Practical Therapeutic Taping of the Upper Extremity

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OBJECTIVES

- Differentiate between the varying types of tape
- Recognize the varying clinical implications for elastic and rigid taping based on theoretical constructs
- Compare the evidence with theoretical constructs
- Gain immediate application for clinical decision making to implement taping techniques TOMORROW!

TOMORROW!
CHARACTERISTICS/TYPES OF TAPE

- ATHLETIC TAPE
- RIGID/STRAP TAPE
  - Non-stretch
- ELASTIC
  - Tape stretches in one direction

RIGID TAPE

THEORY & EVIDENCE

PROPOSED MECHANISMS OF ACTION FOR RIGID TAPE APPLICATION

- Pain Relief
- Proprioception
- Neuro-muscular (Inhibition & Facilitation)
- Tissue De-loading

Kneeshaw, 2000
5 QUICK TIPS/RIGID TAPE:

TAKE IT TO THE CLINIC TOMORROW!

1. **Pain Relief:** Joint support, re-alignment or biomechanical correction.
2. **Muscle Facilitation:** Taping along the muscle to enhance actin and myosin cross bridging. Apply with muscle in a shortened position.
3. **Muscle Inhibition:** Apply the tape adjacent to the muscle to decrease actin and myosin cross-bridging. Apply tape with the muscle in a lengthened position.
4. **Proprioception:** Cutaneous mediated feedback to enhance the protective muscle reflex arc.
5. **Tissue De-loading:** Tape is used to reduce strain on injured soft tissues.

THEORETICAL CONSTRUCTS FOR RIGID TAPE

MECHANISM FOR PAIN REDUCTION

—Mechanical Effects:
  —Joint support (Shapiro et al. 1994)
  —Joint Re-Alignment (Gerrard 1998; Jeit et al. 1996)
  —Biomechanical Correction (Sjavorp 1995))

NEUROMUSCULAR EFFECTS

—Muscle Facilitation
  • Theory: Muscle held in a shortened position will have optimal actin-myosin overlap during the cross bridge cycle

Diagram from: Morrissey 2000
THEORETICAL CONSTRUCTS FOR RIGID TAPE

• NEUROMUSCULAR EFFECTS
  – Muscle Inhibition
    • Theory: Hold muscle in lengthened position resulting in decreased actin-myosin overlap

THEORETICAL CONSTRUCTS FOR RIGID TAPE

#3 MECHANISMS FOR PROPRIOCEPTION ENHANCEMENT

– Enhances muscle control over targeted joint

Cutaneous Mediated Proprioceptive Feedback

De Quervains Taping
THEORETICAL CONSTRUCTS FOR RIGID TAPE

• **MECHANISM FOR TISSUE DELOADING**
  — Surrounding or gathering the tissue around the painful area to deload the tissue

  Vinzenz 2003)

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THEORETICAL CONSTRUCTS FOR RIGID TAPE

• **PSYCHOLOGICAL EFFECTS**
  — Feelings of increased confidence, strength and decreased anxiety

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APPLICATION PRINCIPLES

• Prepare skin (clean & dry)
• Recommend spraying skin with alcohol
• Place the joint in the desired position
• Apply the skin protective piece of mesh tape (hypoallergenic)
• Apply the rigid tape with minimal tension
• Apply a second piece if needed for desired movement pattern
• Tape precautions. Recommend a test patch before application. (swelling, redness, itchiness)
• Removal of tape (don’t pull off). Use oils with gradual removal.
• Tape application can be worn up to 48 hours in some individuals

Photo retrieved on 8/10/14 from: http://www.medwest.ca/media/Cover-Roll-Stretch-Tape-400x353.jpg
WHAT IS THE EVIDENCE?
RIGID NON-ELASTIC TAPE THEORY

Reduce Pain
Shapiro et al 1994

Inhibition
Morrissey 2000

Facilitation
Morrissey 2000

Proprioception
Heit et al 1996
Loher et al 1999

Tissue
Deloading
McCann

SHOW ME THE EVIDENCE
Structured Effectiveness for Quality Evaluation Scores (SEQES) (MacDermid 2004)

SHOW ME THE EVIDENCE
Structured Effectiveness for Quality Evaluation Scores (SEQES) (MacDermid 2004)

Clincial Research
Articles

UE Taping
Rigid
Elastic

Exclusion
Pediatrics
No Comparison

Inclusion
UE Application,
Adults & Comparison

High Quality
Score >32

Mod. Quality
Score 17 to 32

Low Quality
Score below 17

SHOULDER STUDIES
Comparing the Evidence with Theoretical Constructs
SHOULDER IMPLICATION
Theory Meets Evidence

Theory
• Facilitate Lower Trapezius (LT)
• Inhibit Upper Trapezius (UT)

Evidence
• Smith et al 2009 (High Evidence/SEQES 33) Inhibit UT/No Facilitation LT
• Selkowitz et al 2007 (Moderate Evidence/SEQES 26) ↑ LT activity and ↓ UT activity with function immediately after application

Healthy Shoulders (UT/LT Effects)
Theory Meets Evidence

Healthy Subjects UT/LT Effects
• Cools et al 2002 (Moderate Evidence/SEQES 24)
  • No inhibition UT or facilitation of LT

Myofascial Shoulder Pain
Theory Meets Evidence

Myofascial Pain
• Lee et al 2012 (Moderate Evidence/SEQES 24)
  • Taping & Stabilization Exercises vs. Exercises only
    • Taping & Stabilization Exercises resulted in decreased pain and improved function (CMS) versus exercise only at 4 wks

LT / UT Video
SHOULDER IMPINGEMENT
Theory Meets Evidence

Theory
• Pain Relief (1st piece)
  – Taping for UT inhibition
  – Taping for LT facilitation

• Pain Relief (2nd piece)
  – Tape at anterior humeral head to provide proprioceptive feedback to avoid anterior translation

Evidence
• Miller et al 2009 (High Evidence/SEQES 38)
  – At two weeks a trend towards pain relief during self-reported activity and pain reduction with abduction.
  – Low powered study

