

Taping for Neurological Issues for Individuals with MS

Current Topics and
Trends in MS Rehabilitation

CMSC, 2015

Dr. Emil Euaparadorn
Dr. Robert Schreyer
Professor Marissa Barrera

Learning Objectives

1. Participants will **identify the primary dysfunctions** associated with MS.
2. Participants will decipher between the application of **rigid tape versus kinesio tape**.
3. Participants will be able to **summarize the current evidence** available illustrating the use of kinesio.
4. Participants will demonstrate the **application of kinesio taping** for treatment of 5 common dysfunctions associated with MS.

An Introduction to MS

- Multiple Sclerosis (MS) is one of the most common chronic neurological diseases, yet its cause is unknown and its course unpredictable.
- MS is a progressive disorder of the central nervous system which results in demyelination of nerve fibers and axonal injury (Bjartmar & Trapp, 2001).
- It affects the white matter of the central nervous system and is characterized by progressive neurological deficits with a remitting/relapsing disease course (Sliwa & Cohen, 1998).
- The development of scattered lesions and/or plaques within the brain produces varying combinations of motor, sensory, and cognitive-communication impairment.

Common Deficits associated with MS

- Weakness
- Fatigue
- Spasticity
- Swallowing disorders
- Balance disorders
- Respiratory Deconditioning

Can kinesiotape help?

Learning Objectives

1. Participants will **identify the primary dysfunctions** associated with MS.
2. Participants will decipher between the application of **rigid tape versus kinesio tape**.
3. Participants will be able to **summarize the current evidence** available illustrating the use of kinesio.
4. Participants will demonstrate the **application of kinesio taping** for treatment of 5 common dysfunctions associated with MS.

Therapeutic taping

- Many different types of tapes
 - Rigid taping
 - Kinesio taping
- Tape is essentially trying to mimic what your hands can do

What is rigid taping?

- Heavy-duty strapping tape with aggressive adhesive
 - Adhesive Tape is rayon-backed tape with an aggressive zinc oxide adhesive
- No lengthening
- Aka McConnell tape, leukotape



What are the indications for rigid taping?

- Proprioceptive feedback
- Neural tissue unloading effect
- Bracing effect

Can Rigid Taping help the dysfunctions associated with MS?

Weakness

Fatigue

Spasticity

Balance disorders

Can Rigid Taping help the dysfunctions associated with MS?

- Weakness
- Indirectly by **inhibiting** the antagonists
- An overactive antagonists inhibits the agonist from firing
- Common example: quads over-riding the hamstrings

EXAMPLE: Quads over-riding the hamstrings

Can Rigid Taping help the dysfunctions associated with MS?

- Fatigue
 - Yes, not primary MS fatigue, but secondary fatigue due to gait compensation
- Primary fatigue is CNS dysfunction, while secondary fatigue is not
 - Distinguishing between the two?
- What drives secondary fatigue
 - Compensations
- Rigid taping can prevent compensations
 - Example: rigid tape to medial knee to prevent valgus collapse

EXAMPLE: Rigid tape to medial knee to prevent valgus collapse

Can Rigid Taping help the dysfunctions associated with MS?

- Spasticity
 - Yes, by offloading the structure
- Spasticity
 - Induced with speed
- Rigid taping can slow down the rate in which limb motion can occur
- Example
 - Inhibiting the quadriceps during heel strike

EXAMPLE:
Inhibiting the quadriceps during heel strike

Can Rigid Taping help the dysfunctions associated with MS?

- Balance disorders
- Many causes of balance dysfunction
- One common cause is poor proprioception
- Poor proprioception does not allow for muscles to react
- Rigid taping can be used to **enhance** proprioception
- Example
 - Rigid tape on the on the everters to enhance proprioception of inversion

EXAMPLE: Rigid tape on the on the everters to
enhance proprioception of inversion

Can Rigid Taping help the dysfunctions
associated with MS?

Weakness

Yes

Fatigue

Yes

Spasticity

Yes

Balance disorders

Yes

Taping Contraindications

- Do not apply tape over an open wound or already irritated skin.
- Be mindful of allergies and skin sensitivity
- Be aware of previous taping applications

Ask the following questions beforehand (1)

- Are you allergic to tape?
- Does your skin get irritated when you use an adhesive bandage?
 - Do you know if you have extra sensitive skin?
 - If yes, first try a small piece of tape as a test.

