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# Treatment of trigger finger with metacarpophalangeal joint blocking orthosis vs relative motion extension orthosis: A randomized clinical trial

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ABSTRACT

*Background:* The metacarpophalangeal joint blocking orthosis (MCPJ-BO) is one of the first-line orthotic treatment for patients with trigger finger (TF). Relative motion extension orthosis (RME-O) has recently emerged as a treatment option for various hand disorders involving TF.
*Purpose:* The primary objective of this study was to compare the effectiveness of 6 weeks of orthotic treatment with the MCPJ-BO and the RME-O for pain relief. Function and satisfaction with the orthosis were assessed as secondary objectives.
*Study design:* Randomized clinical study.
*Methods:* Thirty patients with an average age of 50 years with Froimson stage 1-3 A1 pulley triggering participated in the study. They were randomly assigned to either the MCPJ-BO ($n$ = 15; 10 females, five males) or the RME-O group ($n$ = 15; 12 females, three males). The orthoses were worn full time for 6 weeks. All patients received patient education, activity modification, and flexor tendon gliding exercises as part of the rehabilitation program. Pre- and post-assessments included Numeric Pain Rating Scale, Disability of the Arm, Shoulder, and Hand questionnaire, and Quebec User Evaluation of Satisfaction with Assistive Technology questionnaire. The Mann-Whitney U test was conducted to analyze the difference between the two groups.
*Results:* There were no significant differences between the two groups in pain and function before treatment ($p < 0.05$). Within-group comparisons indicated that both orthoses relieved pain, but the MCPJ-BO group achieved greater pain relief ($p = 0.001$). There was a significant improvement in function in the MCPJ-BO group, with a mean change of 12.7 ($p = 0.0001$). The overall success rates for the MCPJ-BO group and RME-O group were 60% and 27%, respectively. Patients in both groups had high satisfaction with the orthosis.
*Conclusions:* MCPJ-BO and RME-O could be used for pain relief in the treatment of TF. The MCPJ-BO appears to be more effective than the RME-O in improving function.



## Introduction

Trigger finger (TF) is a common condition with a prevalence of approximately 2% in the general population and an increased prevalence in adults with diabetes.[1] It is the fourth most common reason for referral to a hand clinic.[2] The underlying cause of TF is chronic repetitive friction between the flexor digitorum tendons (FDTs) and the A1 pulley, which exerts a high angular load on the tendons during finger flexion.[3] The pathologic grade of the abnormal A1 pulley has been shown to correlate highly with the clinical severity of TF.[4] The characteristic locking of the TF is observed when an affected digit moves from flexion to extension. As a result, TF can cause pain, stiffness, and loss of range of motion in the affected finger, leading to decreased function and long-term disability.[5]

Orthotic intervention is one of the first-line treatment modalities for patients with TF. The success rate of orthotic treatment varies from 40% to 93%.[6,7] Three types of orthoses are used in the treatment of TF (Fig. 1A-C): the metacarpophalangeal blocking orthosis (MCPJ-BO),[7-11] the proximal interphalangeal blocking orthosis (PIPJ-BO),[9] and the distal interphalangeal blocking orthosis (DIPJ-BO).[11,12] PIPJ-BO limits the maximal differential glide between flexor digitorum superficialis and flexor digitorum profundus, effectively relieving pain and improving triggering and function[6]. DIPJ-BO is used to limit

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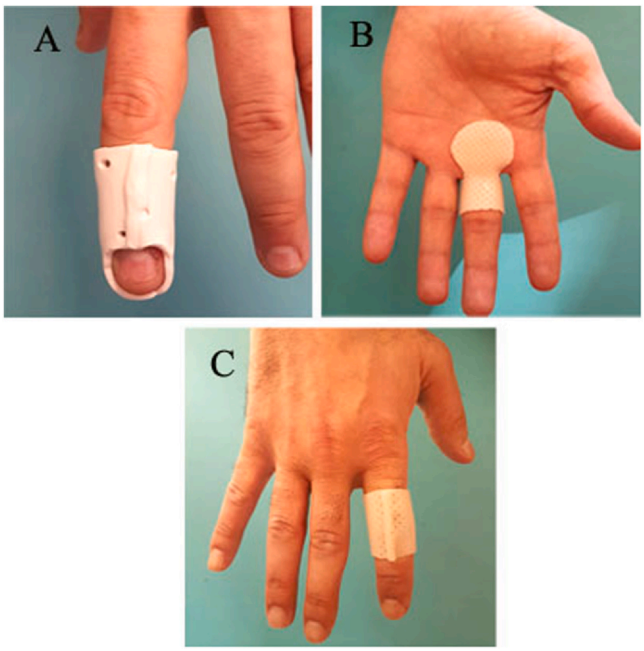