SHOULDER IMPINGEMENT
Theory Meets Evidence

Theory
• Biomechanical Change

Pain Relief and improved ROM when applying tape to the humeral head after Mulligan technique

Evidence
• Teys, Bisset, Coolins, Coombes & Vicenzino, 2013 (SEQES 34)
  • Improved ROM and decreased pain at one week in group with tape combined with Mulligan technique versus Mulligan technique only

SHOULDER IMPINGEMENT
Theory Meets Evidence
(Posture Taping 2)

Theory
• Proprioceptive Feedback for improved posture

• Decrease thoracic flexion provided cutaneous mediated proprioceptive feedback for improved movement patterns

Evidence
• Lewis et al 2005 (SEQES 43)
  • Improved posture & immediate AROM
SCAPULAR KINEMATIC IN HEALTHY SUBJECTS

Theory Meets Evidence

Theory
• Biomechanical constraint
  – Pull of tape decreases scapular internal rotation and anterior tilt resulting in increased scapular upward rotation.

Evidence
Shaheen et al 2012 (SEQES 37)
• Improved scapular posterior tilt, upward rotation and external rotation


Posture Taping (Lewis et al) – video

Taping Effects on Posture in Women with Osteoporosis
(posture taping 3)

Women with Osteoporotic Vertebral Fractures
• Greig et al 2007 (Moderate Evidence/SEQES 32)
  • Improved thoracic extension, no effect on electromyographic (EMG) activity of recorded trunk muscles
**AT RISK HEMIPLEGIA SHOULDER**

**Rigid Tape**

**Theory**
- Pain Relief
  - Joint support
  - Biomechanical re-alignment
  - Proprioception

**Evidence**
- Pandian et al 2013 (SEQES 41)
  No difference for pain and function at 2 weeks. ↓ pain and ↑ function at 30 days

Griffin & Bernhardt 2006 (SEQES 42)
More pain free days with (mean 26 days) tape vs placebo tape in at risks patients

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**Hemiplegia Rigid Tape**

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**ELBOW STUDIES**

*Comparing the Evidence with Theoretical Constructs*
### Lateral Epicondylosis

#### Theory Meets Evidence

**Theory**

- Soft tissue deloading
  - Tape takes tension off of the injured soft tissue structures for pain reduction

**Evidence**

- Smith et al 2009 (High Evidence/SEQES 33)
  - Inhibit UT/No Facilitation LT
- Vincenzion et al 2003 (Moderate Evidence/SEQES 31)
  - Increased pain free grip but, no change with pain threshold
- Shamsoddin et al 2010 (Low Evidence/SEQES 15)

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#### Elastic Tape Outcomes for Lateral Epicondylosis (LE)

**Outcomes:**

**Theory**

- Unloads tendon.

**Evidence**

- Shamsoddini & Hollisaz, 2013, SEQES: 22

Group A: Extremity with LE
Group B: Extremity without LE served as control

**Results:** Effect on improved grip strength, wrist extensor force and pain with tape versus no tape comparing to uninvolved side when taping applied

- Zaky, 2013, SEQES: 21

Group A: Subjects with LE pain applied diamond taping and received ultrasound treatment
Group B: Subjects with LE pain treated with ultrasound

**Results:** Improved wrist extensor strength and decrease pain intensity

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#### Rigid Tape Outcomes for Lateral Epicondylosis (LE)

**Outcomes:** joint position sense (JPS) & force reproduction (FR)

**Theory**

- Enhances muscle control over targeted joint to improve proprioception

**Evidence**


Group A: Subjects working in automobile parts manufacturing company with lateral epicondylosis
Group B: Subjects working in automobile parts manufacturing with no lateral epicondylosis
Both groups measured for JPS and FR with and without tape conditions

**Results:** Subjects with LE had more errors with JPS and FR. LE subjects improved FR and JPS with tape applied.
Lateral Epicondylosis
Theory Meets Evidence

Theory
- Soft tissue unloading
  - Tape takes tension off of the injured soft tissue structures for pain reduction

Evidence
- Amro et al 2010 (Moderate Evidence/SEQES 32)
  - Compared Mulligan technique and taping combined with standard treatment to a standard treatment group
  - Both groups improved VAS, grip strength and Patient Rated Elbow Evaluation (PREE)
  - Significant improvement with VAS and PREE in tape/Mulligan technique group

ELASTIC TAPE
THEORY & EVIDENCE
ELASTIC TAPE

Kneeshaw, 2000

PROPOSED MECHANISMS OF ACTION FOR ELASTIC TAPE APPLICATION

Pain Relief

Range of Motion

Proprioception

Strength

Muscle Inhibition & Facilitation
Elastic Tape
THEORETICAL CONSTRUCT

Pain Relief
— Sensory pathways stimulated to increase afferent feedback.
 Diminish input from nerve fibers conduction nociceptive pain (Kneeshaw 2002)

Elastic Tape
THEORETICAL CONSTRUCT

Pain Relief
— Tape lifts skin to directly reduce pressure on subcutaneous nociceptors (Kahanov 2007)

Elastic Tape
THEORETICAL CONSTRUCT

Range of Motion
1. Physiological benefit of increased blood circulation that may facilitate ROM (Yoshida & Kahanov, 2007)
2. Sensory feedback reduces fear of movement (Gonzalez-Inglesia et al 2009)
Elastic Tape
THEORETICAL CONSTRUCT

**Strength**
1. Concentric pull on the fascia stimulating increase muscle contraction (Hsu et al. 2009)
2. Facilitate muscle activity and improved muscle alignment (Hsu et al. 2009)

**Proprioception**
- Cutaneous receptors stimulated from pressure and stretching of tape
- Results in improving proprioception providing information of joint position and movement

**Muscle Activity**
1. Supports muscle for efficient activity when muscle inhibited
2. Facilitatory effect to enhance muscle function
**TAPE APPLICATION**

