Fractures of the fifth metacarpal neck, or boxer’s fractures, are common, particularly among young men. Because of the high frequency of this injury, there is a considerable range of treatment options. The purpose of this systematic review was to determine whether reduction and splint or cast immobilization is necessary for fractures of the fifth metacarpal neck. The authors conducted a systematic review of all published studies that randomized these fractures to cast immobilization vs treatment with soft wrap without reduction. Cast immobilization is not superior to soft wrap without reduction in most cases. The study found that reduction and cast immobilization is not necessary for boxer’s fractures. [Orthopedics. 2016; 39(3):188-192.]

However, prospective, randomized studies have shown that regardless of fracture angulation or treatment method, adequate short-term16-20 and long-term21 outcomes are achieved. The current comprehensive systematic review of all available prospective, randomized studies compares reduction and splint immobilization vs soft wrap without reduction of boxer’s fractures. This study demonstrates that there is no clear benefit to reduction and splint immobilization of boxer’s fractures.

**Materials and Methods**

**Literature Search**

A systematic review of the literature was performed. The following search terms were queried in PubMed, EMBASE, and Medline for the time period between 1960 and 2015: metacarpal neck fracture*, boxer’s fracture*, and subcapital metacarpal*. Two independent reviewers (J.C.D., N.K.) assessed the methodology and quality of each study. Homogeneous data were extracted from studies that met the inclusion and exclusion criteria, and frequency-weighted means were generated. A PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) diagram guided the study selection (www.prisma-statement.org).
Inclusion and Exclusion Criteria

The inclusion criteria were as follows: (1) prospective, randomized design; (2) treatment of metacarpal neck fractures; and (3) 2 treatment groups involving splinting vs soft wrap. Soft wrap techniques in this study included buddy taping or soft wrap. Either self-adherent wrap or silk tape was used for soft wrap, and all of these techniques are referred to as “wrap” for simplicity.

The exclusion criteria were as follows: (1) non-English-language translation; (2) any review, technique article, biomechanical study, or case series without a control group; (3) any study with unclear methods; (4) operative management; and (5) any study that included a fracture brace in lieu of a splint (Figure).23

If an abstract met the inclusion and exclusion criteria, the authors reviewed the entire text to verify qualification. In addition, they manually reviewed all references from all studies that met the inclusion and exclusion criteria to generate a list of qualifying studies not identified in the electronic searches. The authors met and conferred at this point. There were no discrepancies between their findings.

Data Extraction and Analysis

Study design, demographic variables (Table 1), outcomes (Table 2), and complications (Table 3) were extracted and analyzed. Two authors (J.C.D., N.K.) independently extracted the data, then conferred and compiled the data, correcting any discrepancies. Reported outcomes varied between studies. To account for the heterogeneity, Table 2 reports which outcomes specific authors used and which treatment method, either splint or wrap, was found to be superior.

RESULTS

The search resulted in 50 potentially eligible studies; only 5 studies met the inclusion and exclusion criteria. All studies were prospective, randomized, Level I therapeutic studies with greater than 80% follow-up (Figure). In total, 215 patients with an average age of 28 years were followed for an average of 13 months. Of these, 106 were randomized to the splint group and 109 were randomized to the soft wrap group (Table 1). The splint group did not receive a reduction in 4 of the 5 studies. In these studies, the exclusion criteria of dorsal angulation, or the maximum angulation without a reduction attempt, was 50° to 70° (average, 59°). All splinted patients were placed in the intrinsic plus position.
Outcomes of the 2 cohorts were cumulatively similar across all studies (Table 2). Braakman et al16 conducted a prospective, randomized study of 48 fifth metacarpal fractures with 6-month follow-up. Half of the patients were randomized to immobilization and half were randomized to buddy taping. In all, only 4 patients had a reduction: 2 for excessive angulation and 2 for a rotational deformity. At 1 week, 4 weeks, and 3 months, the wrap group had better range of motion (ROM). By 6 months, ROM between the 2 groups was equivalent. Similarly, pulling strength, pronation strength, supination strength, and torque strength were better for the wrap group at 1 week and 4 weeks. There was a slight loss in reduction in all 4 patients who had a reduction by 1 week. Initial fracture angulation did not correlate with outcomes (Table 2).