**Fig. 1.** (**A**) Distal interphalangeal blocking orthosis. (**B**) Metacarpophalangeal blocking orthosis. (**C**) Proximal interphalangeal blocking orthosis.

the excursion of the flexor digitorum profundus tendon and allow the resolution of synovitis.[12] Rodgers et al[12] reported an 83% success rate, and Tarbhai et al[11] reported a 47% success rate with complications, such as stiffness, discomfort, and easy slippage. However, there is still disagreement in the literature about the type of orthosis used in the conservative treatment of TF[13]; clinicians frequently prefer MCPJ-BO because they have a high success rate and are convenient to use in everyday life.[6,7,10,11,14,15]

MCPJ-BO aims to reduce pressure on the A1 pulley and friction between the A1 pulley and FDTs by limiting the MCPJ to 0º-15º of flexion. The efficacy of the MCPJ-BO should not be surprising because MCPJ flexion plays an essential role in the triggering mechanism.[16-18] During MCPJ flexion, there is a discrepancy between the A1 pulley thickness and the cross-sectional areas of the FDTs as the thickness of the A1 pulley increases, but the cross-sectional areas of the FDTs do not.[16] This result suggests that the increase in pulley thickness during MCPJ flexion may contribute to the development of the TF, as the thicker A1 pulley may result in greater strain and friction in the affected digits 16. MCPJ-BO orthoses can be designed to position the MCPJ at 0º of extension[11,18] or restrict its movement to 10º-15º of flexion.[6,7,9,10,15] If the orthosis is positioned at 0º of extension, the palmar portion causes discomfort and interferes significantly with daily activities.[11] Thus, the orthosis is usually designed to position the MCPJ in 10º-15º of flexion, allowing tip-to-tip prehension while performing activities. Patient compliance with orthoses is highly dependent on the ability to use them in daily activities. Although the restriction of the MCPJ in 10º-15º flexion compared to 0º extension is considered comfortable during activities, some patients may still find the orthosis restrictive, especially the palmar portion of the orthosis, which may cause discomfort.

A new orthotic design has been introduced, relative motion extension orthosis (RME-O). "Relative motion" is the concept of positioning multiple tendons originating from a muscle to prevent or relieve the affected tendons while limiting their excursion.[20] RME-O was initially used to treat extensor tendon injuries.[21,22] This orthosis positions the affected finger in extension relative to the adjacent fingers, which provides a therapeutic advantage by limiting flexor tendon excursion through the quadriga effect, resulting in less stress in the A1 region and improvement in symptoms. Additionally, the RME-O may increase patient satisfaction by allowing daily living activities and having a minimal design with no palmar components.

We concluded that the RME-O could be an alternative orthotic treatment option in TF with its several advantages, including small size, low-profile design, easy and inexpensive fabrication, and better patient compliance.[20] The primary objective of this study was to compare the efficacy of a 6-week orthotic intervention for pain relief in a randomly selected group of patients with TF using the MCPJ-BO and the RME-O. The secondary objective was to determine the comparative effectiveness of the orthoses on function and orthosis satisfaction.

## Material/patients

### *Study design*

This was a randomized, parallel-group clinical trial in which study participants were randomly assigned to treatment groups. University Institutional Research Ethics Board approved the study with a submission number X. The trial is registered at Clinical Trials, and the identifier is X. The study was conducted at a hand rehabilitation unit in a university hospital. Patients were recruited after admission for hand rehabilitation from June 2021 to March 2022. All patients were informed about the study and completed an informed consent before enrollment.

The study sample consisted of patients with TF. The inclusion criteria were patients aged between 18 and 65 years diagnosed with Froimson stage 1-3 A1 pulley triggering. We excluded patients with trigger thumbs, multiple TFs on one hand, neurologic disorders, rheumatologic diseases, pregnancy, and patients who had received a steroid injection in the affected finger within the previous 6 months or had previously undergone trigger release surgery.

Power analysis was performed using G*Power 3.1 (Version 3.0.1.0; Heinrich- Heine Universität, Düsseldorf, Germany)[23] to test the difference between pretreatment and posttreatment means with a two-tailed test. The primary outcome measure was pain, as measured by the Numeric Rating Pain Scale (NRPS). The sample size was calculated based on the effect sizes reported in the study by Lunsford et al[13] for NRPS in conservatively treated TF patients. For the studies by Colbourn et al[7] and Tarbhai et al[11] that used a similar protocol to the present study (full-time MCPJ-BO), an effect size of 1.28 and 1.98, respectively, was reported. The analysis indicated that with an effect size of 1.28, an alpha of 0.05, and a power of 0.90, 14 patients would be needed in each group.

