

Jeffrey C. Leggit, MD, CAQSM; Geoff McLeod, DO, CAQSM, Capt, USAF, MC
Department of Family Medicine, Uniformed Services University of Health Sciences, Bethesda, Md

jeff.leggit@usuhs.edu

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MSK injury? Make splinting choices based on the evidence

Which devices do—and don't—have evidence to support their use when it comes to injuries like carpal tunnel syndrome, "tennis elbow," or an ankle sprain? Read on.

PRACTICE RECOMMENDATIONS

- › Consider a wrist splint for carpal tunnel syndrome secondary to repetitive motion. **(B)**
- › Recommend a simple knee sleeve to help patients with osteoarthritis reduce their pain and improve daily function. **(B)**
- › Use ankle bracing for secondary prevention of a recurrent ankle sprain. **(A)**

Strength of recommendation (SOR)

- (A)** Good-quality patient-oriented evidence
- (B)** Inconsistent or limited-quality patient-oriented evidence
- (C)** Consensus, usual practice, opinion, disease-oriented evidence, case series

About 25% of all outpatient visits to family physicians include musculoskeletal (MSK) complaints.¹ Splinting, bracing, or wrapping are used in 25% of these visits.² The goals of splinting/bracing are multifold: accommodate a correct movement pattern, restrict poor movement patterns, and decrease the use of an injured area to allow for healing.

Splints and braces are generally noncircumferential and are easily put on and taken off. (The terms *splints* and *braces* can be used interchangeably.) The devices can be adjusted for swelling and are more comfortable than casts, but have the potential for poor patient adherence, may require frequent adjustment, and can allow for excessive motion.

Making the most of these devices requires an understanding of when the evidence supports (and doesn't support) their use for particular injuries. In this article, we review the evidence for the use of splints/braces for common upper and lower extremity MSK conditions seen in family practice. We have confined our discussion to readily obtainable, off-the-shelf products. These products come in a variety of sizes and are easily kept on hand, or ordered through a durable medical equipment provider.

Carpal tunnel syndrome

Carpal tunnel syndrome (CTS) is a compression neuropathy of the median nerve at the level of the wrist. It is caused by several different conditions.

Goal of splinting: Minimize wrist movement to decrease any concomitant swelling in the carpal tunnel contributing to the compression. The two different types of orthoses commonly used are a neutral wrist splint (FIGURE 1) and a cock-up wrist splint (20° wrist extension).

Evidence: A 2003 Cochrane review concluded that short-term symptom relief was achievable with bracing; however, better outcomes were seen with combination therapies (eg,

medications, occupational therapy) vs splinting alone.³ A more recent Cochrane review in 2012 found poor or limited evidence that splint use at night was better than no treatment or any other nonsurgical treatment.⁴ There was also insufficient evidence to recommend one type of splint over another, although several poor-quality studies found neutral splinting to be more beneficial.⁵

A 2016 clinical practice guideline (CPG) from the American Academy of Orthopaedic Surgeons (AAOS) reported strong evidence supporting the use of immobilization.⁶ (Strong evidence is defined by the AAOS as 2 or more “high” strength studies with consistent findings for the intervention.⁶) Interestingly, of the 2 studies that AAOS used to make its conclusions,^{7,8} only the study by Manente et al⁸ was available at the time of the Cochrane 2012 review, and the Cochrane authors came to a different conclusion. The AAOS CPG does not comment on a specific type of brace.

■ **Harms:** Both the 2012 Cochrane review and the AAOS statement indicate that there are no long-term harms other than some subjective discomfort in a minority of patients while wearing the splint.

■ **Bottom line:** A wrist splint should be considered in the treatment of CTS—especially if the condition is likely the result of repetitive wrist motion. If the patient can tolerate continuous use for 2 to 4 weeks, this should be employed. But at a minimum, nocturnal use for this duration would constitute a therapeutic trial. Combination therapy (ie, medication, occupational therapy, and splinting) is better than splinting alone.

de Quervain tendinopathy

This form of tendinopathy involves pain at the tendon sheaths of the abductor pollicis longus and the extensor pollicis brevis. Onset of symptoms has been attributed to overuse or repetitive movements of the wrist and thumb.