- Apply to clean, dry skin. Remove oils from skin
- Can use skin adhesives for improved contact
- Typically tape is applied to stretched skin
- Tape is stretched (~10 to 15%) when applying to non-stretched skin
- Avoid excessive stretch to tape when applying to the skin
- Excessive stretch can result in skin reactions
- Tape applied to the dorsum of the hand is recommended to determine how patient’s skin will react to tape
- Monitor for skin reactions
- Additional stretch required when applying for mechanical correction. AVOID 100% STRETCH
- Tape likely to adhere better to skin where hair has been clipped or shaven

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**PRECAUTIONS/CONTRAINDICATIONS**

Avoid applying tape to persons with:

- Skin allergies or sensitivity to tape
- Open wounds
- Skin infections/conditions
- Fresh scars
- Fragile and sensitive skin
- Circulatory conditions (bleeding or clotting disorders)
- Sensory loss in taped region or distal to tape
- Pregnancy avoid selective acupuncture points
- Lymphedema requires knowledge of pathways
PRECAUTIONS/CONTRAINDICATIONS
Avoid applying tape to persons with:

- Peripheral vascular disease
- Peripheral neuropathies
- Diabetes
- Prolonged use of steroids or anticoagulant medications
- Cognitive loss (patient is unable to report any negative effects of tape)
- If questionable, apply a test patch for one day before applying taping technique

ELASTIC TAPE

I CUT
Y CUT
FAN CUT
X CUT

5 QUICK TIPS
TAKE IT TO THE CLINIC TOMORROW!

1. Mechanical Correction: Tape supplies signals to cutaneous nerves, mechanoreceptors or muscle spindles to promote or avoid movement patterns.

2. Spacing Correction: Tape lifts skin taking pressure off of noceiceptive endings and/or promoting blood flow to area

3. Muscle Inhibition/Facilitation: Tape pulls skin towards inserion (facilitation) or tape pulls skin to insertion (inhibition)

4. Ligament Correction: Signals to mechanoreceptors to decrease motion

5. Functional Correction: Tape tensions in undesired motion or promotes desired motion due to less tension

Taping principles from: 
THEORETICAL OBJECTIVES

• **MECHANICAL CORRECTION/Skin Function**

**GOAL:**

1) Position muscle, fascia, or joint. Tape provides feedback to mechanoreceptors resulting in the body adjusting to minimize tension.

2) Elasticity in tape assists the body to adjust to desired position.

OR

3) Block movement

— Stretch qualities and pressure of the tape stimulate mechanoreceptors via cutaneous receptors that provide input from sensation.


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THEORETICAL OBJECTIVES

• **SPACING CORRECTION**

**GOAL:**

1) Lift fascia & soft tissue in painful region.

2) Create more space in the area above pain, inflammation, or edema resulting in decreased pressure in the injured area.

3) Possible increase circulation to injured area by creating more space.

4) Stimulation of mechanoreceptors possibly decreasing pain.

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Theoretical Concept

Mechanical Correction / Lateral Epicondylitis
Theoretical Concept
Spacing Correction
Example: Long Head Biceps

Start shoulder flexion 90°
Apply tape with 25-50% stretch as the patient moves into extension

Edema Tape for High Volume Insufficiency following Trauma

Fan Tape Method
– The base is affixed to promote flow towards lymph nodes
– Place patient in a stretched position
– Apply strips with paper off up to 25% tension

Retrieved from http://www.anatomyatlases.org/AnatomicVariants/Cardiovascular/Images0400/0455.gif
Theoretical Concept
Muscle Facilitation
Example: Deltoids

Tape shrinks towards origin.

THEORETICAL OBJECTIVES

• MUSCLE FACILITATION/INHIBITION

GOAL:

1) Facilitation of a muscle contraction by using tape to displace the skin in the direction of contraction/origin to insertion. Apply while muscle in shortened position.

2) Inhibit muscle contraction by using the tape to displace the skin in the direction of the insertion to origin thereby, reducing a muscle contraction. Apply with muscle in lengthened position.

Theoretical Concept
Muscle Inhibition
Example: Deltoids

Tape shrinks towards insertion.

THEORETICAL OBJECTIVES

• **LIGAMENT SUPPORTING**

**GOAL:**

1) Tape increases stimulation of joint mechanoreceptors for the brain to interpret as normal tissue

2) Tape pulls ligaments to the middle

Theoretical Concept
Ligament Support/PIP Joint Sprain
THEORETICAL OBJECTIVES

**Functional Taping**

**GOAL:**
1) Limit joint motion through sensory stimulation provided from the tape


Theoretical Concept
**Functional Taping/Limit Wrist Flexion**

Video for functional taping
THEORETICAL OBJECTIVES

Clinical Tip!
Scar Management
- Improve appearance and perceptions of scar
- Tape may have qualities similar to skin
  - Stretches 30 to 40% resting length
  - Allows for evaporation
  - Thickness similar to epidermis

5 QUICK TIPS
TAKE IT TO THE CLINIC TOMORROW!
1. Mechanical Correction: Tape supplies signals to cutaneous nerves, mechanoreceptors or muscle spindles to promote or avoid movement patterns.
2. Spacing Correction: Tape lifts skin taking pressure off of nociceptive endings and/or promoting blood flow to area
3. Muscle Inhibition/Facilitation: Tape pulls skin towards insertion (facilitation) or tape pulls skin to insertion (inhibition)
4. Ligament Correction: Signals to mechanoreceptors to decrease motion
5. Functional Correction: Tape tensions in undesired motion or promotes desired motion due to less tension

Taping principles from: Keene, A., & Keene, T. Clinical Therapeutic Applications of the KinesioTaping Method. Tokyo, Japan: Ken Ikai Co. Ltd; 2003.

sometimes you just need a new perspective on things!
SHOW ME THE EVIDENCE
Structured Effectiveness for Quality Evaluation Scores (SEQES) (MacDermid 2004)