### *Study sample*

Patients were randomly assigned in a 1:1 ratio to either the MCPJ-BO group or the RME-O group using a simple random sampling method. Patients were numbered according to their admission to the clinic. Randomization was performed using a random number table system. Starting with the MCPJ-BO group, each group was assigned a number in turn. Patients in the MCPJ-BO group received an MCPJ-BO (Fig. 1), and patients in the RME-O group received an RME-O for 6 weeks (Fig. 2).

## Intervention

The conservative treatment program for all patients included patient education, activity modification, orthotic treatment, and flexor tendon gliding exercises, including full extension, table-top fist, hook fist, straight fist, and full fist. Tendon gliding exercises are routinely part of our rehabilitation program in TF to improve tendon nutrition,

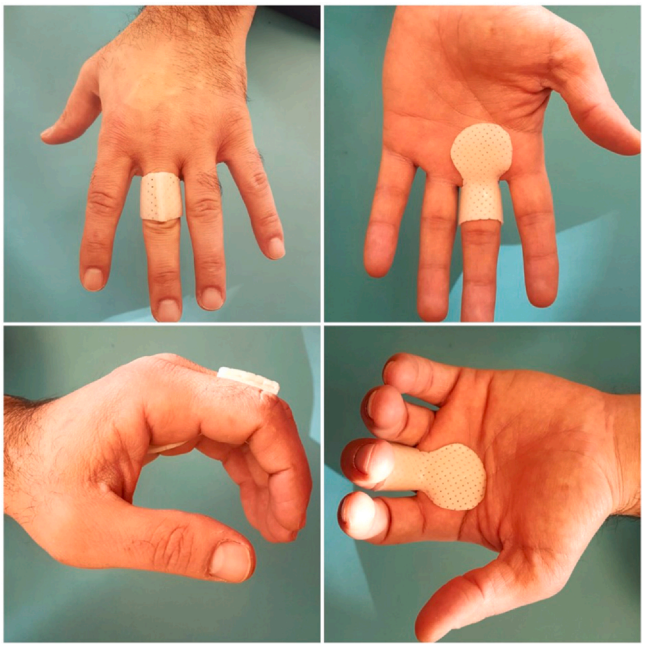

**Fig. 2.** Dorsal, volar, and lateral views of the metacarpophalangeal blocking orthosis for the third finger.

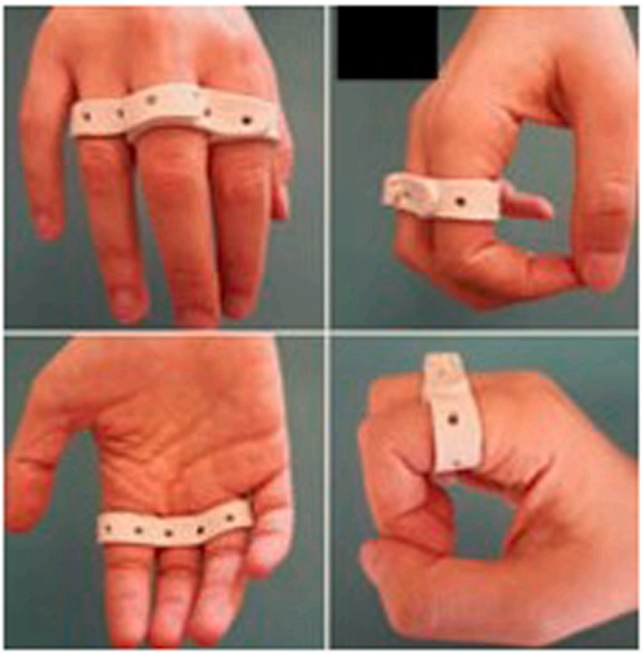

**Fig. 3.** Dorsal, volar, and lateral views of the relative motion extension orthosis for the third finger.

promote tendon healing, and prevent degenerative processes and inflammatory diseases of flexor tendons. They are also important in preventing adhesion formation and promoting tendon healing.[24,25]

In our clinic, MCPJ-BO is a standard treatment method for patients with TF. This orthosis is designed to block the MCPJ in flexion of 10°-20° while allowing active motion of the PIPJ and DIPJ. The custom MCPJ-BO was fabricated out of 1.6-mm thermoplastic material that extends from the palm over the MCPJ and includes a ring around the proximal phalanx (Fig. 2).

The RME-O was fabricated from 3.2-mm splinting material with the affected finger positioned at an extension of approximately 10°-20° relative to the adjacent fingers (Fig. 3). We had previously used 1.6 mm thermoplastic material for RME-O. The thinner thermoplastic material tends to deform more quickly, resulting in improper fit and reduced effectiveness of the orthosis. Patients with strong hand muscles and those who use their hands frequently tend to exert more force on their orthoses during these activities. Using a thicker thermoplastic material provides more stability and minimizes the risk of deformation.