■ **Goal of splinting:** Immobilize the affected tendons to reduce irritation and/or inflammation. A thumb spica splint (FIGURE 2) is used to achieve this restriction.

■ **Evidence:** Three randomized controlled trials (RCTs) suggested that the

FIGURE 1
Neutral wrist splint



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➤ **Combination therapy—medication, occupational therapy, and splinting—is better for carpal tunnel syndrome than splinting alone.**

natural course is not affected by splint use for patients with prolonged symptoms (>3 months), and eventual resolution was noted in about 12 months—regardless of intervention with bracing. Symptoms improved more rapidly with the combination of medications and splint wear for those with a shorter duration of symptoms.⁹⁻¹¹ Symptom severity driven wear compared with full-time use yielded equivalent outcomes.⁹ Those patients with longer duration and increased severity of symptoms fared worse regardless of treatment.¹⁰

■ **Harms:** No documented harmful adverse effects (AEs) have been reported with splinting for this condition.

■ **Bottom line:** A thumb spica splint remains an option for de Quervain tendinopathy. It may provide symptomatic relief,



A thumb spica splint remains an option for de Quervain tendinopathy.

FIGURE 2

Thumb spica splint



especially if used early in the disease, but does not alter the natural disease course.

Lateral/medial epicondyle pain

Also known as tennis/golfer's elbow, lateral/medial epicondyle pain is thought to result from overuse of the common wrist extensor/flexor muscle origins at the site of the myotendinous junctions.

■ **Goal of splinting:** To dampen or disperse the forces at the painful area via a counterforce brace (FIGURE 3). In addition, braces are used to decrease wrist use, specifically extension or flexion.

■ **Evidence:** A 2002 Cochrane Review found insufficient data to support the use of counterforce braces for relief of acute or chronic pain symptoms associated with epicondyle pain. Several studies supporting their use within this review were of varying

FIGURE 3

Counterforce brace



quality with weak evidence.¹²

Volar wrist braces have also been studied for conservative management of epicondyle pain. Equivalent outcomes were noted comparing volar wrist bracing with a counterforce brace. Higher rates of recovery were seen in patients who participated in combination therapies (ie, bracing, physical therapy, and medication use).¹²

■ **Harms:** Use of counterforce braces for ≥ 30 days resulted in higher rates of braces restriction, more medical visits per patients, and higher medical costs. Derebery et al¹³ concluded that this was due to deconditioning on returning to normal activity. Use of a volar wrist brace should be discouraged as it reduces the active range of wrist motion, further contributing to deconditioning with long-term application.¹⁴

■ **Bottom line:** A trial of counterforce bracing should be used if pain precludes

FIGURE 4

Simple knee sleeve



active rehabilitation or vocational pursuits, but should not be used as the sole therapy.

Knee osteoarthritis

Knee osteoarthritis (OA) can result from multiple (often commingled) etiologies, which ultimately result in loss of cartilage, ensuing bony abnormalities, and affected joint/soft tissue structures. Patients can present with severe symptoms with little loss of structural architecture or major structural changes with a paucity of symptoms.

■ **Goal of splinting:** Depending on the orthoses used, the goals of splinting vary. A simple knee sleeve (FIGURE 4) provides warmth and proprioception, and a valgus unloader brace (FIGURE 5) provides valgus stress to open and unload the medial compartment.

■ **Evidence:** A single study evaluating a neutral knee sleeve vs control exhibited im-

FIGURE 5

Valgus unloader brace



proved pain scores following several months of treatment. Mixed results were demonstrated with patient perceived quality of life improvement though.¹⁵ Currently, there is inconclusive evidence to support the use of valgus offloader braces per AAOS guidelines.¹⁶ This decision is based on 3 separate studies of moderate to high strength evidence. Improvements in the domains of pain, stiffness, self-reported functional capacity, and physical performance were unclear and no conclusions were able to be drawn.^{17,18}

■ **Harms:** To date, no harmful AEs have been demonstrated with the use of knee sleeves. Valgus knee bracing can be uncomfortable, leading to poor adherence, but there are no long-term negative consequences.