Helping Sensitive Skin(3)

- Reduce irritation by applying a thin coating of milk of magnesia over the skin.
 - All skin to dry for one minute
- Note: An important side effect to consider is that the tape does not stick as well to the skin as well due to the milk barrier.



Taping Guidelines

- Obtain verbal consent
- Wash area well to remove surface oil
- Shave area (if applicable)
- Ideally, use hypoallergenic tape first



Hypoallergenic tape(1)

- Minimize the potential risk of skin irritation related to taping.
- Generally white in color.
- Small amount of tension.
- Apply firmly to the skin.
- To maximize its effectiveness, ensure adherence of tape edges.



Rigid Tape (1)

- For optimum results, the second tape that is applied over the white tape must be a non-stretch /rigid tape
- Generally brown in color
- These tapes are not generally applied directly to the skin due to their strong adhesive properties.
- Wrinkles are okay (for unloading)



Anchors (2)

- Small anchors may be applied using small pieces of tape at the **distal** and **proximal** ends of the tape to further secure the edges of the tape.
- Use of anchors can dramatically increase the strength and durability of the tape.
- The end result should look like a capital "I".

Pre & Post Testing (2)

- Immediately following the application of the tape, ask the patient to perform the activity that consistently reproduces their symptoms (e.g. walking, stair climbing, lifting arm overhead, gripping, etc.).
 - As a general rule, the patient must report at least a **50% improvement** in symptoms post-taping to confirm effectiveness.

How long do we use the tape for?(2)

- Tape can be applied up to one week.
- The average time is 2-3 days.
- Should not come off with showering.
- Consideration:
 - The tape is likely to loosen if the patient performs vigorous activities.

Patient Instructions (3)

- If the patient feels the tape is aggravating their symptoms, it should be immediately removed
- Taping is to benefit so it should ONLY remain on if it “feels good.”
- Patients must be informed to remove the tape if they feel:
 - itchy,
 - hot, or
 - any kind of skin irritation.

Patient Instructions⁽³⁾

- Clearly explain to the patient that the tape is not a cure or a substitution for rehab and exercising.
- The tape is, however, like training wheels on a bicycle; it will be discontinued once muscular control is regained.

Maximizing the Tape Adhesiveness

(9)

- Tape can loosen with movement and functional activities.
 - Its effectiveness will be dramatically reduced.
- Adhesive skin spray such as Tuf-Skin[®] prior to the application of the tape.
 - However, this may irritate skin for certain individuals.



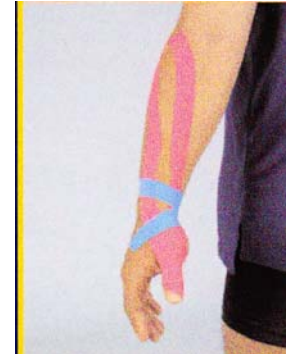
Reapplying Tape (3)

- As a general rule, it is easier on the skin to keep the tape applied for a few days rather than take it off and re-apply each day over the same skin region.
- Consistency is key!

Tape Removal (3)

- Always pull in the direction of the hair.
- As the tape is being pulled away, the other hand is to gently pull the skin away.
- This helps to minimize discomfort and hair loss.

Rigid Taping VS Kinesio Taping



Kinesio Taping

- Mimic the qualities of the skin
- Longitudinal stretch of 55-60 % of its resting length
 - Normally 25% tension
- It is not designed to stretch horizontally
- Tape is effective for 3-5 days before the elastic polymer diminishes



Properties of Kinesio Tape (12)

- Same thickness of the epidermis of the skin.
 - Limit perception
 - After approximately 10 minutes, the patient will generally not perceive there is tape on their skin.
- There is **NO** latex in the tape.
- Tape becomes more adherent the longer a patient wears it.

Properties of Kinesio Tape (12)

- Once the basic application is complete, it is important to instruct the patient about a few topics.
 - The tape needs approximately 20 minutes to gain full adhesive strength.
- Upon removal, there will be no glue residue
 - Less irritation → better for sensitive skin
 - No white tape underneath
 - Multiple taping
- This normally allows for multiple taping technique applications without skin irritation.