Statius Muller et al17 followed a series of 35 boxer’s fractures for 12 weeks. Fifteen were randomized to plaster immobilization and 20 were randomized to a pressure dressing and immediate ROM. At 6 and 12 weeks, there was no difference between the groups in terms of metacarpophalangeal joint (MCPJ) ROM, pain, and overall satisfaction (Table 2).

McMahon et al18 treated 42 patients with boxer’s fractures, randomizing half to splints and half to a compression dressing. At weeks 2 and 3, treatment favored the wrap cohort in terms of ROM and swelling (Table 2).

Hansen and Hansen19 randomized 85 patients with boxer’s fractures to treatment with either a splint, a wrap, or a soft brace. Excluding the brace patients, the wrap cohort had improved tenderness and MCPJ movement at 4 weeks. However, the splint group had 10° of additional metacarpophalangeal joint ROM at 3 months. The groups were equally satisfied at the conclusion of treatment (Table 2).

Kuokkanen et al20 randomized 29 patients with boxer’s fractures to closed reduction with splint vs no reduction and soft wrap with immediate ROM. At 4 weeks, the wrap had improved metacarpophalangeal joint ROM and grip strength. Although grip strength remained superior

### Table 2
**Outcomes of Fracture Treatment**

<table>
<thead>
<tr>
<th>Study</th>
<th>Measurement</th>
<th>Treatment Favored</th>
<th>Study</th>
<th>Measurement</th>
<th>Treatment Favored</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hansen and Hansen19</td>
<td>MCPJ</td>
<td>Wrap</td>
<td>Kuokkanen et al20</td>
<td>MCPJ</td>
<td>Wrap</td>
</tr>
<tr>
<td>Braakman et al16</td>
<td>Flexion deficit</td>
<td>Wrap</td>
<td>McMahon et al18</td>
<td>MCPJ</td>
<td>Wrap</td>
</tr>
<tr>
<td>Status Muller et al17</td>
<td>MCPJ</td>
<td>Equiv</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**ROM**
- **Measurement**: MCPJ
- **Treatment Favored**: Wrap
- **Favored Measurement**: NR

**Strength**
- **Measurement**: Pull Torque Pronation Supination
- **Favored Measurement**: Wrap

**Other Outcome Score**
- **Measurement**: Tenderness Salinification Union PIPJ circumference Hand volume Pain Salinification Mean radiographic angulation
- **Favored Measurement**: Equiv

**Abbreviations**: Equiv, equivalent; MCPJ, metacarpophalangeal joint; NR, not recorded; PIPJ, proximal interphalangeal joint; ROM, range of motion.

### Table 3
**Complications of Fracture Treatment**

<table>
<thead>
<tr>
<th>Study</th>
<th>Complication</th>
<th>Splint</th>
<th>Wrap</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hansen and Hansen19</td>
<td>NR</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kuokkanen et al20</td>
<td>NR</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>McMahon et al18</td>
<td>NR</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Braakman et al16</td>
<td>Residual symptoms at 24 wk</td>
<td>9/25</td>
<td>8/23</td>
</tr>
<tr>
<td>Status Muller et al17</td>
<td>Return to work at 6 wk;</td>
<td>14/15;</td>
<td>19/20;</td>
</tr>
<tr>
<td></td>
<td>return to work at 12 wk</td>
<td>15/15;</td>
<td>20/20;</td>
</tr>
</tbody>
</table>

**No./Total No.**
- **Complication**: Residual symptoms at 24 wk
- **Return to work at 6 wk**: 14/15; 19/20; 20/20
- **Return to work at 12 wk**: 15/15; 20/20

**Abbreviation**: NR, not recorded.
in the wrap cohort at 3 months, ROM was equivalent between the 2 groups. A reduction and splint did not improve the range of angulation from the initial injury. Furthermore, it is worth noting that this study was randomized; however, the wrap group had a significantly higher preduction fracture angulation (Table 2).