■ **Bottom line:** Use of knee sleeves is worthwhile in patients with mild-to-moderate OA to improve functional scores. Inconclusive support for valgus knee bracing, along with the high cost of equipment, should reserve this option for patients with advanced OA who do not respond to typical conserva-



Inconclusive support for valgus knee bracing—along with the high cost of equipment—should reserve this option for patients with advanced knee osteoarthritis.

FIGURE 6
Hinged knee brace



FIGURE 7
Ankle braces



Velcro strap stirrup ankle brace (A), lace-up stirrup ankle brace (B), and pneumatic stirrup ankle brace (C).

tive management and who are unwilling or ill-advised to undergo knee arthroplasty.¹⁶⁻¹⁸

Medial collateral ligament injury

An injury of the medial collateral ligament (MCL)—the medial stabilizer of the knee—can result from either a direct blow or a noncontact twisting injury. Grade 1 injuries have no actual ligament tear, grade 2 injuries have partial disruption, and grade 3 injuries denote a complete tear.

■ **Goal of splinting:** A hinged knee brace (FIGURE 6) allows for full extension but limited valgus and varus stresses.

■ **Evidence:** A conservative management strategy for an isolated injury is generally adequate to allow for sufficient healing, and “return to play” without prolonged disability. With conservative management, the affected joint is protected with a hinged knee brace for about 3 to 6 weeks.^{19,20} Data gathered on patients 9 years postinjury support the use of bracing of grades 1 to 2 injuries, but it is unclear what the optimal strategy is for grade 3 injuries.¹⁹

■ **Harms:** Generally well tolerated, and no harms have been reported.

■ **Bottom line:** Isolated grades 1 to 2 MCL injuries can be treated conservatively, and a hinged knee brace should be used as part of the rehabilitative process. It is unclear how to optimally manage grade 3 injuries.

Lateral ankle sprain

Lateral ankle sprains involve inversion injury to 1 or more of the 3 lateral ankle ligaments. Injuries are graded using the same grade schema as MCL injuries.

■ **Goal of splinting:** There are a variety of braces designed to provide lateral stability to patients with lateral ankle sprains. These stirrup braces differ in degree of support and additional fixation points—rigid (pneumatic) vs semirigid (Velcro, lace-up, etc) (FIGURE 7).

■ **Evidence:** A 2017 meta-analysis of systematic reviews found improved (self-reported) function when patients used external support devices such as tape, compression bandages, semirigid braces or boots, or walking casts.²¹ Secondary prevention utilizing brace wear during at-risk activities has been found to be the most important intervention to reduce recurrence.^{21,22}

■ **Harms:** No direct injury from brace use has been reported, but consistent evidence exists that lack of early mobilization

and rehabilitation can substantially affect the recovery from these injuries.

Bottom line: Consensus opinion recommends stirrup bracing for the treatment of grades 1 and 2 injuries.^{23,24} Controversy remains regarding brace use or complete immobilization for grade 3 injuries. Regardless of injury grade, early mobilization should be integrated into the treatment plan, coupled with active rehabilitation, including restoration of strength and proprioception. Prevention of second injuries is best accomplished with full rehabilitation and bracing during at-risk activities (eg, sports practices and competitions).^{21,22,25}

A useful tool, but one not always covered by insurance

Bracing is a useful tool in the armamentarium of treating the common MSK complaints seen in everyday practice. Bracing must always be accompanied by a functional, active rehabilitation program.

Keep in mind, though, that many insurance plans may not cover the cost of bracing. Therefore, knowledge of its efficacy for a particular injury (or lack thereof) should guide treatment recommendations, along with shared decision making. **JFP**

CORRESPONDENCE

Jeffrey C. Leggit, MD, CAQSM, 9706 Ethan Ridge Avenue, Frederick, MD 21704; jeff.leggit@usuh.edu.

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