NAJSPT

CLINICAL SUGGESTION

A NEW EXERCISE FOR TENNIS ELBOW THAT WORKS!

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ABSTRACT

Eccentric exercise has been effectively used in the management of tendinopathies in multiple regions of the body. Lateral epicondylosis ("tennis elbow") is a common tendinopathy that has shown improvement following treatment utilizing isokinetic eccentric exercise. A novel exercise was developed for home-based eccentric exercise that has shown promise for use with patients with lateral epicondylosis. Clinicians should be aware of this exercise and consider it as an evidence-based intervention.

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Disclosure: Dr. Phil Page is employed by The Hygenic Corporation, manufacturers of the FlexBar®.

BACKGROUND & PURPOSE

Lateral epicondylosis (LE), otherwise known as "tennis elbow" is often a painful, debilitating and chronic condition characterized by lateral elbow pain. While not usually associated with actually playing tennis, LE is a relatively common condition that can affect persons who perform repetitive upper body activities such as carpenters, musicians, and computer programmers. There is evidence that eccentric exercise may be effective in reducing the symptoms associated with LE.[1] Clinical researchers developed a novel exercise that was proven effective for treating patients with LE.[2] The purpose of this clinical suggestion is to provide the rationale for and to discuss the performance and practical applications of this exercise.

DESCRIPTION OF THE TOPIC

From a pathomechanical perspective, LE involves the proximal tendons of the extensor carpi radialis (ECR) and extensor digitorum (ED). Studies have shown that the ECR in particular is subject to increased stress during activities requiring power from the wrist.[3] Electromyographic (EMG) analyses of patients with LE has demonstrated mixed results. Several authors have noted increased activation of the ECR and ED in patients with LE compared to those without,[4,5,6] while other authors have noted decreased ECR activation.[7,8]

Historically, tennis elbow (as well as other chronic tendon conditions) has been referred to as "tendinitis," suggesting the presence of an acute inflammatory process. Recently, researchers have noted a lack of acute inflammatory markers in patients with tennis elbow and therefore suggest using the terms "tendinosis" or "tendinopathy" to reflect the chronicity of the condition.[9,10]

Traditional conservative treatments for LE include cross friction massage, electrical and thermal modalities, bracing, and therapeutic exercise. Interestingly, a systematic review and meta-analysis of interventions for LE noted a lack of evidence to support treatments other than exercise.[11] Anti-inflammatory medication may not be as effective as exercise[12]; thus, the benefit of therapeutic exercise may be related to the fact that LE is not due to an acute inflammatory process.

Therapeutic eccentric exercise (TEE) has been found to be an effective intervention for a variety of tendinopathies including Achilles tendinosis,[13] shoulder impingement,[14] and patellar tendinopathy.[15] One of the first recommendations in the literature regarding the use of eccentric exercise for managing tedinopathies was made by Stanish et al[16] in 1986. They suggested that eccentric exercise effectively "lengthened" the muscle-tendon complex resulting in structural remodeling of the tendon with hypertrophy and increased tensile strength of the tendon.

Eccentric exercise may also provide neuromuscular benefits through central adaptation of both agonist and antagonist muscles[17]; therefore, TEE may provide both a structural and functional benefit during tendinopathy rehabilitation. Interestingly, some patients with LE exhibit lowered pain pressure thresholds (PPT) and larger referred pain patterns than would occur solely due to the presence of trigger points, suggesting a central nervous system mediation of pain.[18] Many questions remain as to the mechanism of the effectiveness of TEE, as well as the appropriate dosage. In a recent systematic review, Woodley et al[19] noted a lack of high-quality studies comparing the effectiveness of eccentric exercise to standard management of tendinopathies.

Subsequent to the Woodley et al[19] review, clinical researchers at the Nicholas Institute for Sports Medicine and Athletic Trauma developed a novel eccentric exercise using a flexible rubber bar (FlexBar®, The Hygenic Corporation, Akron OH) for patients with LE. The researchers noted the previously described efficacy of eccentric training in LE patients using an isokinetic dynamomter in a study by Croisier et al[1], but wanted to develop an effective, cost-effective home-based eccentric exercise for their patients. This resulted in the creation of the novel Flexbar® exercise sequence (also known as "The Tyler twist") shown in Figure 1.