Kinesio Tape Indications

- Mechanical correction – bracing
- Tone Reducing
- Activating muscle

Can KinesioTaping help the dysfunctions associated with MS?

Weakness

Fatigue

Spasticity

Swallowing disorders

Balance disorders

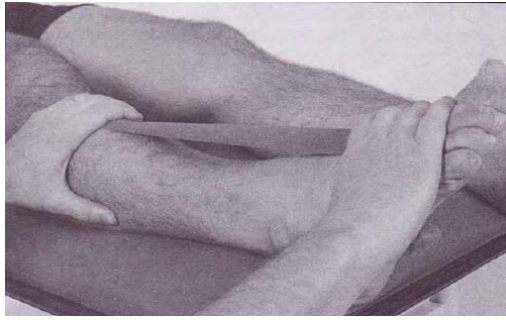
Can Kinesio Taping help the dysfunctions associated with MS?

- Weakness
 - Aide in activation of muscles
- Fatigue
 - Not primary but secondary due to compensations
- Spasticity
 - Yes by tone management
- Swallowing disorders
 - Yes assists in the activation of muscles
- Balance disorders
 - Yes by enhancing proprioception

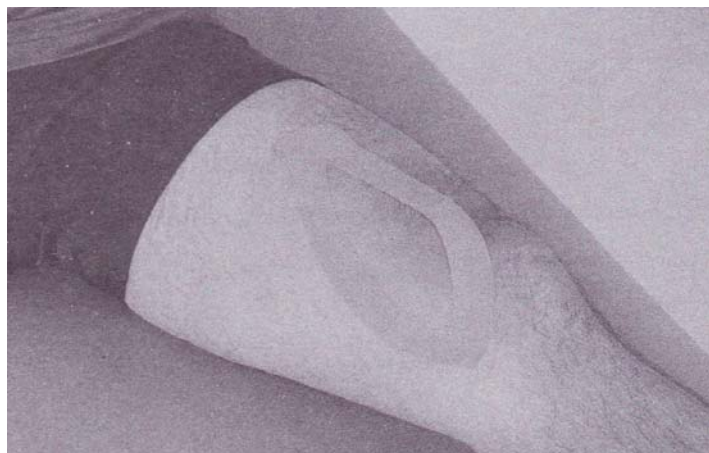
Can Kinesio Taping help the dysfunctions associated with MS?

- Weakness
 - Aide in activation of muscles

Assist in df



Stimulate VMO



Can Kinesio Taping help the dysfunctions associated with MS?

- Fatigue
 - Not primary but secondary due to compensations

Aide in valgus thrust



Can Kinesio Taping help the dysfunctions associated with MS?

