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Comparison of the effectiveness of Lumbrical Splint and Wrist Neutral Splint on patients with Carpal Tunnel Syndrome (CTS): A Pilot Study

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Introduction

Carpal Tunnel Syndrome (CTS) is the most common upper extremity peripheral entrapment neuropathy due to the compression of median nerve at wrist, causing nocturnal awakening, fingers weakness and clumsiness or even thenar muscle atrophy, reduced hand grip strength and hand function for severe cases. The effectiveness of a nocturnal wrist neutral splint by the Occupational Therapists for CTS patients has long been supported and lowest carpal tunnel pressure is demonstrated when the wrist is at neutral position. Recently, various overseas studies have suggested a modified nocturnal Lumbrical splint design with both the wrist and metacarpophalangeal joints (MCPJ) in neutral positions had a more significant effect on improving CTS symptoms and hand functions than the conventional wrist splint. The additional MCPJ support helps to maintain the fingers in extended position, hence keeping the Lumbricals distal to the transverse carpal ligament and hopefully to promote the treatment effectiveness to CTS patients with the lowest carpal tunnel pressure. The lack of local data among HK population for evaluating these splints and the uncertain long term effect of using Lumbrical splint in treating CTS (as most studies lasted for 4-6 weeks) provoke me to start this study.

Objectives

- To compare the effectiveness of Lumbrical splint and Wrist Neutral splint on improving CTS symptoms and hand functions for CTS patients. - To collect preliminary data for future full-scale randomized control trial.

Methodology

This is a prospective single-blinded (blinded assessors) randomized pilot study with 2 treatment groups. All out-patients who were clinically diagnosed as CTS and referred for nocturnal splint by Medical Officers to Occupational Therapy Department, Prince of Wales Hospital will be screened for their eligibility based on the inclusion and exclusion criteria. Blocked randomization method is used for the randomization of

subjects into either splint group. The principal investigator is responsible for the randomization of the subjects, splint fabrication and checking of splint fitting. Baseline assessments (T0) and reassessments at 4-week (T1) and 12-week post-splint (T2) are done by blinded trained Occupational Therapists. The primary outcome measures include both symptoms severity scale (SSS) and functional status scale (FSS) of Chinese (HK) version of the CTS questionnaire. The objective secondary outcome measures include Moberg pick-up test, frequency of nocturnal awakening, 2-point discrimination at middle finger and hand strength. A total of 30 subjects are recruited to the study, with 15 subjects in each intervention group. At the moment, all subjects have completed T0 and T1 reassessment and 20 subjects have completed T2 reassessment.

Result

IBM SPSS Statistics 24 is used for the analysis of the preliminary data collected with level of significance set at 0.05. There is no statistical significant group X time interaction concluded from the Repeated Measures ANOVA, i.e. both Lumbrical splint and Wrist Neutral splint have similar effect on improving CTS symptoms and hand functions for CTS patients. Both groups of subjects show statistical significant improvements in frequency of nocturnal awakening between T0 and T1, T0 and T2 ($p < 0.001$) as concluded from Repeated Measures ANOVA for the within group comparison. Most subjects commented improved sleep quality after using both types of splints. For the group using Lumbrical Splint, significant improvement found in hand grip strength between T0 and T2 as well ($p = 0.014$). Whereas for the group using Wrist Neutral Splint, significant improvement found in CTSQ-SSS between T0 and T1 ($p = 0.005$), T0 and T2 ($p = 0.006$).