Both orthoses were fabricated in about 20-30 minutes, with the RME-O taking slightly less time than the MCPJ-BO. If necessary, modifications were made to alleviate the discomfort associated with the orthosis, such as placing a strap over the proximal phalanx in patients with edema. Patients were instructed to remove the orthoses for hygiene and flexor tendon gliding exercises.

## Measurements

Demographic information obtained during the pretreatment assessment included age, gender, affected finger, dominant hand, duration of symptoms, and occupation. The outcome measures were performed twice, before and after treatment at 6 weeks. Pain intensity was assessed using an NRPS. A patient-reported change of two or more on the NRPS is considered a minimally clinically important difference (MCID).[26] Functional status was assessed with the Disabilities of Arm, Shoulder, and Hand questionnaire (DASH). The higher the DASH score, the greater the disability in daily function. The MCID for the DASH was set at 11 points as a lower limit, as suggested in the study by Franchignoni et al.[27] The Quebec Assistive Technology User Satisfaction Evaluation (Quest 2.0) [28] was used to assess patients' satisfaction with their orthoses. Of the 12-item Quebec instrument, eight items evaluate the characteristics of the assistive device in terms of dimensions (size), weight, adjustments, safety, durability, ease of use, comfort, and effectiveness. The remaining four items evaluate service, including service delivery, repairs and service of the assistive device, professionalism of service, and follow-up service.[28] The instrument also included an assessment of satisfaction with the device on a 5-point scale. In the final section, participants were asked to select the three most essential items related to the assistive device from 12 short satisfaction statements.[28]

## Statistical analysis

Descriptive analyses were presented using means and standard deviations and medians and interquartile ranges for the non-normally distributed and ordinal variables (using frequency tables for the ordinal variables). The normal distribution of the continuous variables was tested using visual (histogram and probability plots) and analytical methods (Shapiro-Wilk test). We used the Mann-Whitney U test or independent samples *t* test to compare the results between groups. The Student t-test or Wilcoxon signed-rank test was used to compare the results before and after treatment. The significance level was set at $p < 0.05$.

The success rate of orthotic treatment was analyzed by improvement in NRPS and DASH. Treatment was considered "successful" if the patient had an improvement by the MCID value in the NPRS score of > 2 and in the DASH score of > 11. Overall treatment success was determined if the patient was successful in terms of pain and function. We also examined factors related to treatment success or failure using the Student *t*-test for continuous variables and the chi-square test for categorical variables.

## Results

Thirty-two patients diagnosed with TF and met the inclusion criteria were enrolled in this study. Two patients dropped out of the