Exclusion
Pediatrics
No Comparison

Inclusion
UE Application,
Adults & Comparison

UE Taping
Rigid
Elastic

High Quality
Score >32

Mod. Quality
Score 17 to 32

Low Quality
Score below 17

SHOULDER STUDIES
Comparing the Evidence with Theoretical Constructs

SHOULDER IMPINGEMENT/PAINFREE SHOULDER AROM
Theory Meets Evidence

THEORY
- One piece on supraspinatus for spacing correction
- 2nd piece on deltoids for inhibition
- 3rd piece on anterior humeral head for mechanical correction

EVIDENCE
- Thelan et al 2008 (SEQES 44)
  Immediate increase with pain free abduction 1 day
- Shaker et al 2013 (SEQES 36)
  Improved DASH scores at 1 week compared to placebo taping
### SHOULDER IMPINGEMENT

**Elastic Tape vs Sham Tape**

**Theory Meets Evidence**

<table>
<thead>
<tr>
<th>THEORY</th>
<th>EVIDENCE</th>
</tr>
</thead>
</table>
| 1st strip (Y) space correction at supraspinatus takes pressure off of nociceptive endings<br>2nd strip (Y) at deltoids to inhibit by application from insertion to origin with muscle lengthened<br>3rd strip (I) from coracoid process to post. deltoid (50% to 75% tension)<br>4th strip (I) from thoracic spine to medial border of the scapula (facilitate) | Shakeri et al 2013b<br>(SEQES 30 for the outcomes of pain and DASH scores)  
**Results**  
DASH scores and nocturnal pain, pain w/motion & painfree motion improved at 1 week |
### SHOULDER IMPINGEMENT/PAINFREE SHOULDER AROM TAPING COMBINED MOBILIZATION TECHNIQUE

**Theory Meets Evidence**

<table>
<thead>
<tr>
<th><strong>THEORY</strong></th>
<th><strong>EVIDENCE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>One piece on supraspinatus for spacing correction</td>
<td>Djordjevic et al 2012 (SEQES 32)</td>
</tr>
<tr>
<td>2nd piece on deltoids for inhibition</td>
<td>Results</td>
</tr>
<tr>
<td>3rd piece on anterior humeral head for mechanical correction</td>
<td>Tape/Mobilization technique improved active pain-free ROM compared to exercise group at 10 days</td>
</tr>
</tbody>
</table>

### SHOULDER IMPINGEMENT

Scapular Kinematics & L.T. Facilitation

**Theory Meets Evidence**

<table>
<thead>
<tr>
<th><strong>THEORY</strong></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Tape from origin to insertion with muscle in a shortened position</td>
<td>Hsu et al 2009 (SEQES 35)</td>
</tr>
<tr>
<td>Skin pulls towards the origin to facilitate the muscle</td>
<td>Taping condition resulted in increase posterior tilt</td>
</tr>
<tr>
<td></td>
<td>Taping ’ed LT activity lowering the arm</td>
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### SHOULDER IMPINGEMENT

Elastic Tape vs Physical Modalities

**Theory Meets Evidence**

<table>
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</thead>
<tbody>
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<td>1st strip space correction at supraspinatus takes pressure off of nociceptive endings</td>
<td>Kaya et al 2010 (SEQES 35)</td>
</tr>
<tr>
<td>2nd piece at deltoids to inhibit (insertion to origin with muscle lengthened)</td>
<td>Decreased pain at 1 week, no difference at 2 weeks</td>
</tr>
<tr>
<td>3rd piece to teres minor mechanical correction to maintain scapula stability</td>
<td>Taping group improved DASH scores at 2 weeks</td>
</tr>
</tbody>
</table>
Hemiplegic Shoulder Elastic Tape Outcomes
(pain, SPADI, pathology, subacromial space)

Theory
Facilitation technique combined with space correction

Evidence
Huang, Chang, Liou, Cheng, Lin & Huang (2017) SEQES: 39 N= 21

Group A: Elastic tape applied anterior, posterior and medial deltoids (origin to insertion)
Group B: Elastic tape sham technique

Results: Both groups demonstrated significant \((p<.05)\) improvements with pain rating and SPADI scores. No significant differences between groups. No changes with secondary outcomes.

Elastic Tape Outcomes for Hemiplegia Shoulder
(functional outcomes)

Theory
Facilitation technique

Evidence
Kim & Kim , 2015 SEQES: 29 N= 30

Group A: Elastic tape applied to subjects with hemiplegia anterior and posterior deltoids ("Y" technique) performing functional tasks
Group B: No tape subjects with hemiplegia performing functional tasks

Results: Both groups improved with functional independence movements.

SHOULDER ADHESIVE CAPSULITIS
Elastic Tape & Coraco-humeral Ligament Stretching

THEORY
- One piece on supraspinatus for spacing correction
- 2nd piece on deltoids for inhibition
- 3rd Y strip. Superior tail inferior to the clavicle. Inferior piece lower fibers of pectoralis major. Assist with external rotation by releasing tension of internal rotators.

EVIDENCE
- Pradeepshankar et al 2013 (SEQES 26)
- Taping combined with stretching resulted in improved ROM and DASH scores compared to stretch only group
**Healthy Shoulders**

**Elastic Tape vs Sham Tape**

**EVIDENCE**
- Luque-Suarez et al 2013 (SEQES 34)

- Elastic tape increased acromio-humeral distance when lifting arm between 0-60° in scapular plane
- No effect for sham tape
- Direction of application not significant

**THEORY**
- Mechanical correction to increase acromio-humeral distance
- Applied “I” strip at humeral head anterior to posterior
- Applied “I” strip at posterior to anterior humeral head

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**Healthy Shoulders (Typists) with Upper Trapezius Inhibition**

**EVIDENCE**
- Huang et al 2012 (SEQES 27)

- Decreased upper trapezius activity with tape compared to no tape

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**Increase Acromio-Humeral Space**
(video) Luque-Suarez et al

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Photo retrieved from: http://upload.wikimedia.org/wikipedia/commons/thumb/5/5d/Biceps_brachii_muscle06.png/640px-Biceps_brachii_muscle06.png
EVIDENCE
- Lin et al 2011 (SEQES 33)
  - Proprioceptive sense improved
  - Decreased activity of anterior deltoid and upper trapezius
  - Increased activity of serratus anterior
- Van Herzeele et al 2013 (SEQES 31)
  - Female elite handball players demonstrated increased scapula posterior tilt and upward rotation compared to no tape

THEORY
- Cutaneous mediated proprioception?

