# Objective Measurements of SpiderTech® Taping Application Using OptoGait®

Justin Baker BS, Tyler Kowalski BS

October 15, 2012

Melissa Engelson DC,M., - Advisor

## ABSTRACT

**OBJECTIVES:** To determine if contact times and flight times using OptoGait® improve (i.e. decreased measured CV) by applying SpiderTech® to the gluteal region.

**METHOD:** Ten random young men (aging from 22-26) were evaluated for gluteus medius dysfunction using six-inch step down testing, manual muscle testing, and Trendelenburg test. If the subjects were found to have any positive tests, the individuals were measured for contact time and flight times using the OptoGait® analysis program prior to and after SpiderTech® application to the gluteal region using SpiderTech® taping application guidelines. Readings were taken for three consecutive days and the results were interpreted.

**RESULTS:** No correlation was found between SpiderTech taping of the gluteus medius and the data collected on OptoGait®. Only 3 subjects demonstrated improvement with taping with a lower CV in both contact and flight times.

**CONCLUSION:** This study was inconclusive as the data collected was not significant in showing improved variability within movement. This does not support nor disprove the effectiveness of SpiderTech taping. It is recommended that more research is necessary to quantify the effects of SpiderTech taping.

**Introduction:**

Gluteus medius dysfunction is often found in many athletes. Athletes are often able to mask their insufficiencies with over facilitation of other muscles, leading to later biomechanical stress and failures. With such failures, both the musculature and supporting structures (i.e.- fascia, tendons, ligaments, etc.) are chronically fatigued[10]. Chronic fatigue leads to "altered movement patterns"[9]. These patterns are often the body's adaptation in order to stabilize a joint to prevent further damage[2, 3, 5]. Understandably so, such an altered movement pattern can lead to an athlete's inability to reach maximal gains in their respective sport. When such structural integrity is compromised, more damage is likely to occur and less than optimal performance will occur due to asymmetrical individuals[8].

Three possibilities can occur when muscle failure occurs—successful compensation of another muscle or group of muscles, long-term adaptation, or injury and insult to one or more of any components in the dysfunctional group[3, 9]. With such chronic stress placed on particular "tonic" and, specific to this study, "phasic" muscles, an athlete may miss out on maximal gains. Janda identified these two types of muscles based on their phylogenetic development. The phasic muscle group of the gluteus medius, as determined by Janda, is prone to inhibition or weakness due to a possible disruption of the central nervous system or muscle imbalances created by human movement patterns[3]. It is primarily known for being the main stabilizer of the pelvis[7, 10]. Thus, its function is critical in maintaining ideal posture and gait.

In any athlete, every aspect of performance is crucial; performance is dependent on the functionality of the athlete. It is the goal of any rehabilitation expert to re-establish symmetry, function, and performance in the dysfunctional athlete[1, 10]. Electrotherapy is one way that has been shown to be effective in treatment of weakened or de-conditioned musculature by stimulating muscle fibers to contract involuntary, thus maintaining tone of the stimulated muscle[5]. In the past fifteen years, a new technique has been implemented in assisting in the rehabilitative efforts of dysfunctional movement patterns in athletes called kinesio taping.

SpiderTech® claims that by altering sensory neurons under the taped area both local and global effects can occur. "*The plastic nature of our nervous systems is one whereby increased input, be it frequency, duration, or strength of activation, as an external stimulus or a motor program leads to either a stronger or weaker response to that input"*[4]. This concept of having a proprioceptive influence on the rehabilitation of "de-activated" or dysfunctional muscles is seen in various rehabilitative methods. SpiderTech® has showed to help with functional testing improvement through what the authors believed as possible proprioceptive mechanisms[1].

We will investigate the affects of SpiderTech® application to the fascia overlying gluteal muscles become "facilitated" or more ready to perform its action due to the increased proprioceptive stimuli. This will be investigated by using quantitative measurements using OptoGait®. The symmetry of gait before and after SpiderTech® application will be analyzed. OptoGait® is a machine that measures variability in gait. It is the purpose of this study to investigate possible changes in flight times and contact times before and after SpiderTech® application.

