further studies are required to establish clear criteria for differentiating between fractures that require surgical intervention and those that can be treated conservatively. Additionally, while multiple splinting techniques have been identified, the optimal approach remains debated and may vary based on fracture characteristics.

The review encompassed a broad range of studies that provided insights into different conservative treatment modalities, comparing their efficacy and outcomes. Several key findings emerged from the included studies, particularly regarding various conservative treatment methods such as splinting, buddy taping, and traction splints, and their comparison to surgical interventions when necessary.

Studies consistently demonstrated that conservative treatment methods can be highly effective for managing stable, extra-articular proximal phalanx fractures. For instance, the use of splints, such as the forearm cast and Lucerne Cast (LuCa), showed no significant differences in fracture angulation, radial/ulnar deviation, total active motion (TAM), or extensor lag. Notably, the LuCa provided better wrist range of motion (ROM) and similar patient satisfaction compared to the forearm cast [25,32–34]. Non-surgical management with immediate mobilization using thermoplastic splints and buddy taping resulted in a high percentage of excellent or good outcomes, as shown by Byrne et al. (2020) [27]. This method effectively maintained fracture alignment and promoted early mobilization, leading to satisfactory functional recovery and minimal pain.

When comparing conservative treatments with surgical interventions, Singer et al. (2011) [26] provided valuable insights. The results indicated excellent outcomes in both groups, with slightly better outcomes and fewer complications in the surgical group. This suggests that while conservative treatments are effective for stable fractures, surgical interventions may be preferred for unstable or complex fractures to minimize complications and achieve better functional outcomes.

Our findings align with existing guidelines that recommend conservative management for stable, extra-articular P1 fractures. However, our review highlights the superior outcomes of surgical intervention in unstable or complex fracture cases, particularly in minimizing complications and ensuring better functional recovery [35,36]. This suggests a need for a more tailored approach, where the decision between conservative and surgical treatment is based on a careful assessment of fracture stability and patient-specific factors. Both conservative and surgical approaches yield excellent outcomes, but the choice depends on fracture stability and patient-specific factors. For stable extra-articular fractures,

conservative methods such as buddy taping, splinting, and dynamic mobilization provide high functional recovery (TAM ~230–270°) with minimal complications, allowing a return to function in 4–6 weeks.

For unstable fractures, surgical intervention offers slightly superior ROM (~100–110°) and fewer complications, as shown in Singer et al. (2011) [26]. However, some conservative approaches (e.g., dynamic traction splints) have shown comparable outcomes, emphasizing the importance of careful monitoring.

Complications differ between methods: conservative treatment occasionally leads to joint stiffness (e.g., extensor lag or PIPJ stiffness), while surgery reduces misalignment risks but may cause hardware-related issues. Recovery times are similar (~4–6 weeks for surgery vs. ~6–8 weeks for conservative treatment in unstable fractures).

A stratified treatment approach is essential: conservative treatment remains the first line for stable fractures, while surgery is preferable for unstable cases where alignment cannot be maintained. Future studies should focus on standardized outcome measures to refine guidelines and improve patient-specific treatment strategies.

Similarly, Held et al. (2013) [29] supported the viability of conservative treatments even for initially unstable fracture patterns, provided that careful weekly monitoring and adjustments are made to maintain reduction.

Dynamic mobilization protocols and the use of traction splints were shown to be effective for both extra-articular and intra-articular fractures. Studies by Rajesh et al. (2007) [31] and Ashok Raj Koul et al. (2009) [30] demonstrated that these methods promote early mobilization and significant improvements in TAM and grip strength over time, with a high percentage of excellent outcomes. Markus Figl et al. (2011) [28] found that a dynamic treatment approach using a dorsal plaster splint with buddy taping allowed for active mobilization, resulting in complete ROM in 86% of patients, although some experienced extension deficits due to difficulties performing exercises within the cast.

Patient demographics and injury characteristics also played a role in the outcomes of conservative treatments. Younger patients with transverse fracture patterns tended to achieve better outcomes, as highlighted by A. Maitra et al. (1992) [9]. This study indicated that conservative management was highly effective for simple, stable fractures, particularly in younger populations who are more compliant with treatment protocols and have better healing capacities.

Despite the positive outcomes associated with conservative treatments, several limitations were identified across the studies. Many of the studies included were case series or observational studies with relatively small sample sizes, limiting the generalizability of the findings and underscoring the need for larger, randomized controlled trials to further validate the efficacy of conservative treatments. Additionally, the conservative treatment protocols varied significantly among studies, including differences in splinting techniques, immobilization positions, and durations of treatment. This variability makes it challenging to draw definitive conclusions about the optimal conservative management strategy for proximal phalanx fractures.

Short-term follow-up periods in several studies may not fully capture the long-term outcomes and potential complications associated with conservative treatments. Long-term follow-up is crucial to assess the durability of the treatment outcomes and the incidence of late complications such as joint stiffness or malunion. Furthermore, there was a lack of standardized outcome measures across the studies, with different studies using various criteria to assess functional outcomes, patient satisfaction, and complication rates. Standardized outcome measures are necessary to facilitate comparison among studies and to establish best practices.