Elastic Tape Outcomes for Healthy Shoulders
(internal rotation & external rotation ROM; external rotation strength)

Theory
Facilitation technique

Evidence
Alam, Malhotra, Munjal & Chachra (2015) SEQUES: 34

Group A: Elastic tape for facilitation (origin to insertion 50% stretch)
Group B: Placebo tape
Group C: No tape

Results:
- No significant difference between taped conditions with ER ROM. Smaller mean IR in placebo group. No difference in muscle strength between groups.
EVIDENCE
Ujino et al 2012 (SEQES 31)
• Improved total arc of rotation with tape compared to stretching group and stretching/taping group

THEORY
1. Taping applied for scapular stabilization
2. Cutaneous mediated proprioception feedback?

EDEMA & LYMPHADEMA STUDIES
Comparing the Evidence with Theoretical Constructs

EVIDENCE
• Tsa 2009 (SEQES 41)
• Both groups had water composition reduction
• Conclusion: patient may be more compliant with taping due to increased comfort

THEORY
• Edema reduction achieved by lifting the skin and increasing lymphatic flow towards drains

Breast Cancer Related Lymphedema
Elastic Tape vs Standard Pneumatic Devices

Healthy Shoulders Increase Gleno-Humeral Rotation
Edema Reduction in Acute Post Stroke
1. Elastic Taping and Standard Therapy
2. Stand therapy

THEORY
Edema reduction achieved by lifting the skin and increasing lymphatic flow towards drains

EVIDENCE
- Bell & Muller, 2013 (SEQES 29)
  - Decreased VAS scores in both groups, but significant difference with VAS scores in elastic tape group

Hand Edema Strokes
Video

WRIST STUDIES
Comparing the Evidence with Theoretical Constructs
DeQuervains
Compared Elastic Tape to Paraffin bath combined with ultrasound, TENS and friction massage
1. Taping 4x weekly
2. Therapy Group (10 sessions)

THEORY
- Insertion to origin at thumb muscles (inhibition technique)
- Functional correction to limit wrist motion
- Spacing techniques for pain reduction to lift the skin to promote healing

EVIDENCE
- Homayouni, Zeynali & Mianehsaz (2013)
- Decreased VAS scores in both groups, but significant difference with VAS scores in elastic tape group

DeQuervains Video

Carpal Tunnel in Pregnant Women (3rd Trimester)

THEORY
- Fascia Correction technique used to reposition fascia. Tape applied with oscillation motion in an attempt to reduce tension and adhesions between and within layers of the fascia (Kase 2003)

EVIDENCE
- El Kosery, Elshamy & Allah, 2012 SEQUEST: 26
- Improved median nerve motor latency after 4 weeks of taping

EVIDENCE
- El Kosery, Elshamy & Allah, 2012 SEQUEST: 26
- Improved median nerve motor latency after 4 weeks of taping
Elastic Tape Outcomes for Dorsal Hand Burns

(Outcomes: grip strength)

Theory
Elastic tape for facilitation with 15-25% tension and functional correction for finger flexion with 100% tension.

Evidence
Waked, Eladi & Elgohary (2017) SEQES: 20

Group A: Tape with standard therapy
Group B: Standard therapy (positioning, orthosis and stretching exercises)

Results: Both groups improved grip strength at 2 week and 4 weeks. Significant improvement with the taping group after 30 minutes application at 2 and 4 weeks when comparing to the control group.

Healthy Hands Taped for Grip and Pinch Strength

Theory
1. Directional application of elastic tape may facilitate and/or inhibit muscular activity
2. Author’s taped from origin to insertion (facilitate) for strength
3. Functional correction for digit flexion

Evidence
Donec et al 2012
- ↑ grip at 30 and 60 min after application
- ↑ pinch at 60 min but, no significant ↑ at 30 min
Rheumatoid Arthritis Improve Hand Strength and Function

**THEORY**
1. Directional pull of tape inhibits or facilitates muscle (Kase 2003)
2. Facilitation “I” strips applied to flexors and extensors
3. Ligament correction. Tape increases stimulation of joint mechanoreceptors for the brain to interpret as normal tissue (Kase & Wallis 2003; Kase T. Clinical Therapeutic Applications of the KinesioTaping Method. Tokyo, Japan: Ken-Ikai Co. Ltd;2003.)
4. Tape pulls ligaments to the middle (Kumbrink & Taping: An illustrated Guide. Berlin Heidelberg: Springer-Verlag; 2012.)

**EVIDENCE**
Szczeglelniak et al 2012 (SEQES 26)

* Increased hand strength and function with tape combined with exercise versus exercise only

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Elastic Tape Outcomes for Healthy Women Subjects
*(Outcomes: grip strength)*

**Theory**
Elastic tape for facilitation (origin to insertion, “I” strip)

**Evidence**
Lemos, Pereira, Protassio, Lucas & Matheus (2015) SEQES: 21

Group A: Elastic tape applied at 25% to 35% stretch origin to insertion
Group B: Elastic tape applied with no stretch origin to insertion
Group C: No tape

**Results:** Group A demonstrated significant increase with grip compared to controls at 24 hours and 48 hours after taping. Group A demonstrated significant improvement compared to Group B at 24 hours

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Elastic Tape Outcomes for Healthy Subjects
*(Outcomes: wrist extensor strength, long finger extensor strength and grip strength)*

**Theory**
Facilitation technique allowing the fascia to pull at fascia allowing tape to recoil and pull muscle towards the origin

**Evidence**
Kuo & Huang (2013) SEQES: 19

Single group repeated measures design.