In the prospective, randomized, quasi-control study, 22 LE patients were assigned to either a standard physical therapy (PT) treatment group (control) or a group that received standard PT with the addition of the novel FlexBar® exercise.[2] There was no significant difference between the groups prior to the intervention. Standard PT included stretching, cross-friction

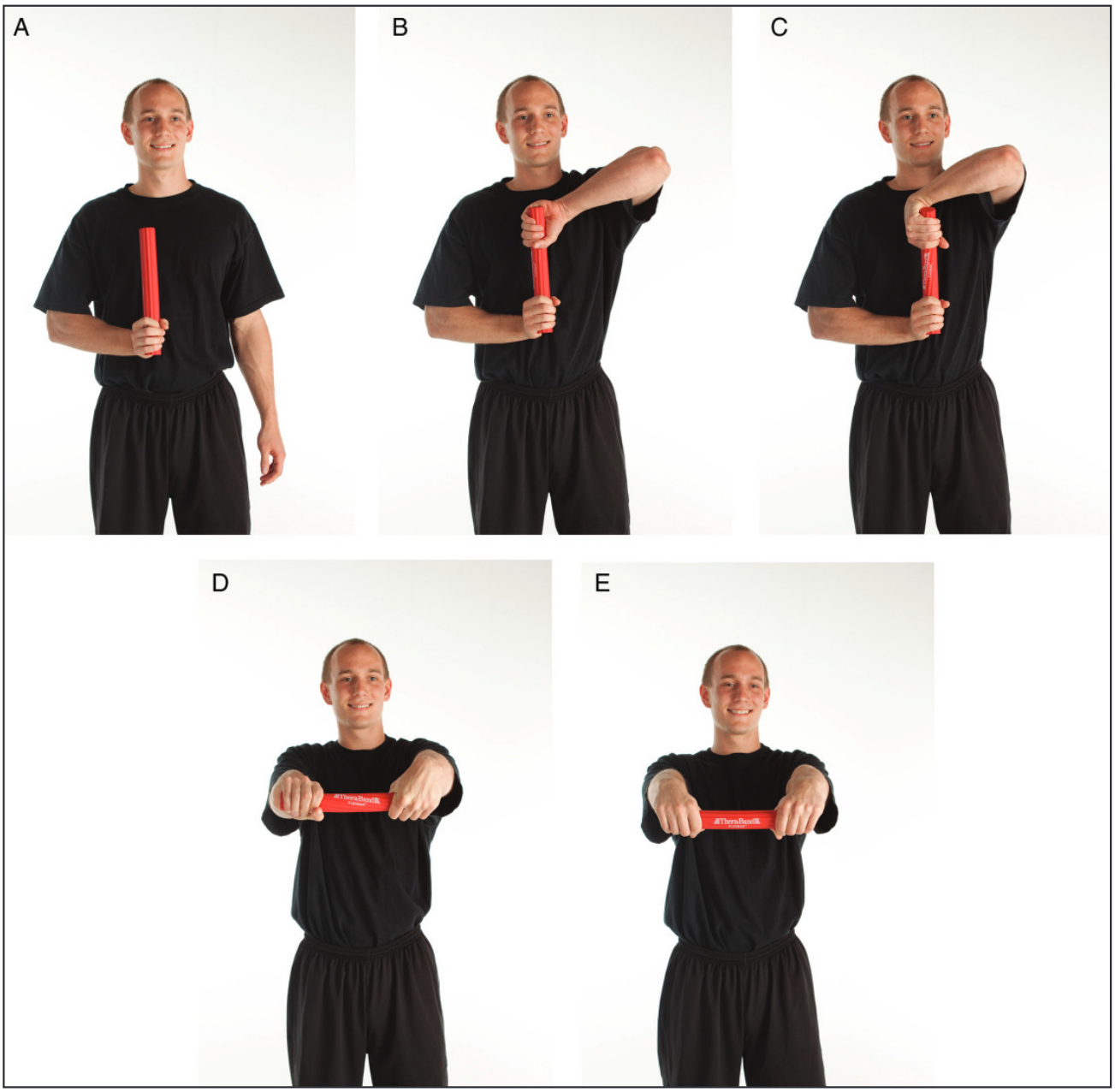

Figure 1. *Instructions for the 5 Steps of the Exercise:*
A. Hold FlexBar® in involved (right) hand in maximum wrist extension
B. Grab other end of FlexBar® with uninvolved (left) hand
C. Twist FlexBar® with noninvolved wrist while holding the involved wrist in extension
D. Bring arms in front of body with elbows in extension while maintaining twist in FlexBar® by holding with noninvolved wrist in full flexion and the involved wrist in full extension
E. Slowly allow FlexBar® to 'untwist' by allowing involved wrist to move into flexion (ie, eccentric contraction of the involved wrist extensors).

