Outcomes of Rigid Night Splinting and Activity Modification in the Treatment of Cubital Tunnel Syndrome

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Purpose To prospectively analyze, using validated outcome measures, symptom improvement in patients with mild to moderate cubital tunnel syndrome treated with rigid night splinting and activity modifications.

Methods Nineteen patients (25 extremities) were enrolled prospectively between August 2009 and January 2011 following a diagnosis of idiopathic cubital tunnel syndrome. Patients were treated with activity modifications as well as a 3-month course of rigid night splinting maintaining 45° of elbow flexion. Treatment failure was defined as progression to operative management. Outcome measures included patient-reported splinting compliance as well as the Quick Disabilities of the Arm, Shoulder, and Hand questionnaire and the Short Form-12. Follow-up included a standardized physical examination. Subgroup analysis included an examination of the association between splinting success and ulnar nerve hypermobility.

Results Twenty-four of 25 extremities were available at mean follow-up of 2 years (range, 15–32 mo). Twenty-one of 24 (88%) extremities were successfully treated without surgery. We observed a high compliance rate with the splinting protocol during the 3-month treatment period. Quick Disabilities of the Arm, Shoulder, and Hand scores improved significantly from 29 to 11, Short Form-12 physical component summary score improved significantly from 45 to 54, and Short Form-12 mental component summary score improved significantly from 54 to 62. Average grip strength increased significantly from 32 kg to 35 kg, and ulnar nerve provocative testing resolved in 82% of patients available for follow-up examination.

Conclusions Rigid night splinting when combined with activity modification appears to be a successful, well-tolerated, and durable treatment modality in the management of cubital tunnel syndrome. We recommend that patients presenting with mild to moderate symptoms consider initial treatment with activity modification and rigid night splinting for 3 months based on a high likelihood of avoiding surgical intervention. *(J Hand Surg 2013;38A:1125–1130.*

Type of study/level of evidence Therapeutic II.

Key words Conservative, cubital tunnel syndrome, nonoperative, splinting, treatment.

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CUBITAL TUNNEL SYNDROME is the second most common nerve compression syndrome, and the cubital tunnel is the most common site of ulnar nerve compression.[1,2] Research regarding the anatomy of the ulnar nerve and the causes of ulnar nerve dysfunction suggests that cubital tunnel syndrome is likely multifactorial with components of direct compression as well as traction on the nerve related to elbow flexion.[3,4] The degree of nerve dysfunction may be classified based on the work by McGowan,[5] later modified by Dellon,[1] that categorizes nerve dysfunction as mild, moderate, or severe based on history and physical examination findings. Mild disease, Dellon 1, is limited to intermittent paresthesias and subjective weakness; moderate disease, Dellon 2, includes intermittent paresthesias and objective weakness; severe disease, Dellon 3, has persistent paresthesias and objective weakness with or without intrinsic atrophy.[1,5–7]

The initial treatment of cubital tunnel syndrome may be nonoperative, which includes activity modification, nerve gliding exercises, and splinting.[8–10] A trial of conservative care is considered appropriate for patients with Dellon 1 symptoms. An understanding of the increased extraneural and intraneural pressure demonstrated in ulnar nerve compression has helped to better define conservative treatment options, especially splinting. It has been shown that prolonged elbow flexion, static or repetitive, induces strain on the ulnar nerve and increased extraneural and intraneural pressures within the cubital tunnel. These intra- and extraneural pressures are at their lowest mean values at an elbow position of 40° to 50° of flexion, and pressures are significantly greater in full elbow flexion or extension.[11] The goals of splinting are to alleviate symptoms and prevent progressive nerve dysfunction.

Various forms of splinting have been used in the treatment of cubital tunnel syndrome ranging from padded sleeves to rigid thermoplastic custom-fit orthoses. Patient compliance with splinting regimens can be difficult and represents a limiting factor in the utility of this treatment. Outcomes have been examined, but splint compliance and duration of splinting remain uncertain.[12–14] In addition, the response of patients with Dellon 2 symptoms to conservative care is unclear.[9,12,15]

Our goal in this investigation was to prospectively analyze, with validated patient-rated outcome measures, symptom improvement in patients with mild to moderate cubital tunnel syndrome treated with rigid night splinting and activity modification. We also assessed splint compliance during the 3-month trial. We hypothesized that patients treated with a 3-month course of rigid night splinting and activity modification would comply with the splinting protocol and demonstrate a clinically relevant and statistically significant improvement in validated outcome measures of both upper extremity function and general health measures.

MATERIALS AND METHODS

After institutional review board approval, patients were prospectively enrolled from our hand clinic between August 2009 and January 2011. Any adult patient diagnosed with an idiopathic cubital tunnel syndrome by typical findings on history, physical examination, and/or nerve studies who was amenable to both nonoperative and operative treatment was eligible for inclusion. We graded the severity of cubital tunnel symptoms according to Dellon's classification. The distinction between mild, Dellon 1, and moderate, Dellon 2, disease was made based on weakness in grip/pinch strength of less than 80% of the contralateral, unaffected extremity. For those patients with bilateral disease, strength classification was based on Dellon's grip/pinch strength criteria because an uninvolved contralateral extremity was not available.[12] We excluded patients with severe, Dellon 3, disease because we advised them to have surgery. Patients with cubital tunnel syndrome secondary to elbow deformity, a congenital anomaly, a prior trauma, cervical radiculopathy, or previous elbow surgery were also excluded. Workers' compensation patients were excluded owing to potential confounding as a result of secondary gain considerations. Although we did not exclude patients with a generalized neurological condition or diabetes, none of our patients had these conditions.

Nineteen patients (25 extremities) were enrolled. The 8 men and 11 women had a mean age of 43 years (range, 21–72 y). There were 20 extremities with Dellon 1 disease and 5 with Dellon 2 disease. Symptoms had been present an average of 7 months (range, 1–41 mo) before presentation, and 5 patients had experienced symptoms for more than 6 months. Twenty-four of the 25 extremities were available at a minimum follow-up of 1 year with a mean follow-up of 2 years (range, 15–32 mo). One patient with Dellon 2 disease was lost to follow-up and was excluded from final analysis.

All patients were treated with a rigid nighttime orthosis holding the elbow at a position of 45° of flexion for 3 months. We allowed the orthosis (Hely & Weber, Santa Paula, CA) to be discontinued at 3 months (Fig. 1). The selected orthosis included malleable aluminum stays that allowed the orthosis to be molded to maintain the elbow at 45° of flexion. In addition, each patient was given information regarding his or her diagnosis and various activity modifications to help reduce day-