Dominant hand: Elastic tape for inhibition (insertion to origin, “Y” strip)
Non-dominant hand: Elastic tape for facilitation (origin to insertion, “I” strip)

**Results:** Significant immediate effects with (facilitation) and decreases (inhibition) with wrist and long finger extension. Significant increases with long finger extension strength after 24 hours.
**Rheumatoid Arthritis Improve Hand Strength and Function**

**THEORY**

1. Directional pull of tape inhibits or facilitates muscle.
2. Facilitation "T" strips applied to flexors and extensors.
3. Ligament correction. Tape increases stimulation of joint mechanoreceptors for the brain to interpret as normal tissue.
4. Tape pulls ligaments to the middle.

**EVIDENCE**

Szczegielniak et al. 2012 (SEQES 26)

- Increased hand strength and function with tape combined with exercise versus exercise only.

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**ELBOW STUDIES**

*Comparing the Evidence with Theoretical Constructs*

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**Elbow Medial Epicondylitis in Baseball Players**

**Elastic Tape Two Types**

1. Tape with Wefting Angles to the Right
2. Tape with Longintundinal Weaves

**THEORY**

- Tape improves proprioception by cutaneous mediated movement patterns.
- Spacing techniques for pain reduction to lift the skin to promote healing.
- Inhibition taping from insertion to origin with the muscle in a stretched position.

**EVIDENCE**

- Chang et al. 2012 (SEQES 39)
  - Both types of tape resulted in pain reduction and improve proprioceptive sense.
  - No difference b/w the two types of tape for the above outcomes.
  - Taping conditions did not improve strength.
ELASTIC TAPE APPLICATION IN HEALTHY SUBJECTS
GRIP STRENGTH

• Merino-Marba 2012 reported no difference with grip between elastic tape vs no tape immediately or post 48 hours (SEQES 30)

• Chang et al 2010 reported increase force sense, no difference with maximal grip strength (SEQES 31)

• Lee et al 2010 increase grip strength (SEQES 21)

HEALTHY SUBJECTS
Facilitate/Inhibit
Theory Meets Evidence

THEORY

• Tape from origin to insertion (facilitate) with muscle in a shortened position
• Tape from insertion to origin (inhibitory) with the muscle in a lengthened position
• Skin pulls towards the origin to facilitate the muscle

EVIDENCE

• Cai, Au, An & Cheung, 2015 (SEQES 35)
  No evidence of inhibitory or facilitatory when testing grip strength.

Activities of Upper Limb Muscles Related to the Direction of Elastic Tape Application in Healthy Adults

1. Concentric pull on the fascia stimulating increase muscle contraction (Hsu et al 2009)
2. Facilitate muscle activity and improved muscle alignment (Hsu et al 2009)

EVIDENCE

• Oh & Chon, 2013 (SEQES 28)
  • Proprioceptive sense improved
  • Parallel and cross taping may be helpful decreasing muscle activity
LATERAL EPICONDYLOSIS

Healthy Elbows Increase Torque with Tape vs Sham

THEORY
1. Concentric pull on the fascia stimulating increase muscle contraction (Hsu et al 2009)
2. Facilitate muscle activity and improved muscle alignment (Hsu et al 2009)

EVIDENCE
• Fratocchi et al 2012 (SEQES 36)
• Improved concentric torque with tape applied to biceps
• Started at insertion with no stretch followed by 75% over the muscle belly

SCAR STUDIES
Comparing the Evidence with Theoretical Constructs
Improved Perception and Appearance of Hypertrophic Scars, Keloids and Scar Contractures

Theory
Tape may have qualities similar to skin
- Stretches 30 to 40% resting length
- Allows for evaporation
- Thickness similar to epidermis

EVIDENCE
Karwacinska, J et al 2012 (SEQES 17)
- 27 scar height decreased (ttl 34 hypertropic or keloid)
- 52 perception of scar improved
- 40 above satisfactory color appearance
- 48 reporting above 50% mobility

STUDY COMPARING RIGID AND ELASTIC TAPE

Rigid and Elastic Taping Changes Scapular Kinematics and Pain in Subjects with Shoulder Impingent: an experimental study

EVIDENCE
Shaheem, Bull & Alexander, 2015
- Sagittal plane scapular ER improved in both groups
- Scapular plane scapular retraction and posterior tilt improved in the elastic taping group
- No effect on pain in scapular plane but both groups demonstrated decreased pain in sagittal plane
Rigid and Elastic Tape Joint Position Sense Outcomes for Hemiplegia Shoulder

Lopes dos Santos, Souza, Desloover & Russo (2017) SEQES: 44, N=13

Group A: Elastic tape applied anterior, posterior and medial deltoids (origin to insertion)
Group B: Rigid tape described as same technique

Results: Both groups improved with joint protections sense during flexion and abduction (30° and 60°)

Theory: Facilitation
Technique

Evidence
Lopes dos Santos, Souza, Desloover & Russo (2017) SEQES: 44, N=13

Rigid and Elastic Taping Outcomes for Lateral Epicondylitis

EVIDENCE
Fouda & Dewir (2017) SEQES 33
• Group A: Elastic “Y” strip applied with no tension
• Group B: Rigid “diamond” techniques
Both groups performed stretching and eccentrics 3x week/3 weeks
• Both groups demonstrated significant (p=.05) improvements with VAS scores and grip strength after 3 weeks
• No difference between groups

Rigid and Elastic Tape Outcomes for Healthy Adults
(Outcomes: grip strength)

Kim & Kim (2016) SEQES: 16

Group A: Elastic tape for facilitation (origin to insertion 50% stretch)
Group B: Rigid tape (applied same as elastic tape)

Results: Elastic tape demonstrated significant increase with grip strength.