In the current study, the complications between the 2 groups were equivalent (Table 3). Whereas several studies reported no complications, one study reported that approximately one-third of both the splint and wrap cohorts had some degree of residual symptoms at 3 months. Statius Muller et al12 reported that only 1 of 15 patients in the splint group and 1 of 20 patients in the wrap group did not return to work at 6 weeks.

**Discussion**

The key finding of the current study is that there is no benefit to reduction and splint immobilization of closed boxer’s fractures with initial angulation of less than 70°. In fact, using soft wrap without reduction was generally favored in terms of MCPJ ROM,16,18-20 strength,16,20 and swelling.19 Outcomes were generally equivalent in terms of pain17 and tenderness,19 fracture healing,20 patient satisfaction,17,19 and return to work.17

In the current study, the range of dorsal angulation that was accepted without reduction and placed in a soft wrap varied from 50° to 70° (Table 1). The degree of dorsal angulation for a closed boxer’s fracture may not correlate with outcome.8,24 An analysis of boxer’s fractures separated into those with dorsal angulation above 30° and those below 30° demonstrated no association with functional results.8 A prospective case series of boxer’s fractures with angulation up to 75° treated with buddy taping alone without reduction exhibited no adverse outcomes.21 Patients in this series had no loss in grip strength, 100% of fractures healed with no change in fracture angulation, and median Disabilities of the Arm, Shoulder and Hand (DASH) score was 0 at 3 years. Although the experimental group in this review was treated with a soft, compressive wrap, buddy taping is an alternative method for boxer’s fracture treatment in place of a splint. It is hypothesized that buddy taping prevents rotational deformity.16

The current study established that reduction and splint immobilization are not superior to a soft wrap or buddy tape (Table 2). In a similar systematic review of boxer’s fractures, Poolman et al23 found no superior method of fracture immobilization. Outcomes were at least equivalent in the short term, and long-term outcomes of wrapping metacarpal fractures are excellent as well.21 In addition, obtaining long-term outcomes for these injuries is especially difficult. Hansen and Hansen19 did not attempt a return-to-work analysis in their cohort because so many of their patients were unemployed, nonworking, or students. In another prospective analysis of boxer’s fractures, Bansal and Craig26 also had poor follow-up. The initial 40 patients with a boxer’s fracture were treated with reduction and splint immobilization; however, only half of the patients returned for the follow-up visit. The second cohort included 38 patients who were treated by buddy taping the fourth and fifth fingers. In this cohort, only 2 patients returned to clinic. Despite the poor follow-up, the buddy taping group returned to work over 2 weeks before the immobilization group (2.7 vs 5 weeks). In addition, the 2 groups had equivalent DASH scores at 12 weeks.26

Although the subjective outcomes in the treatment of boxer’s fractures are equivalent between reduction and splint vs soft wrap, the radiographic outcomes were not well controlled for in the current analysis (Table 2). However, one study noted no difference between the groups in mean radiographic angulation,18 and another reported no difference in union rate.20 Furthermore, some authors do not advocate ordering lateral radiographs in the follow-up period for these fractures.27

Another study of 200 boxer’s fractures demonstrated equivalent residual radiographic dorsal angulation at 4 weeks post-injury in the treatment group that underwent closed reduction and the group that did not.28

No major complications were identified in the current study (Table 3). There have been reports of skin necrosis after splinting,29,30 but no cases were found in the current analysis. Both return to work18 and incidence of residual symptoms (approximately one-third)18 were equivalent between the 2 cohorts.

This study has limitations. It included a limited number of patients with inconsistent and irregular follow-up. Each study used different outcome variables, making it impossible to combine data. In the future, a well-powered prospective, randomized study with close follow-up, including specific outcome measures, should be conducted. However, despite these shortcomings, to the authors’ knowledge this is the most complete review of nonoperative management of boxer’s fractures.

**Conclusion**

Given the reasonable short- and long-term outcomes of wrapping boxer’s fractures without reduction,11,16,21,25,28 it is likely that reduction with immobilization of these fractures is unnecessary. For fifth metacarpal neck fractures with up to 70° apex dorsal angulation and without a rotational deformity, the best available evidence suggests that a soft wrap with buddy taping the fourth and fifth digits without reduction yields equivalent results to closed reduction and splint treatment.

**References**