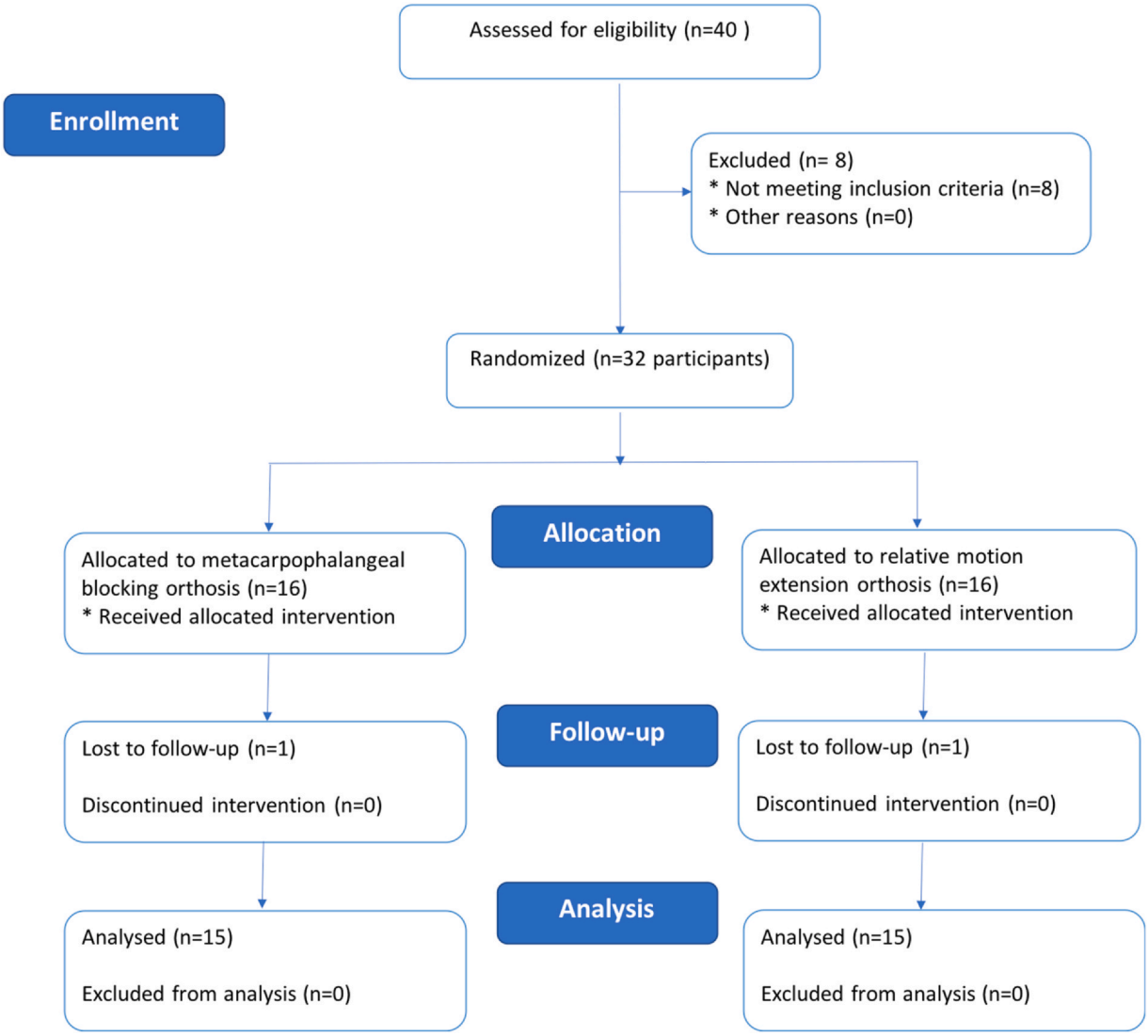


**Fig. 4.** Flowchart of the study.

study because they could not participate in the follow-up because of travel problems. Therefore, the study was completed with 30 patients: 15 patients (10 females, five males) in the MCPJ-BO group and 15 patients (12 females, three males) in the RME-O group. Figure 4 shows the flowchart of the study. The descriptive data of the patients according to the groups are presented in Table 1.

There were 22 females and eight males whose ages ranged from 30 to 62 years, with an average age of 50 years. Of the 30 affected fingers, 17 had TF on the dominant hand. Middle and ring fingers were most commonly affected (Table 1). The majority of patients were white-collar workers and retirees (Table 1). According to the Froimson classification, one patient was in stage 1, 24 were in stage 2, and five were in stage 3. Thirteen patients were in the acute phase (< 3 months), seven were in the subacute phase (3-6 months), and 11 were in the chronic phase (> 6 months). The number of patients in the chronic phase was higher in the MCPJ-BO group (MCPJ-BO: $n = 10$; RME-O: $n = 6$), whereas the number of patients in the acute phase was higher in the RME-O group (MCPJ-BO: $n = 3$; RME-O: $n = 6$). The two groups had no significant differences regarding pain and function before treatment.

The results of the Shapiro-Wilk test showed that DASH was normally distributed; the NRPS was not normally distributed. The Mann-Whitney test showed that pain scores were not significantly different between the MCPJ-BO and RME-O groups. The Student t-test showed that the two groups did not differ regarding function and satisfaction with the orthosis. Within-group comparisons showed that pain and function improved significantly in the MCPJ-BO group after treatment (Table 2). The mean change was 12.7 for the DASH. In the RME-O group, the reduction in pain score was clinically significant; however, there was no statistically or clinically significant difference in the DASH score ($p > 0.05$; Table 2). Comparisons between groups showed no significant difference in pain, while the MCPJ-BO group had better functional performance than the RME-O group ($p = 0.012$; Table 3). The RME-O group had higher satisfaction with the orthosis service ($p = 0.011$; Table 3). In the MCPJ-BO group, the three most preferred orthosis satisfaction characteristics were simplicity of use/effectiveness, safety/follow-up service, and comfort, respectively. In the RME-O group, the three most preferred orthosis satisfaction characteristics were effectiveness/follow-up service, simplicity of use, and comfort.

The overall success rate for the MCPJ-BO group was 60%, and for the RME-O group, it was 27%. In the MCPJ-BO group, nine patients had successful treatment outcomes for pain and function, and only one had unsuccessful treatment outcomes for pain and function. One

**Table 1**
Demographic characteristics of the patients ($n = 30$)

| Variable | RME-O group ($n = 15$) | MCPJ-BO group ($n = 15$) |
|---|---|---|
| Age (y), mean (SD) | 50.5 (7.1) | 50.2 (9.8) |
| Gender, *n* | | |
| Female | 12 | 10 |
| Male | 3 | 5 |
| Dominant hand, *n* | | |
| Right | 12 | 14 |
| Left | 3 | 1 |
| Affected hand, *n* | | |
| Right | 11 | 6 |
| Left | 4 | 9 |
| Froimson classification, *n* | | |
| Stage 1 | - | 1 |
| Stage 2 | 13 | 11 |
| Stage 3 | 2 | 3 |
| Affected finger, *n* | | |
| 2 | 3 | 3 |
| 3 | 5 | 6 |
| 4 | 4 | 4 |
| 5 | 3 | 2 |
| Disease duration, *n* | | |
| Acute (< 3 mo) | 6 | 3 |
| Subacute (3-6 mo) | 3 | 2 |
| Chronic (> 6 mo) | 6 | 10 |
| Occupation, *n* | | |
| White collar | 7 | 7 |
| Blue collar | 1 | 1 |
| Others (eg, retirement) | 7 | 7 |