- Spasticity
 - Yes by tone management



Inhibiting planter flexors

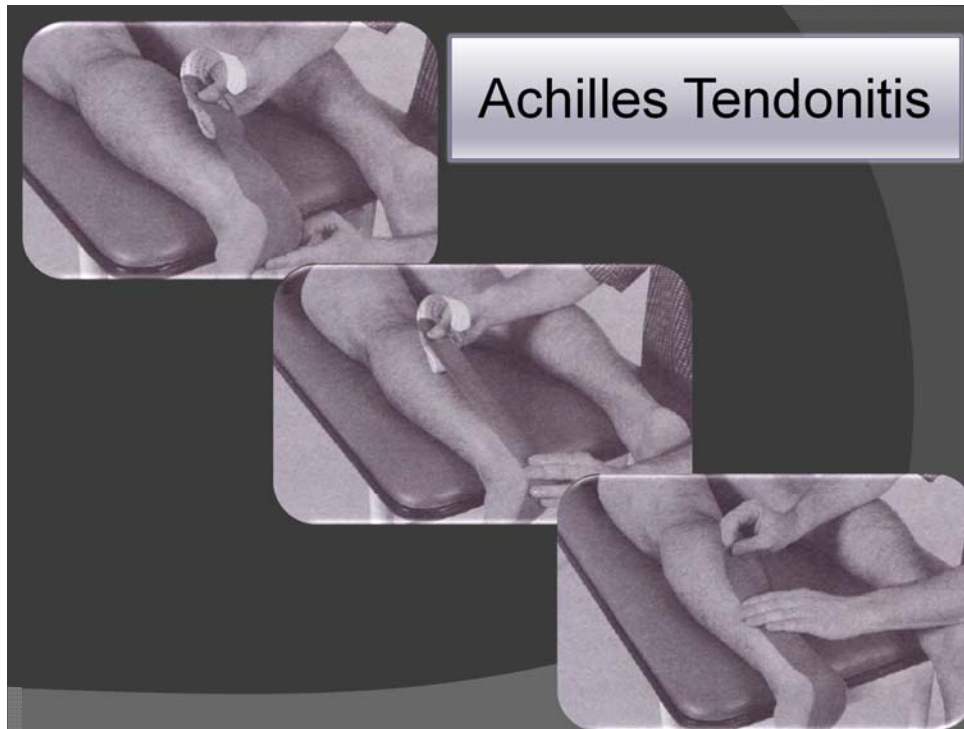


Can Kinesio Taping help the dysfunctions associated with MS?

- Swallowing disorders
 - Yes assists in the activation of muscles
- Balance disorders
 - Yes by enhancing proprioception

Can Kinseio Taping help the dysfunctions associated with MS?

- Balance disorders
 - Yes by enhancing proprioception



Achilles Tendonitis

Selection of Kinesio Strip Type (13)

- A Kinesio strip can be applied in the shape of a
- "Y", "I", "X", "Fan", "Web", and "Donut".
- The shape selected depends upon the size of the affected muscle and desired treatment effect.



Neck Pain



Low Back Pain



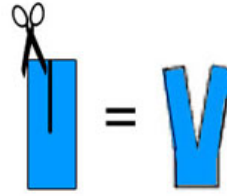
Shoulder Pain



Foot Pain

"Y" Technique (13)

- Most common
- It is used for **surrounding** a muscle to either facilitate or inhibit muscle stimuli.
- Tape weakened muscles is to wrap the tape around the affected muscle.
- This is accomplished by using the "Y" strip.
- The "Y" strip should be approximately two inches longer than the muscle, measured from **origin** to **insertion**.

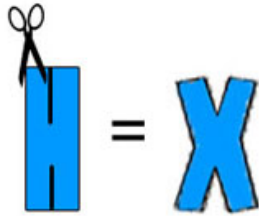


"I" Strip

- The "I" strip can be used in place of the "Y" strip for an acutely injured muscle.
- Placed **directly** on injured area
- The primary purpose of tape application following acute injury is to limit edema and pain.

"X" Strip

- Used when a muscle's origin and insertion may **change** depending upon the movement pattern of the joint (e.g.:Rhomboid)
- 2 joint muscle



"Fan" Strip

- The "Fan" strip is used for lymphatic drainage
- none to very light stretch



"Donut" Cut (13)

- The "Donut" cut is primarily used for edema in a focal or sport-specific area.
- A series of two or three overlapping strips are applied with the center removed from the Kinesio tape.
- The center cut out, of "donut hole" is placed directly over the area to be treated.



Basic Application (14)

- Place the base in as close to an anatomical position as possible.
- Make sure to **firmly rub** the base prior to any further movement.
- The base of the Kinesio strip is always started and ended with **no tension** in order to minimize discomfort from tape application.

Tape Stretch/Tension (14)

- Tensions are also listed descriptively by terms which should convey the amount of tension desired.
- Descriptions used are:
 - full- (100%)
 - severe - (75%)
 - moderate - (50%)
 - light or paper off - (15-25%)
 - very light - (0-15%)
 - none - (no tension)

Tension

- Tape is inherently 20% w/o pull
- 15-20%= Acute stage
- 25-50%
 - Muscle activation
 - Fascia holding
- 50-75%
 - Mechanical correction
 - Ligament/Tendon Correction



Tape Direction (14)

INSERTION to ORIGIN

- Inhibit muscle function
- For acutely over-used or stretched muscles

ORIGIN to INSERTION

- Facilitate muscle function
- For chronically weak muscles or where contraction is desired

