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Practice Forum

A simple orthosis solves a problem in a patient with a dystonic finger after stroke

Stefano Vercelli PT, PhD^{a,*}, Giorgio Ferriero MD, PhD^b, Elisabetta Bravini PT, PhD^c, Wafa Al Yazeedi MD^b, Ludovit Salgovic MD^d, Marco Caligari PT^e, Francesco Sartorio PT, MSc^a

^a Laboratory of Ergonomics and Musculoskeletal Disorders Assessment, Division of Physical Medicine and Rehabilitation, Salvatore, Maugeri Foundation - IRCCS, Scientific Institute of Veruno, Novara, Italy

^b Department of Physical Medicine & Rehabilitation, Hamad Medical Corporation, Doha, Qatar

^c School in Advanced Sciences and Technology in Rehabilitation Medicine and Sport, Department of Clinical Sciences and Translational Medicine, Tor Vergata University, Rome, Italy

^d University of Ss. Cyril and Methodius, Trnava, Slovak Republic

^e Division of Physical Medicine and Rehabilitation, Salvatore Maugeri Foundation - IRCCS, Scientific Institute of Veruno, Novara, Italy

These authors use a custom-fabricated orthotic device to improve hand motion and function for a client with hand dystonia after stroke. Clinical observation and reasoning resulted in an effective solution to control the dystonia that was acceptable to the client. — KRISTIN VALDES, OTD, OT, CHT, Practice Forum Editor

Introduction

Stroke is considered the most common cause of complex disability, often resulting in a combination of significant motor, sensory, and cognitive deficits.¹ Of patients affected by stroke, 1%–4% can develop a wide range of movement disorders, and vascular dystonia is the most common cause of secondary movement disorders.² Dystonia is a chronic disorder characterized by involuntary muscle contractions that cause slow repetitive movements or abnormal postures.³ Dystonia secondary to stroke causes worsening of motor ability as it is often seen in conjunction with other disturbances, such as rigidity, spasticity, or weakness.³ Many therapeutic approaches are available including drugs, physiotherapy, adaptive strategies,³ and—in selected cases—orthotic devices. These can also serve to enhance function.⁴ Hand dystonia, even mild, can be particularly disabling as it interferes with daily activities, working ability, and quality of life.⁵

This article describes a case showing the efficacy of a simple hand static orthosis to control abnormal movements of the fingers during gripping.

Case report

The patient (male, aged 72 years) was admitted to a rehabilitation clinic in January 2014 for a tailored rehabilitation program. In 1998, he had a right hemorrhagic stroke resulting in a left hemiparesis, treated with both physiotherapy and injections with botulinum toxin. At admission, his Functional Independence Measure score was 107 of 126 (Functional Independence Measure motor subscale = 72 of 91). His activities of daily living performance were affected by the reduced functionality of the left hand, although he was right handed. Considerable difficulty in gripping objects was observed due to an abnormal hyperextension of the second left metacarpophalangeal (MCP) joint and subsequent flexion of the proximal interphalangeal (PIP) and distal interphalangeal (DIP) joints. Closer investigation demonstrated that if the MCP was blocked in neutral position (avoiding hyperextension), the patient could actively extend both PIP and DIP joints improving his ability to grip properly ([Video segment 1](#)). The solution consisted of a low-temperature customized thermoplastic orthosis, designed to avoid MCP hyperextension and enhance grip.

Static orthosis

The customized orthosis was created using low-cost recycled materials, for a total cost of approximately \$20 ([Video segment 2](#)). The orthosis design included the following:

1. A thermoplastic strip of about 1" × 4" was cut—rounding the edges of the 4 corners—and molded over the dorsal aspect of the

* Corresponding author. Fondazione "Salvatore Maugeri", IRCCS - Istituto Scientifico di Veruno, Laboratorio di Ergonomia e Valutazione dei Disturbi Muscoloscheletrici, Divisione di Recupero e Riabilitazione Funzionale, Via per Revislate 13, Veruno, I-28010 Novara, Italy. Tel.: +39 0322 884711; fax: +39 0322 830294. E-mail address: stefano.vercelli@ism.it (S. Vercelli).

hand. Care should be taken to avoid pressure over the metacarpal bony prominences.

2. An outrigger (Orfitube; Orfit Industries, Wijnegem, Belgium) was bent to 20° using a specific device (Orfitube adjuster; Orfit Industries, Wijnegem, Belgium).
3. A thermoplastic strip (1" × 2") was fixed at the distal end of the outrigger to cover the dorsal aspect of the proximal phalanx. The outrigger was aligned with the shaft of the second finger to avoid hyperextension of the MCP joint and secured with the thermoplastic.
4. Two pieces of strapping were placed at the ends of the orthosis and secured with a Velcro strap across the palmar region of the hand.

With the orthosis, the patient was immediately able to extend PIP and DIP joints when opening his hand to improve his ability to extend his digits when grasping an object. During his stay in hospital, the orthosis did not cause any discomfort. At his 1-year follow-up, the orthosis was still being used and rated highly by the patient who reported great satisfaction with it (Orthotics and Prosthetics Users Survey—Client Satisfaction with Device module⁶ score: 10 of 32; lower scores indicate better satisfaction; range, 8–32).

Conclusions

This case report demonstrates the synergy between clinical observation of a dystonic movement, clinical reasoning, and the use

of thermoplastic materials to improve compromised hand function in an individual. One of the strengths of this approach is that it is easily accessible to all, even in clinical settings with limited financial resources.

Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.jht.2016.04.003>.

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