**Materials and Methods:**

Ten random young men aging from 22-26 were evaluated for gluteus medius dysfunction using six-inch step down testing, manual muscle testing of the gluteus medius, and Trendelenburg test. If the subjects were found to have any positive tests, the individuals were measured for "contact times" and "flight times" using the OptoGait® analysis program prior to and after SpiderTech® application to the gluteal region using SpiderTech® taping application guidelines. Readings were taken for three consecutive days and the results were then interpreted.

Subjects' height and weight were measured to make sure all BMI's were between 18.5-2-24.9, rates considered normal according to the Center for Disease Control and Prevention's website, http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html. The subjects' percentage of body fat was measured to make sure all subjects are less than 20% in order to target a population that would represent fit, young males.

Subjects that were found to have a positive test would first march in place for 15 seconds and evaluated using the OptoGait®. They would then get a SpiderTech® application applied to the weak gluteus medius side. The subjects would then march for another 15 seconds on the OptoGait®. The subjects would come in the following two days to march and get evaluated while leaving the SpiderTech® application on the entire time. Ten subjects met all the requirements for this study and were evaluated. Informed consent was obtained on all participants.

Data was collected on all ten individuals using the OptoGait® software to analyze the coefficient of variability (CV) of the left foot and right foot during contact times and flight times. This system measures the length of time one foot is on the ground, or contact time, while the other is in the air, or flight time. Once information for all three trials per ten subjects, the data was compiled and evaluated. See Table 1.

Table 1.

| Subject | Name | Contact Time[s] | Flight Time[s] |
|---|---|---|---|
| 1 | PreTaping | 54.1 | 5.9 |
| | PostTaping Day 1 | 2.9 | 4.8 |
| | PostTaping Day 2 | 3.5 | 9.5 |
| | Post Taping Day3 | 3.4 | 7.5 |
| 2 | PreTaping | 4.9 | 19.7 |
| | PostTaping Day 1 | 4.4 | 15.6 |
| | PostTaping Day 2 | 6.7 | 15.6 |
| | Post Taping Day3 | 5.2 | 15.5 |
| 3 | PreTaping | 4.1 | 6.8 |
| | PostTaping Day 1 | 5.3 | 9.3 |
| | PostTaping Day 2 | 5.2 | 12.7 |
| | Post Taping Day3 | 5.4 | 13.2 |
| 4 | PreTaping | 5.3 | 15.6 |
| | PostTaping Day 1 | 4.9 | 13.6 |
| | PostTaping Day 2 | 5.4 | 15.5 |
| | Post Taping Day3 | 3.8 | 12.1 |
| 5 | PreTaping | 13.5 | 16.7 |
| | PostTaping Day 1 | 5 | 11.6 |
| | PostTaping Day 2 | 4.9 | 19 |
| | Post Taping Day3 | 3.6 | 7.8 |
| 6 | PreTaping | 3.8 | 14 |
| | PostTaping Day 1 | 5.6 | 12.6 |
| | PostTaping Day 2 | 36.6 | 15.6 |
| | Post Taping Day3 | 7.8 | 17.4 |
| 7 | PreTaping | 14.9 | 4.4 |
| | PostTaping Day 1 | 2.8 | 7 |
| | PostTaping Day 2 | 2.8 | 5.3 |
| | Post Taping Day3 | 3.7 | 4 |
| 8 | PreTaping | 5.5 | 8.8 |
| | PostTaping Day 1 | 7 | 7.5 |
| | PostTaping Day 2 | 2.9 | 9.3 |
| | Post Taping Day3 | 2.9 | 6.7 |
| 9 | PreTaping | 2.7 | 7.2 |
| | PostTaping Day 1 | 3.3 | 9.8 |
| | PostTaping Day 2 | 5.9 | 9.6 |
| | Post Taping Day3 | No data collected | No data collected |
| 10 | PreTaping | 3.8 | 7.5 |
| | PostTaping Day 1 | 4.5 | 5.5 |
| | PostTaping Day 2 | 3 | 7 |
| | Post Taping Day3 | 2.9 | 9.3 |

**Results:**

No correlation between the use of SpiderTech and improved variability of movement was observed. This study failed to conclude any significant results due to several reasons. The numbers that resulted from the study gave no indication of any significant improvement. 3 of the 10 subjects showed improved data sets after the taping application was applied; however, 2 subjects had no significant change, and 3 different subjects had increased variability of movement (CV) post Spider-Tech taping.