massage, ultrasound, heat and ice. Subjects were assessed for pain (Visual Analog Scale), subjective disability (Disability of Arm, Shoulder and Hand {DASH} questionnaire), tenderness (pressure algometer), and wrist and finger strength (hand-held dynamometer). A power analysis determined that 15 patients would be required in each group to detect meaningful changes in the DASH score for 80% power at $p < .05$. The authors reported on the reliability of their strength and tenderness assessments, noting lower reliability of middle finger extension strength.[2]

The FlexBar® exercise was performed for 3 sets of 15 each day (See Figure 1). Each repetition took 4 seconds to complete, and there was a 30 second rest between each set of 15 repetitions. The exercise was performed both during clinic visits and at home. Once the patients could perform 3 sets of 15, they progressed to the next color FlexBar®, indicating a higher intensity of eccentric resistance. The treatment continued until the patient had a resolution of symptoms, which occurred at an average of 7 weeks of treatment with 10 clinic visits.

Subjects performing the FlexBar® exercise in addition to standard PT had significantly more improvement than the group receiving only standard PT; in particular, the eccentric exercise group improved their pain level 81% vs. 22% in the standard group. Strength was also significantly more improved in the eccentric group, 79% vs. 15% improvement in the standard group. The DASH Score improved 76% in the FlexBar® group compared to only 13% in the control group. The findings of Tyler et al[2] were first presented at the 2009 American Orthopaedic Society for Sports Medicine's Annual Meeting, and was published in The Journal of Shoulder and Elbow Surgery.[2]

DISCUSSION

This clinical suggestion presents an excellent example of clinical practice leading to the creation of an evidence-driven novel exercise technique. Clinicians understanding the positive effects of eccentric exercise on tendinopathies used an existing clinical tool (the FlexBar®) to develop an "evidence-led" intervention that could be applied in today's outpatient physical therapy environment. This clinical suggestion promotes an emphasis on home-based, inexpensive treatment as compared to clinically-based use of more expensive isokinetic devices. Tyler et al[2] utilized the scientific inquiry process in order to answer the question of efficacy of this novel exercise intervention in a clinical setting.

There were some limitations to the Tyler et al[2] study such as a small sample size. Only 21 of the 30 subjects needed for sufficient power completed the study. The researchers who performed that study noted significant improvements in the experimental group and therefore decided to terminate the random group allocation due to the ethical possiblitiy that an effective treatment may have been withheld from the control subjects. The Tyler et al[2] study only examined and reported short-term improvements; longer-term outcomes would help determine if the positive results were sustained over longer time periods. Nonetheless, the amount and variety of short-term improvement in symptoms described in the study seem to offer positive clinical benefits.

In today's world of the Internet and social media, there were some interesting phenomena that resulted from this study. Within a year after the study, there were over 180,000 views of the "Tyler Twist" exercise video on YouTube. After presenting the abstract at the 2009 American Orthopaedic Society for Sports Medicine's Annual Meeting, a press release was issued by the society. The New York Times, among other media outlets, posted blog articles about the results of the study, resulting in numerous replies from consumers. Patients provided impressive testimonials about their successes with the exercise. In addition, patients began asking about the possibilities of treating 'golfers elbow' with the same device, which has resulted in a similar ongoing clinical investigation.

In conclusion, this clinical suggestion demonstrates an excellent example of true "evidence-based practice" in physical therapy. By understanding the evidence and applying experience within a clinical environment, clinicians can develop effective, novel interventions. It also supports the scientific process used in clinical practice: developing a hypothesis based on a clinical need and testing it in a real-world, clinical situation, with real patients. Finally, today's Internet-based society will continue to challenge rehabilitation providers to support and participate in

evidence-based practice as patients learn about successful treatments and look to their physical therapists to provide them.

Note: For a video demonstration of the exercise, visit http://www.youtube.com/watch?v=gsKGbqA9aNo

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