The review found that conservative treatment methods for proximal phalanx fractures in adults can be highly effective, particularly for stable, extra-articular fractures. Techniques such as splinting, buddy taping, and dynamic mobilization promote early functional recovery with minimal complications. However, for unstable or complex fractures, surgical intervention may provide better outcomes with fewer complications.

The review also identified the need for larger, randomized controlled trials and standardized treatment protocols to validate these findings and establish clear guidelines for the conservative management of proximal phalanx fractures. Long-term follow-up studies are essential to assess the durability of treatment outcomes and the incidence of late complications. By addressing these limitations, future research can provide more robust evidence to guide clinical practice and improve the management and outcomes of patients with proximal phalanx fractures.

One of the challenges in comparing the effectiveness of conservative and surgical treatments is the lack of standardized outcome measures across studies. As seen in Table 4, some studies focused on total active motion (TAM), while others assessed range of motion (ROM), grip strength, or pain levels, making direct comparisons difficult.

Table 4. Comparison of Outcome Assessment Methods in Included Studies.

Study	Total Active Motion (TAM)	Range of Motion (ROM)	Grip Strength	Pain Levels	Return to Activity Time
Franz et al., 2012 [25]	Yes	Yes	No	No	No
Singer et al., 2011 [26]	Yes	Yes	No	No	Yes
Byrne et al., 2020 [27]	Yes	Yes	No	Yes	No
Held et al., 2013 [29]	No	Yes	No	No	No
Koul et al., 2009 [30]	Yes	Yes	Yes	Yes	No
Rajesh et al., 2007 [31]	Yes	No	Yes	No	No
Figl et al., 2011 [28]	Yes	Yes	No	No	No
Maitra et al., 1992 [25]	No	No	No	Yes	Yes

To improve the consistency of future research, we propose the following standardized set of recommended outcome measures for evaluating the effectiveness of treatment:

1. Total Active Motion (TAM) and Range of Motion (ROM)—Essential for assessing functional recovery.
2. Grip Strength—Important for evaluating hand function, particularly in daily activities.
3. Pain Levels (VAS or NRS scales)—Critical for determining patient-reported outcomes.
4. Time to Return to Activity—Key for assessing recovery and treatment success.

Implications for Physiotherapy Practice

The findings of this review have significant implications for physiotherapy practice, particularly in the management of stable proximal phalanx fractures. Conservative treatments, such as splinting, buddy taping, and dynamic mobilization, have proven effective in promoting early functional recovery while minimizing complications. These methods are particularly valuable for physiotherapists seeking non-invasive approaches that allow patients to regain function without resorting to surgery.

Early mobilization, as demonstrated in several studies, is crucial in preventing joint stiffness and ensuring optimal tendon gliding, which is essential for full recovery of hand function. Physiotherapists can integrate this into their treatment protocols by emphasizing the importance of controlled, early movement in the rehabilitation process, especially in younger patients, who tend to recover more quickly with conservative approaches.

A major limitation of this review is the small number of included studies ($n = 8$), which restricts the generalizability of the findings. Furthermore, while we applied the JBI Critical Appraisal Checklist, methodological quality varied, with some studies showing potential selection bias, lack of standardized outcome measures, and limited follow-up periods.

Another critical limitation is the short follow-up duration (3–6 months) in most included studies, which does not allow for an adequate evaluation of long-term complications such as arthrosis, tendon adhesions, and functional deterioration. While short-term outcomes suggest that conservative management is effective, the lack of extended follow-up limits our understanding of its durability over time.

Future research should expand the evidence base by conducting a systematic review with meta-analysis, incorporating a larger dataset and standardized outcome measures to provide more robust conclusions. Additionally, further studies should focus on long-term functional outcomes and complications, particularly in comparing early mobilization strategies with prolonged immobilization.

Furthermore, physiotherapists should consider individual patient factors, such as age, fracture type, and the patient's ability to comply with treatment, when choosing between conservative and surgical management strategies. For unstable or complex fractures, collaboration with orthopedic surgeons may be necessary to ensure optimal outcomes.

Incorporating evidence-based conservative management strategies into physiotherapy practice can enhance patient outcomes, reduce recovery time, and minimize the need for invasive surgical interventions, especially for stable fractures. Continuous education on the latest splinting techniques and mobilization protocols will be crucial for physiotherapists to maintain high standards of care.

6. Conclusions

This scoping review confirms that conservative management is an effective treatment option for stable, extra-articular proximal phalanx fractures, promoting early functional recovery with minimal complications. Splinting, buddy taping, and dynamic mobilization have demonstrated favorable outcomes, particularly in younger patients and stable fracture patterns.

For unstable or complex fractures, surgical intervention may provide better functional recovery and fewer complications, ensuring long-term fracture stability. However, some conservative approaches, such as dynamic traction splints, have shown comparable results, highlighting the importance of careful patient selection and monitoring.

Despite the promising results, variability in treatment protocols, outcome measures, and short follow-up periods (3–6 months) limit the generalizability of the findings. Future research should focus on randomized controlled trials with long-term follow-up (≥ 12 –24 months) to assess late complications, functional outcomes, and patient satisfaction, ensuring standardized guidelines for optimal conservative management.

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