**Discussion:**

Given the uncertain outcome of the data, the following may be reasons as to the seemingly random outcomes:

1. The study may also be limited to the consistency of the way subjects are marching, so more specific marching instructions would be recommended
2. Have the same person applying the SpiderTech taping to all the patients to increase consistency of the study
3. There may be an adaptation period to the taping so waiting longer to retest the subjects after the tapping application would be recommended.

The data collection proved challenging as the software utilized in OptoGait® is not yet perfected. Further, the OptoGait® is a new tool in measuring symmetry and gait analysis which still needs to be proven effective in its accuracy in measuring the claims that the tool makes. Unfortunately, the data collected proved inaccurate and of no diagnostic value.

The data collected in this study was unable to be compared to any normal values deeming the statistics gathered in this study useless until further research validating true, statistically accurate numbers of normative data for "contact time" and "flight time" are gathered. Further, there were several instances in the data collection where the numbers gathered during the study were not useful for data analysis as the OptoGait® collected the right foot starting first versus the instructed left.

No data analysis tool could be utilized to evaluate this data as the poor quality of starting foot capture would cause the data to be inaccurate. .

**Conclusion:**

Clinically, SpiderTech® application has been shown to assist with faulty movement patterns and pain[1]. This study was unable to support those clinical findings at this time. In future studies we would recommend having a larger study group from which to collect data. It is recommended that further research be performed to better quantify the effects of SpiderTech application. The authors feel that quantitative measurements to support SpiderTech® application will further validate its use in the clinical settings for a broad range of conditions that it claims to help.

Also, more research should be invested in OptoGait® as it is still relatively new technology yet appears to have scientific value to support clinical claims of SpiderTech® application.

**References:**


1) Bicici et al. Effect of Athletic Taping and Kinesiotaping® on Measurements of Funcional Performance in Basketball Players with Chronic Inversion Ankle Sprains. Int J Sports Phys Ther. 2012 April; 7(2): 154–166.
2) Donatelli R et al. Sport-specific Biomechanics of Spinal Injuries in the Athlete. Clin. Sports Med. 2012 Jul;31(3): 381-96.
3) Fedoryk, Donald J. "Hip Extension and Abduction Dysfunction." http://www.ccptr.org/articles/hip-extension-and-abduction-dysfunction/. Feb. 12, 2012.
4) Foundations for Therapeutic Effectiveness of SpiderTech® Kinesiology Taping. http://www.spidertech.com/kinesiology-taping-education/
5) Hansen, Derek. Electronic Muscle Stimulation for Strength, Athletic Performance and Recovery. Jan. 3, 2009. http://www.runningmechanics.com/electronic-muscle-stimulation-for-strength-athletic-performance-and-recovery/
6) Illustrated Orthopedic Physical Assessment. Third Edition. Copyright © 2009, 2001 by Mosby, Inc., an affiliate of Elsevier Inc.
7) Kendall FP, McCreary EK. Muscle Testing and Function. Baltimore, Lippincott n Williams & Wilkins, 2004.
8) O'Sullivan PE, Twomey L, Allison G, et al. Altered patterns of abdominal muscle activation in patients with chronic low back pain. Aust J Physiother 43:91-98, 1997.
9) Panjabi MM. 1992. The stabilizing system of the spine. Part I. Function, dysfunction, adaptation, and enhancement. J Spinal Disord. 5(4):383-9.
10) Williams GN, Barrance PJ, Snyder-Mackler L, Buchanan TS: Specificity of muscle action after anterior cruciate ligament injury, J Orthop Res 21 (6):1131-1137, 2003.