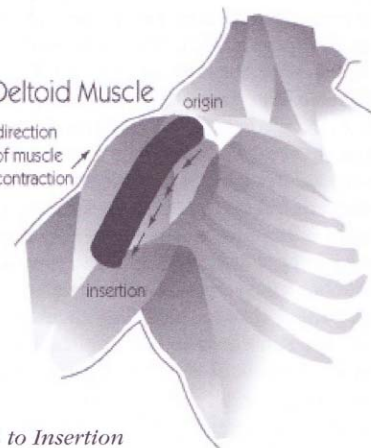
Insertion to Origin



Deltoid Muscle

direction of muscle contraction

Origin to Insertion



Tape Direction & Tension ⁽¹⁴⁾

INSERTION to ORIGIN

- "less is better"
- 15-20%
- Applying too much tension decreases desired results instead of enhancing them

ORIGIN to INSERTION

- light to moderate, 25-50%
- See slight separation of the elastic fibers in the Kinesio Tape

Learning Objectives


1. Participants will **identify the primary dysfunctions** associated with MS.
2. Participants will decipher between the application of **rigid tape versus kinesio tape**.
- ➔ 3. Participants will be able to **summarize the current evidence** available illustrating the use of kinesio.
4. Participants will demonstrate the **application of kinesio taping** for treatment of 5 common dysfunctions associated with MS.

The effect of kinesio taping on lower trunk range of motions.

- Determine the effects of KT on trunk flexion, extension, and lateral flexion.
- 2 groups
 - Performed ROM without KT
 - Performed ROM with KT
- Results
 - 17.8 cm increase in KT in trunk flexion in KT group
 - 3 cm lateral flexion in KT group

Yoshida, AyakoKahanov, Leamor

Learning Objectives

1. Participants will **identify the primary dysfunctions** associated with MS.
2. Participants will decipher between the application of **rigid tape versus kinesio tape**.
3. Participants will be able to identify **three common techniques** for the application of kinesio for individuals with MS.
-  4. Participants will be able to **summarize the current evidence** available illustrating the use of kinesio.
5. Participants will demonstrate the **application of kinesio taping** for treatment of 5 common dysfunctions associated with MS.

Literature review on kinesiотaping

- Increase trend over the last few years
- Orthopedic management oriented

The effect of kinesiо taping on lower trunk range of motions.

- Determine the effects of KT on trunk flexion, extension, and lateral flexion.
- 2 groups
 - Performed ROM without KT
 - Performed ROM with KT
- Results
 - 17.8 cm increase in KT in trunk flexion in KT group
 - 3 cm lateral flexion in KT group

THE EFFECTS OF KINESIO™ TAPING ON PROPRIOCEPTION AT THE ANKLE

- An experiment was designed to determine if Kinesio™ taping the anterior and lateral portion of the ankle would enhance ankle proprioception compared to the untaped ankle. 30 subjects, 15 men, 15 women, ages 18-30 participated in this study. Exclusion criteria: Ankle injury < 6 months prior to testing, significant ligament laxity as determined through clinical evaluation by an ATC, or any severe foot abnormality. Experiment utilized a single group, pretest and posttest. Plantar flexion and inversion with 20° of plantar flexion reproduction of joint position sense (RJPS) was determined using an ankle RJPS apparatus. Subjects were barefooted, blindfolded, and equipped with headphones playing white noise to eliminate auditory cues. Subjects had five trials in both plantar flexion and inversion with 20° of plantar flexion before and after application of the Kinesio™ tape to the anterior/lateral portion of the ankle. Constant error and absolute error were determined from the difference between the target angle and the trial angle produced by the subject. The treatment group (Kinesio™ taped subjects) showed no change in constant and absolute error for ankle RJPS in plantar flexion and 20° of plantar flexion with inversion when compared to the untaped results using the same motions. The application of Kinesio™ tape does not appear to enhance proprioception (in terms of RJPS) in healthy individuals as determined by our measures of RJPS at the ankle in the motions of plantar flexion and 20° of plantar flexion with inversion.

Halseth et al

Pilot study: Investigating the effects of Kinesio Taping in an acute pediatric rehabilitation setting.

- Use of KT in UE function
- N=15
- The Melbourne Assessment of Unilateral Upper Limb Function (Melbourne Assessment) was used to measure upper-limb functional change
- Used prior to use of KT immediately afterwards and after 3 days of use
- Improvement in scores
- on motor skills and functional performance once the tape is removed.