MCPJ-BO = metacarpophalangeal blocking orthosis; RME-O = relative motion extension orthosis.

patient had successful functionality but a worse pain score, and four patients had successful pain relief but an unsuccessful disability score. In the RME-O group, although four patients had successful treatment, four had unsuccessful treatment scores for pain and function. One patient had a worse pain score, and two had unsuccessful functional outcomes.

The Pearson chi-square statistic was 8.182, and the *p*-value was 0.017. The likelihood chi-square statistic was 9.759, and the *p*-value was 0.008. The association between treatment success and symptom duration was statistically significant in the RME-O group. Patients in acute and subacute phases did not respond to the treatment. The cross-tabulation and chi-square test results for each group are shown in Table 4.

## Discussion

The MCPJ-BO and RME-O orthoses were found to be effective in relieving pain. Treatment outcomes were comparable in function, with MCPJ-BO showing better results than RME-O. The overall success rate was 60% for the MCPJ-BO and 27% for the RME-O. The most preferred features of both orthoses were their effectiveness, ease of use, and comfort. Based on patient satisfaction, both orthoses had adequate adherence and no adverse effects. The results of the present study provide preliminary evidence for the use of RME-O as an alternative orthotic solution for the conservative treatment of TF.

Studies showed positive results of MCPJ-BO in pain relief and functional improvement with a success rate of 40%-93% in patients with TF[6,7,19] and the duration of orthotic use generally ranged from 6 to 10 weeks. In the current study, both orthoses effectively relieved pain after 6 weeks of treatment, but there was no significant difference between the two groups. The MCPJ-BO restricts MCPJ flexion to 10°-20°, whereas the RME-O supports the affected MCPJ in 10°-20° extension relative to the adjacent fingers and restricts full MCPJ flexion; therefore, the RME-O allows a greater range of motion for MCPJ flexion than the MCPJ-BO. Both orthoses may relieve symptoms by preventing MCPJ flexion to varying degrees, thereby reducing friction between the tendon and pulley. Therefore, the patient's preferences may be considered when determining orthotic treatment for pain control. The patient's occupation can potentially influence the decision. RME-O may be an alternative in patients with carpal tunnel syndrome, as continued pressure on the palm during splinting of the second and third fingers may worsen symptoms in the long term. To our knowledge, no study has reported carpal tunnel syndrome as a complication of MCPJ-BO. Patients with multiple TFs may also benefit from RME.

The functionality of patients with TF may be affected by pain, triggering, or discomfort when using the hand. Several studies have examined the effects of orthotic treatment on function. Namaldi et al[15] demonstrated improved functionality in 55 patients after 3 months of rehabilitation with MCPJ-BO. However, in the study by Teo et al,[6] there was no significant improvement in functional status in patients who wore MCPJ-BO for 8 weeks, but there was a 40% improvement in symptoms. In this study, the MCPJ-BO group showed significant improvement in function, while there was no difference in the RME-O group after treatment. Comparison between the groups showed that the MCPJ-BO resulted in better functional status than the RME-O. Despite the symptomatic improvement achieved in the RME-O group, other factors may contribute to the patient's functional status. Patients may have better functional performance because the MCPJ-BO is less restrictive than the RME-O. In addition, the affected finger in the RME-O group was mainly on the right side, the dominant hand, whereas the affected finger in the MCP-BO group was mainly on the left side. Since the dominant hand is more frequently used for activities of daily living, the involvement of this hand may have influenced the outcome. In addition, there is currently no instrument specifically designed to measure functional outcomes in patients with TF. Developing appropriate disease-specific scales could allow the assessment of different aspects of patient functionality.