Theory (Elastic tape)
Origin to insertion with 50% stretch providing a force on the skin to create more space by lifting fascia and soft tissue (sliding effect)

Theory (Rigid tape)
Applied according to elastic tape theory
**Mallet Finger Conservative Management**

- Full time orthosis wear for 6 to 8 weeks.
- Teach patient digit hygiene.
- Wean from orthosis

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**Rigid and Elastic Taping Outcomes for Lateral Epicondylitis**

- "Y" strip elastic tape
- "Diamond" technique rigid tape

**EVIDENCE**

Fouda & Dewir (2017) SEQES 33

- Group A: Elastic "Y" strip applied with no tension
- Group B: Rigid "diamond" techniques
- Both groups performed stretching and eccentrics 3x week/3 weeks
- Both groups demonstrated significant ($p<0.05$) improvements with VAS scores and grip strength after 3 weeks
- No difference between groups
Taping Technique

- Apply tape to the dorsum of the finger in line with the extensor tendon.
- Extend the tape to the distal crease of the wrist.
- Apply another piece of tape to dorsal wrist to anchor the tape.


Mallet Finger Video

Lateral Epicondylitis Taping Technique #1

Start in supination.

Apply tape while the patient actively moves towards pronation.
DeQuervains Method #2

1. Place wrist in radial deviation.
2. Cut 3-4” I strip.
3. Tear strip in the middle.
4. Apply middle of strip to radial wrist with 75% tension.

THUMB CMC TAPING

Step 1: Star pattern at the thumb CMC joint

1. Cut 3 1 inch lengthwise strips /1/2 inch width.
2. Patient holds “C” position.
3. Tear in the middle of strips. Apply with 75% tension.
4. No tension at the base of strips.

THUMB CMC STABILITY TAPING

Step 2:

1. Cut two 5 lengthwise strips with ~1 in width.
2. Pt. maintains “C”.
3. One strip applied with no tension at dorsal radius.
4. Tension tape ~50% when crossing CMC.
5. 25% tension around web space.
**Tape to Promote Functional Pinch and Stability**

**Step 3:**

1. One strip applied with no tension at volar radius.
2. Tension tape ~50% when crossing CMC joint.
3. 25% tension around web space.

**Thumb CMC Taping**

- Apply I strip to support (ligament) ulnar wrist.
- Tear tape in middle and apply to the ulnar wrist with 75% to 100% stretch.
- Lie tails down without tension.

**Ulnar Sided Wrist Pain TAPING Step 1**
Ulnar Sided Wrist Pain TAPING Step 2

1. Apply a star pattern with volar and dorsal support of the ulnar wrist.

Ulnar Sided Wrist Pain TAPING Step 3

1. Cut an I strip to wrap ¾ way around wrist.
2. Place one end down with no tension.
3. Stretch tape 50% to 75% at ulnar wrist with the wrist positioned in radial deviation.
4. Lay down tail without tension.

Healthy Shoulders/Increase Acromial Humeral Distance
Luque-Suarez et al 2013

1. Patient’s arm is adducted and externally rotated.
2. “I” strip applied at coracoid process with no tension.
3. Stretch 50% to 75% at anterior humeral head.
4. Tail applied posterior without tension.
1. Patient retracts and depresses his/her scapula.
2. “I” strip applied to the medial clavicle with no tension.
3. 50% to 75% stretch to T12 with 50%.
4. No stretch when applying the base.

Healthy Shoulder Improve Proprioceptive Feedback, Inhibition of Anterior Deltoid, & Facilitation of Serratus Anterior

Utinhb.Anttrans (video)

Taping for the MCL Sprain to Limit Flexion

**Step 1:**
A. Cut four 5 inch pieces lengthwise and 1 inch width.
B. Place base of tape at the volar aspect of the thumb proximal phalanx. Pt in palmar abd.
Taping for the MCL Sprain to Limit Flexion

**Step 2:**
A. Apply 1st piece with no tension around the proximal phalanx of the thumb. Bring tape between web space.
B. The tail has about 50% tension across the volar palm.
C. No tension at the base.

**Step 3:**
A. Apply 2nd piece of tape at the volar proximal phalanx and wrap tape dorsal radially.
B. Patient is in palmar abd.
C. Wrap around proximal phalanx the opposite direction of the 1st piece (not tension).

**Step 4:**
A. The tail has about 50% tension across the dorsal palm.
B. No tension at the base.
C. Repeat first 4 steps to limit flexion at MP joint.
D. Anchor at wrist.
**TAPING FOR SCAR**

**SCAR ADHESIONS**

- Apply one strip with 50% stretch in distal direction parallel to scar
- Apply second strip with 50% stretch in proximal direction parallel to scar

**TAPING FOR SCAR**

- Tear tape in the middle in the direction adjacent to the longitudinal weave.
- Apply tape directly to scar with 50% to 75% stretch to tape.
- Skin should be on stretch.
THANK YOU!

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EVIDENCE BASED:
RIGID TAPING INSTRUCTIONS

1. Start the protective piece of tape at the coracoid process.
2. Bring tape over the upper trapezius (adjacent to upper trapezius).
3. Follow the tape along the fibers to lower trapezius.
4. Apply the rigid tape on top of the protective tape starting at the coracoid process and ending at lower trapezius.
5. Tape is applied in a posterior lateral direction.

UT Inhibition / LT Facilitation
Smith et al 2009 & Selkowitz et al 2007
Shoulder Impingement Pain
Miller et al 2009

- 1st strap anchored over anterior deltoid and extends posterior along spine of scapula.
- 2nd strap anchored at coracoid process and extends posterior and inferomedially over scapula to imitate the line of pull of LT

SHOULDER IMPINGEMENT
Theory Meets Evidence

Theory
- Pain Relief (1st piece)
  - Taping for UT inhibition
  - Taping for LT facilitation
- Pain Relief (2nd piece)
  - Tape at anterior humeral head to provide proprioceptive feedback to avoid anterior translation

Evidence
- Miller et al 2009 (High Evidence/SEQES 38)
  - At two weeks a trend towards pain relief during self-reported activity and pain reduction with abduction.
  - Low powered study

Posture Taping
Lewis et al 2005 & Shaheen et al 2012

Posture Taping
Changing Posture May Effect Shoulder ROM

1. Ask patient to extend their thoracic spine.
2. Place protective tape from T1 to T7 followed by strap tape.
3. Ask patient to retract and depress their scapula.
4. Apply protective tape followed by strap tape from middle of the scapula spine to T12 diagonally towards spine.
Posture Taping for Kyphosis

Greig et al 2008

1. Ask the patient to elongate their crown of the head towards the ceiling and draw the shoulder blades down and together.
2. Apply protective tape from each anterior acromion over the trapezius moving diagonally to T6. Tape crosses at T6.
3. Firmly apply the rigid tape to the anterior AC joint and follow tape to T6.
4. Apply bilaterally.
LE Strap Taping
Vincenzion et al 2003

1. Lift skin up off lateral epicondyle to create a orange peel effect.

Picture Using Tape to Hold MWM

1. Apply protective tape from volar medial ulna to just proximal of lateral epicondyle.
2. Tape is applied to replicate mobilization force.

