Development and Field-Testing of an Alternative Low-Cost Hand Splint for Burn Contracture

Kimberly E. Souza, BS*; Lawrence Z. Cai*, BS; Jana P. Lim, BS*; Mohan K. Dangol; Dinesh Chataut, MS; Nancy B. Chee, OTD, OTR/L, CHT; Shankar M. Rai, MBBS; James Chang, MD
*These authors contributed equally to this work.

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Introduction: Burn scar contractures remain a common source of disability in low- and middle-income countries and often require complex reconstructive operations to restore function to the patient.[1] Despite the high prevalence of burn scar contractures and subsequent release procedures, patients often face tremendous barriers to adequate physical therapy and follow-up care, which results in relapse of the contracture following a release.[2,3] Static progressive splinting mechanisms are well-described for this indication[4], but these splints are cost-prohibitive or unavailable to patients in low- and middle-income countries. To that end, we describe our work to develop and test an alternative low-cost static progressive hand splint designed to prevent flexion re-contracture in burn scar contracture release patients.

Methods: The splint was created through an iterative design-and-test process through collaboration with Stanford School of Medicine in the US, Kirtipur Hospital in Nepal, and Scheer Memorial Hospital in Nepal. Splints were given to Nepali patients who underwent burn scar contracture release of the palmar hand and would not be able to return to the hospital for long-term physical therapy after their surgery. Patients were instructed to wear the splint at night for six months and to progressively extend the splint's ratchet mechanism as tolerated. Patients were assessed for range of motion and hand function pre-operatively, one week post-operatively, and three months post-operatively.

Results: The initial prototype underwent multiple rounds of iterative design and feedback from patients for comfort, fit, and durability. Patients demonstrated good compliance with the splinting regimen and expressed satisfaction with the fit and durability of the device. Preliminary follow-up suggests that patients using the splint maintain post-operative range of motion without additional re-contracture.

Conclusion: We have created a hand splint to prevent flexion recontracture following burn scar contracture release of the hand. Ongoing work includes six-month follow-up to ensure maintenance of improved range of motion and testing in other indications including Dupuytren's contracture and stroke.

Reference:

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