In this study, the overall treatment success rate was higher in the MCPJ-BO group than in the RME-O group. In the study by Teo et al[6] examining the efficacy of 2 months of orthotic treatment with PIPJ-BO and MCPJ-BO, patients were divided into "successful" and

**Table 2**
The results of the outcome measures for patients with trigger finger

| Groups | Outcome measure | Pretreatment | | Posttreatment | | Change | p-value |
|---|---|---|---|---|---|---|---|
| RME-O | DASH (0-100), mean (SD) | 27.6 | (17.7) | 25.1 | (15) | −2.5 (9.8) | 0.349* |
| ($n = 15$) | NPRS (0-10), median (IQR) | 7 | (3-9) | 0 | (0-8) | −4 (−6 to −2) | 0.071† |
| MCPJ-BO | DASH (0-100), mean (SD) | 25.1 | (13.1) | 12.4 | (10.5) | −12.7 (9.7) | < 0.0001* |
| ($n = 15$) | NPRS (0-10), median (IQR) | 5 | (4-9) | 0 | (0-2) | 0 (−7 to 1) | 0.001† |

RME-O = relative motion extension orthosis group; MCPJ-BO = metacarpophalangeal joint blocking orthosis group; IQR = interquartile range; SD = standard deviation; DASH = Disabilities of Arm, Hand and Shoulder Questionnaire; NPRS = Numeric Pain Rating Scale.
* Paired Student t-test statistics.
† Wilcoxon signed-rank test statistics.

**Table 3**
Intergroup comparison of outcome measurements

| Outcome measure | | MCPJ-BO ($n = 15$) | | RME-O ($n = 15$) | | $p$-value |
|---|---|---|---|---|---|---|
| DASH (0-100), mean (SD) | | 16.2 | (13.7) | 24 | (15.4) | 0.145* |
| NPRS (0-10), median (IQR) | | 2 | (0-3) | 0 | (0-6) | 0.274† |
| QUEST (0-5), mean (SD) | Device satisfaction | 4.7 | (0.4) | 4.6 | (0.5) | 0.341† |
| | Service satisfaction | 4.9 | (0.4) | 4.9 | (0.3) | 0.742† |
| | Total | 4.7 | (0.4) | 4.7 | (0.4) | 0.831† |

MCPJ-BO = metacarpophalangeal joint blocking orthosis group; RME-O = relative motion extension orthosis group; IQR = interquartile range; SD = standard deviation; DASH = Disabilities of Arm, Hand and Shoulder Questionnaire; NPRS = Numeric Pain Rating Scale; QUEST 2.0 = Quebec User Evaluation of Satisfaction with Assistive Technology.
* Independent samples test statistics.
† Mann-Whitney U test statistics.

**Table 4**
Cross-tabulation and chi-square tests—symptom duration related to treatment outcome

| Orthoses | | Treatment outcome | | | |
|---|---|---|---|---|---|
| | | Success ($n$) | Failure ($n$) | Chi-square value | $p$-value |
| MCPJ-BO | Acute | 2 | 1 | 1.806 | 0.405 |
| | Subacute | 2 | 0 | | |
| | Chronic | 5 | 5 | | |
| RME-O | Acute | 0 | 6 | 8.182 | 0.017 |
| | Subacute | 0 | 3 | | |
| | Chronic | 4 | 2 | | |

MCPJ-BO = metacarpophalangeal joint blocking orthosis group; RME-O = relative motion extension orthosis group.

"unsuccessful" groups based on improvement in NRPS and triggering stage, regardless of orthotic treatment and without using a cutoff value. In this study, we used cutoff values for the outcome variables to classify treatment outcomes as successful or unsuccessful. Of 31 patients, 17 met the criteria for successful treatment. The development of standardized analysis methods to determine treatment success is necessary to compare study outcomes. We also examined factors that contributed to treatment success. A chi-square test revealed a relationship between treatment success and symptom duration in the RME-O group. The number of patients in the chronic phase was higher in the MCPJ-BO group, while the number of patients in the acute phase was higher in the RME-O group. In the MCPJ-BO group, treatment was unsuccessful in one of five patients in the acute and subacute phases, whereas in the RME-O group, treatment failed in nine of nine patients. This, combined with the overall success rate of 60% vs only 27%, suggests that the MCPJ-BO is superior to the RME-O for TF management. Investigating the underlying reasons for the lower success rate of RME-O in the acute and subacute phases will strengthen decision-making for orthotic prescription. There may be several reasons for this, including that the relative extension of the affected finger by the RME-O orthosis might not provide sufficient immobilization to facilitate tissue healing in the early stages. The palmar portion of the MCP orthosis over the A1 pulley might also have provided additional support and stabilized the MCP joint, which would have helped to reduce stress on the A1 pulley and/or flexor tendons and alleviate symptoms. Future biomechanical studies are needed to provide an objective assessment of this issue by determining how much force is exerted by the flexor tendons when using MCP-O and RME-O. In addition, in this study, we examined pain and function as indicators of recovery. Nevertheless, other variables such as triggering, stage improvement, or quality of life may also be important in individual treatment selection for TF patients. Finally, since 6 weeks is the minimum duration for wearing orthoses, we only presented the short-term results of the orthoses. Thus, we do not know which orthosis is more effective when the wearing duration exceeds 6 weeks. Regardless of the underlying cause, the results of this study suggest that symptom duration should be considered when establishing inclusion criteria for future studies.