EVIDENCE BASED ELASTIC TAPING INSTRUCTIONS
SHOULDER IMPINGEMENT/PAINFREE SHOULDER
AROM TAPING COMBINED MOBILIZATION
TECHNIQUE
Theory Meets Evidence

THEORY
• One piece on supraspinatus for spacing correction
• 2nd piece on deltoids for inhibition
• 3rd piece on anterior humeral head for mechanical correction

EVIDENCE
• Djordjevic et al 2012 (SEQES 32)
• Tape/Mobilization technique improved active pain-free ROM compared to exercise group at 10 days

Immediate Pain Relief for Pain Free Abd
Thelan et al 2008

STEP 1
1. Cut a Y strip the length of supraspinatus from origin to insertion.
2. Pt side bends cervical spine to opposite side and involved hand internally rotated behind the back.
3. Apply base with no tension.
4. Apply tails to surround supraspinatus with 0 to 25% tension.

Thelan et al 2008

Immediate Pain Relief for Pain Free Abd
Step 2
1. Cut a Y piece from deltoid insertion to origin.
2. Place base of Y strip at deltoid insertion.
3. Place patient external rotation with the shoulder abducted to 90°
4. Anterior tail is applied to anterior deltoid with light tension 0 to 25% tension.

Thelan et al 2008
Immediate Pain Relief for Pain Free Abd

**Step 3**
1. Place patient in internal rotation, slight horizontal abduction and forward flexion to 90°.
2. Posterior tail is applied to posterior deltoid with 0 to 25% tension.
3. Patient positioned in horiz. Add., IR and forward flexion to 90°.

Thelan et al 2008

**Step 4**
1. Cut an I tail measuring from coracoid process to scapula.
2. Patient is in external rotation with the arm at the side.
3. Apply the base of tape at the coracoid process with no tension.
4. Apply tape with ~75% tension with downward pressure around the anterior head of the humerus.
5. Tape at posterior humeral head is laid down with light tension.

Thelan et al 2008

**Lower Trapezius Facilitation**

Hsu et al 2009

- Cut an Y piece from ~T12 to acromion.
- Place patient’s arm in horizontal abduction.
- Apply base with no tension in region of T12.
- With 0% to 25% tension apply each tail up towards acromion.
- No tension at base.
Upper Trapezius Inhibition/Typists
Huang et al 2012

- Cut an Y piece to start at acromion and tails reach upper trapezius insertions at upper cervical spine.
- Place patient in contra-lateral side neck flexion.
- Apply base with no tension at the acromion.
- With 0% to 25% tension to upper tail to upper fibers of trapezius. Lower tail applied to the middle trapezius.
- No tension at base.

Shoulder Impingement Pain Relief vs Physical Modalities at 1 week
Kaya et al 2010

Steps 1 & 2 are the same as described in the Thelan Study.
Step 3:
- Place the patient in horizontal adduction and internal rotation.
- Apply an “I” strip from the greater tuberosity to lateral border of the scapula with paper off or up to 20% tension.

Shoulder Adhesive Capsulitis
Pradeepshankar et al 2013

1. Supraspinatus: “Y” strip with paper off tension for origin. Top tail applied with 25% tension at superior border of the scapula and bottom tail at the spine of the scapula.
2. Deltoid: “Y” strip begin with the base at the deltoid tuberosity. One tail applied to anterior deltoid and the other tail applied to posterior deltoid with 25% tension. Muscle on stretch with application as previously described (Thelan et al 2008).
3. “Y” strip originating at posterior lateral proximally humerus. Top tail applied below the clavicle with paper off tension. Bottom tail applied to inferior pectoralis major with paper off tension.
De Quervains Step 1: Three I cuts

• 1 six inch strip
• Apply at the insertion of EPB with no tension
• Stretch 70% over the radial aspect of the wrist into the extensor group.
• End at mid forearm in the region of APL origin.

De Quervains Step 2: I cut

• 2nd I strip ~ 4 inches
• Extend the wrist.
• Anchor tape at the dorsum of the hand at ~ 1” distal the ulnar styloid.
• Flex wrist while applying the tape with 25% tension

De Quervains Step 3: I cut

• Cut 3rd strip ~ 3 inches
• Anchor volarly at distal radius.
• Stretch obliquely 50% to the dorsum of the hand.
Edema Reduction Post Stroke

- Cut an "I" strip long enough to cover the volar and dorsal aspect of the forearm.
- Cut three slits in the middle of the tape to serve as holes for the long, ring and small fingers.
- Passive flex the wrist.
- The base is adhered to the dorsal forearm with no tension.
- 20% tension is applied as you wrap the tape from proximal dorsal forearm to hand.
- Place the hand in flexion.
- Apply 20% tension while lying down tape from volar hand to proximal forearm.


Med. Epi Elastic Taping

decreased pain

Chang et al 2012

- Cut a Y strip the length from the wrist just proximal of medial epicondyle.
- Patient flexes elbow to 45° with the wrist extended.
- Apply tape base at the ulnar volar wrist. Each tail is laid down while the patient actively extends the elbow.
- Tails surround the pronator flexor mass.


- Cut an I strip to place from volar proximal ulna to distal medial humerus.
- Place tail volar proximal radius with no tension.
- Apply 50% to 75% as you cross the medial epicondyle.
- Lie the end down without tension.
References


Added References 2017