Yasukawa et al

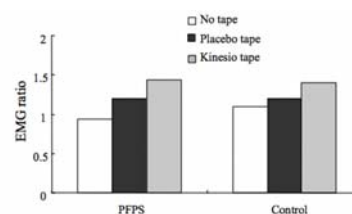
Kinesio Taping applied to lumbar muscles influences clinical and electromyographic characteristics in chronic low back pain patients

- Kinesio Taping (KT) has proved to be effective in various musculoskeletal conditions. Although its precise working mechanism has yet to be fully understood, it is believed to interact with neuromuscular function through mechanoreceptor activation. No studies designed to assess the effects of KT in chronic low back pain (CLBP) patients have yet been conducted.

Paoloni

Effects of kinesio taping on the timing and ratio of vastus medialis obliquus and vastus lateralis muscle for person with patellofemoral pain

- N = 10
- Measured VMO activity with KT vs white athletic tape
- VMO onset quicker with KT
- White athletic tape not significant



Chen et al

Effects of kinesio tape compared with nonelastic sports tape and the untaped ankle during a sudden inversion perturbation in male athletes.

- Examined muscle activity peroneal longus with a sudden inversion perturbation during star test
- 3 groups
 - Sports tape
 - KT
 - No Tape
- Increased EMG activity with sports tape not KT

Briem et al

Effect of kinesio taping on standing balance in subjects with multiple sclerosis: A pilot study

- N = 15 subjects with MS
- KT applied to calves and platform measured motion during Berg test and time walking test
- No differences were found in Medial lateral plane, but were found in the AP plane

Cortes et al

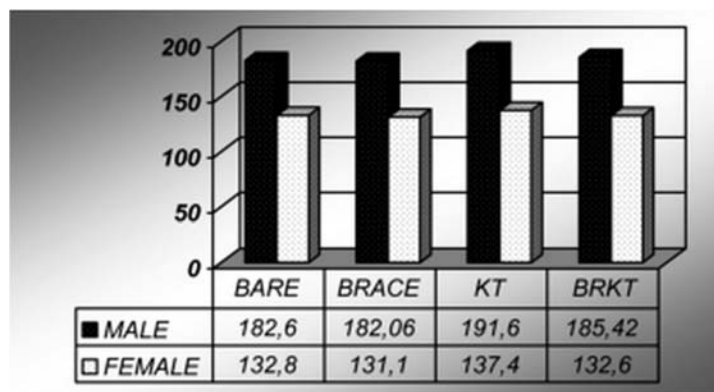
Does kinesiotaping increase knee muscles strength and functional performance

- Muscular strength and jump performance were assessed
- Looked at knee bracing and kinesiotaping
- KT showed increased strength and hopping performance



Aktas

Results of the Hop Test



Learning Objectives

1. Participants will **identify the primary dysfunctions** associated with MS.
2. Participants will decipher between the application of **rigid tape versus kinesio tape**.
3. Participants will be able to identify **three common techniques** for the application of kinesio for individuals with MS.
4. Participants will be able to **summarize the current evidence** available illustrating the use of kinesio.
- ➔ 5. Participants will demonstrate the **application of kinesio taping** for treatment of 5 common dysfunctions associated with MS.

Drop Foot

- Many etiologies
- Taping not appropriate for all cases
- Must have
 - Functional DF ROM
 - 2+/5
- Origin to Insertion over tib anterior

Image of Drop Foot taping

Decreased knee flexion during swing phase

- Can appear to be a foot drag, when it is actually lack of knee flexion
- Due to:
 - Weak hamstrings
 - Origin to insertion taping
 - Overactive Quads
 - Insertion to origin taping

Image of knee flexion taping

SLP Technique – Lip Closure (Obicularis Oris Taping) for Speech and Swallowing



Benefit of Application

- Improved pursing of lips
- Improved mandible and oral cavity closure
- Improved sensation and sensory awareness.
 - Thus better swallows, less oral spillage, improved intraoral air pressure, increased sensory awareness

SLP Technique – Diaphragm



Benefit of Application

- Support activation of the diaphragm
- Increases forced vital lung capacity needed to vocal volume and swallowing safety

Wrist Drop

- Due to weakness of the wrist extensors
- Origin to insertion

References

- Kase K, Wallis J, Kase T. Therapeutic applications of the kinesio taping method, 2nd ed.
- Jam B, Varamini A. A clinical manual on therapeutic taping for peripheral and spinal syndromes (Part I). 2004. APTEI, Ontario.