The durability of orthotic use is strongly influenced by the patient's comfort in the orthosis. Frequently, non-custom-fitted orthoses are abandoned by patients during use. Several factors affect the duration of orthosis use, including the patient's belief in the usefulness of the device, comfort, quality of services provided, and follow-up procedure.[29-31] The systematic review by Mezzio and Valdes[32] suggests that patients who received orthotic intervention for the upper and lower extremities preferred devices that were effective, comfortable, and easy to use. The systematic review concludes clinicians should address patient needs during orthotic interventions to reduce orthotic abandonment, improve functional outcomes, and promote patient-centered practice.[32] There are also studies in which patient satisfaction with orthoses has been assessed using Likert-type and ordinal scales. These scales can be used to measure satisfaction, but they may not provide a comprehensive assessment.[31,33] In the current study, the MCPJ-BO and RME-O groups were very satisfied with orthoses. The MCPJ-BO group's three most preferred satisfaction characteristics were simplicity of use/effectiveness, safety/follow-up service, and comfort. In the RME-O group, the three most preferred satisfaction characteristics were effectiveness/follow-up service, simplicity of use, and comfort. Quebec scores showed no difference between the two orthoses regarding orthosis satisfaction, whereas the RME-O group had higher service satisfaction than the MCPJ-BO group. The high service satisfaction with the RME-O could be because the orthosis was fabricated relatively quickly and with fewer revisions. However, this study did not examine service characteristics, including service delivery, repairs and servicing, professional services, and follow-up services for each patient separately by group. Future studies should assess service characteristics for each patient to evaluate patient satisfaction and complications.

## Limitations

This study lacked a control group without intervention. Because splinting is considered an essential component of hand rehabilitation in our clinic, we did not include a control group without splinting in this study design for ethical reasons. In addition, the generalizability of the results may be limited because of the short-term study design, and we cannot make any conclusions about the durability of our results. The sample size of the study should be considered for the generalizability of the results. Therefore, it may be beneficial to expand the scope of this study in terms of number of participants, orthotic wearing duration, and inclusion of a control group to strengthen the decision-making process in orthotic prescription. In addition, the results of this study should be interpreted in the context of the inclusion criteria. We did not include patients with bilateral or multiple TFs on the same hand. Since diabetic patients typically have multiple TFs, we recommend that these individuals be included in future studies to determine efficacy and patient preferences for the

orthosis. Baseline differences between groups could affect treatment outcomes. In addition, the distribution of patients across the different phases and stages of TF was unequal in the two groups, with a higher number of patients in the chronic phase in the MCPJ-BO group and a higher number of patients in the acute phase in the RME-O group. We did not examine the effects of orthoses on the different stages of TF based on symptom duration. Further long-term randomized controlled trials are needed to determine the effects of treatments on the different stages and phases of TF based on symptom duration and gender. Imaging techniques could also be helpful to investigate the healing process in the A1 pulley region to understand the effects of orthotic treatment on TF symptoms. Furthermore, anatomic and biomechanical studies examining the effects of these orthoses on the A1 pulley region and flexor tendon excursions could help develop individualized orthoses.

## Conclusion

MCPJ-BO and RME-O could be used for pain relief in the treatment of TF. The MCPJ-BO resulted in better functional status than the RME-O. There were no significant differences between the two orthoses regarding orthosis satisfaction.

## Ethical approval declaration

Ethical approval for this study was obtained from Istanbul Medipol University Ethics Committee (Number: 557).

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## Author contributions

Burcu Yendi: Investigation, resources. Esra Atilgan: Conceptualization, supervision, methodology. Seda Namaldı: Investigation, resources, Writing – original draft. Cigdem Ayhan Kuru: Conceptualization, methodology, formal analysis, writing – original draft – review and editing.

## Declaration of Competing Interest

The authors report no conflict of interest.

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## Informed consent declaration

Written informed consent was obtained from all participants before the study.

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# JHT Read for Credit
## Quiz: # A94

**Record your answers on the Return Answer Form found on the tear-out coupon at the back of this issue. There is only one best answer for each question.**

#1. The study design was
a. retrospective cohort
b. qualitative
c. RCTs
d. case series

#2. The triggering was at the ——————— pulley
a. A1
b. A2
c. A3
d. A4

#3. Prior to the study there was
a. more pain but better function in the MCPJ-BO group
b. more pain and less function in the MCPJ-BO group
c. more pain and less function in the RME-O group
d. no significant difference in pain and function between the two groups

#4. One limitation of the study was that it
a. was not cost effective
b. had no clear diagnostic inclusionary criterion
c. had no control group
d. was not subjected to statistical analysis

#5. The RME-O was more effective in improving function
a. true
b. false