Efficacy of stepwise application of orthosis and kinesiology tape for treating thumb metacarpophalangeal joint hyperextension injury

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Abstract. [Purpose] The purpose of this study was to investigate on the effects of the stepwise application of orthosis and kinesiology tape on a patient with thumb metacarpophalangeal joint hyperextension injury. [Subject] The patient was a 43-year-old man with severe thumb MCP pain and extremely limited thumb movement. [Methods] Stepwise application of orthosis and kinesiology taping were performed for 3 weeks and 4 weeks, respectively. [Results] After stepwise treatment, the patient was able to power grip, precision pinch, turn a key, and hold a pen without pain. [Conclusion] Stepwise application of thumb orthosis and kinesiology tape is a safe and effective treatment for thumb MCP joint hyperextension injury.

INTRODUCTION

Hyperextension injury of the thumb metacarpophalangeal (MCP) joint may result in an unstable and painful joint, difficulty in grasping objects, and decreased power. Acute injuries to the thumb MCP joint can occur after sudden, extreme forced hyperextension during sports or daily activities.

Acute thumb MCP joint hyperextension injury requires appropriate immobilization for successful treatment1). However, despite appropriate immobilization, some cases result in chronic disability with an unstable and painful thumb that limits their ability to precision pinch, power grip1), unscrew jar lids, hold a pen, or turn a doorknob key2, 3).

Therefore, the purpose of this study was to investigate the efficacy of a stepwise treatment using thumb orthosis and kinesiology tape for the treatment of thumb MCP joint hyperextension injury.

SUBJECT AND METHODS

A 43-year-old man had severe thumb MCP pain and extremely limited thumb movement due to severe pain rated 8/10 on the visual analog scale (VAS), and instability which developed after traumatic hyperextension injury of the thumb MCP joint. The patient understood the purpose of this study and provided his written informed consent, in accordance with the ethical principles of the Declaration of Helsinki.

In the acute stage, after confirming that surgery was not required, a 3/32”-thick thermoplastic orthosis was applied to the thumb for thumb MCP joint immobilization for a period of approximately 3 weeks. One-inch elastic Velcro straps were applied from the fourth palmar metacarpal bone to the fourth dorsal metacarpal bone to provide stability to the joint.

In the intermediate stage of recovery, kinesiology tape (BB-E TAPE, WETAPE Co., Ltd., Seoul, Korea) was applied to the muscles and joint around the thumb to prevent long-term stiffness, reduce pain, and support the joint. Newly developed taping methods were used in application of the kinesiology tape, which has approximately 40–50% stretch. First, to protect against or restrict painful hyperextension of the thumb MCP joint, 2.5 cm kinesiology tape was applied from the dorsal carpometacarpal joint to the volar carpometacarpal joint of the thumb in a mild flexion position (Fig. 1A). Second, to enhance protection against hyperextension of the thumb MCP joint, 2.5 cm kinesiology tape was reapplied over the same area as in the first step (Fig. 1B). Third, to support the thumb MCP joint, 5 cm kinesiology tape was reapplied over the same area as in the first step. Fourth, to enhance support of the thumb MCP joint, 5 cm kinesiology tape was reapplied over the same area as in the third step.

In the final stage of recovery, to allow more movement of the thumb MCP joint, the second and fourth steps were
omitted. To protect the skin, the kinesiology tape was reapplied every day4).

RESULTS

At the end of the acute stage, after wearing the thumb orthosis for approximately 3 weeks, the VAS score of thumb pain had decreased from 8/10 to 5/10, and mild movement of the thumb joint was possible. However, daily activities such as turning a key, holding a pen, and gripping objects using the thumb were limited due to pain. At the end of the intermediate stage of recovery, after the application of kinesiology tape using 4 steps around the thumb for approximately 3 weeks, the VAS score of thumb pain had significantly decreased from 5/10 to 2/10 during daily activity. In the final stage of recovery, after application of kinesiology tape using 2 steps (second and fourth steps omitted) for approximately 1 week, thumb movement without pain was demonstrated. After this effective stepwise treatment, the patient was able to power grip, precision pinch, turn a key, and hold a pen without pain.

DISCUSSION

Acute thumb MCP joint hyperextension injury requires appropriate immobilization for successful treatment1. The patient must wear a thermoplastic orthosis for approximately 3–6 weeks for immobilization5). However, a balance between sufficient time of immobilization for joint healing and joint stiffness due to a long period of immobilization is needed6). In addition, despite appropriate immobilization, some thumb injuries result in chronic disability with an unstable and painful thumb that limits patients’ ability to precision pinch, power grasp1), unscrew jar lids, hold a pen, or turn a doorknob key2,3). Therefore, after wearing a thumb orthosis for approximately 3 weeks for immobilization, kinesiology tape was applied around the thumb of the present case for approximately 4 weeks (4 steps for 3 weeks, and 2 steps for 1 week), after which pain significantly decreased during daily activity.

Kinesiology tape allows free movement in the range of its elasticity7) and supports the joint structure8). Therefore, kinesiology tape may provide support to an injured thumb MCP joint and thumb movement could be easily compared to wearing the thermoplastic orthosis. In addition, the thumb MCP joint was protected against stiffness by immobilization. Because of its elasticity, kinesiology tape stretched by thumb movement may recoil back rapidly to its original length. In addition, increased tension of stretched kinesiology tape may cause resistance to painful thumb MCP hyperextension. Therefore, the natural healing time of the thumb MCP joint might be assisted because painful thumb MCP joint hyperextension is avoided7). Our results indicate that stepwise application of thumb orthosis and kinesiology tape is a safe and effective treatment for thumb MCP joint hyperextension injury.

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