Dry Needling by the Physical Therapist in the Medical Model

Integrative Medicine Symposium
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Objectives

1. Identify potential risk associated with dry needling
2. Identify appropriate scenarios in which dry needling might be used by a physical therapist
3. Acknowledge the value of dry needling in the comprehensive management of patients with neuromusculoskeletal diagnoses presenting with pain.
Introduction

Dry Needling (Intramuscular Manual Therapy) is a technique using the insertion of a *solid filament needle, without medication*, into or through the skin to treat various impairments including, but not limited to: scarring, myofascial pain, motor recruitment and muscle firing problems. Goals for treatment vary from *pain relief, increased extensibility of scar tissue* to the *improvement of neuromuscular firing patterns*.
Dry Needling

HISTORY
History

Janet Travell, MD and David Simons, MD

- Pioneers with trigger point injections using lidocaine and saline

- Proposed treatments:
  - Manual trigger point release
  - Massage
  - Myofascial release
  - Trigger Point Injections
  - Muscle stretching
  - Reciprocal Inhibition
  - Post-isometric relaxation
  - Spray & stretch
  - Heat
  - US
  - E-stim
  - *Dry Needling*

Janet Travell, MD and David Simons, MD

• Myofascial Trigger Point (MTrP):

A hyperirritable spot in skeletal muscle that is associated with a 
**hypersensitive palpable nodule** in a **taut band**.
**Active TrPs**
- Reproduction of *symptoms*
  - Not *only* pain
- Patient *recognizes familiar symptoms* during palpation
- Symptoms may be absent at rest, but will appear during manual palpation

**Latent TrPs**
- *Do not reproduce* symptoms experienced by the patient
- Patient *does not recognize symptoms* during palpation

**NOTE**
Active TrPs vs. Latent TrPs
- *Larger* referred pain areas.
- *Higher* pain intensities
- Overlying cutaneous and subcutaneous tissue *more sensitive* to pressure and electrical stimulation


Local Twitch Response (LTR): Involuntary spinal cord reflex in response to snapping palpation or insertion of needle

- Eliciting a LTR is one of the key aims to deactivate the trigger point
- LTR with needle treatment
  - Confirms accurate location of needle within the myofascial trigger point
  - Superior outcomes when compared to not eliciting LTR
Karel Lewitt – The “needle effect”

- 241 patients with myofascial or spinal pain treated with dry needling
  - 86.8% had the needle effect

The “Needle Effect”: “…immediate complete analgesia of the pain spot, without hypesthesia” following needle treatments

Lewitt K. The Needle Effect in the Relief of Myofascial Pain. PAIN. 1979
History

Karel Lewitt – The “needle effect”

The positive response of patients to various injected substances was due to the mechanical stimulation of the needle more so than what was injected.

Janet Travell, MD and David Simons, MD

Maximum therapeutic benefit from either dry needling or trigger point injections was due to mechanical disruption of the trigger point by the needle.

Lewitt K. The Needle Effect in the Relief of Myofascial Pain. PAIN. 1979
Review

DRY NEEDLING MECHANISMS
The Integrated Hypothesis

• Explanation of how sensitizing neuroreactive chemicals are responsible for pain associated with MTrPs

• Precipitating event:
  – Unaccustomed eccentric exercise; exercise in an unconditioned muscle; prolonged concentric contraction (i.e. postural) – leads to muscle fiber damage
  – Cascade of events resulting pro-inflammatory chemicals and nociceptive sensitivity
  – Self sustaining cycle

Gerwin RD, Dommerholt J, Shah JP. An Expansion of Simons’ Integrated Hypothesis of Trigger Point Formation. Current Pain and Headache Reports. 2004(8); 468-475
Muscle contraction: (sub)maximal; concentric, eccentric

Sympathetic Nervous System activity

Hypoperfusion

Ischemia

Hypoxia

Muscle injury

K⁺, bradykinin, cytokines, ATP, SP

Muscle nociception activation

CGRP release from motor nerve terminal

Acidic pH

H⁺

ACh released from motor nerve terminal

AChE inhibition

ACh released from motor nerve terminal

Increased ACh concentration in synaptic cleft

CGRP release

AChR upregulation

Increased frequency of MEPP, sarcomere contraction, taut band

Tenderness & pain

Dry Needling Mechanisms

- Insertion of needles into acupoints
- Overlapping activation of multiple cortical and subcortical areas
- PAG
- Stimulation of endogenous anti-nociceptive activity
- Descending pain inhibition

Dry Needling Mechanisms

- **LTR = Reduction in proinflammatory and nociceptive chemicals**

- **Anti-nociceptive effects for at least 15 minutes**

- **Decrease in EPN as measured by EMG**

- **Increased perfusion**
## Dry Needling Mechanisms

<table>
<thead>
<tr>
<th>Local</th>
<th>Central</th>
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<tbody>
<tr>
<td>• Decrease inflammatory and nociceptive chemicals</td>
<td>• Activation of cortical and subcortical areas</td>
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<tr>
<td>• Improved perfusion</td>
<td>• Stimulation of PAG</td>
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<tr>
<td>• Decreased elevated EPN</td>
<td>• Activation of endogenous anti-nociceptive activity</td>
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<tr>
<td>• Improved PPT</td>
<td>• Descending pain inhibition</td>
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<td>• Improved PPT to distant sites</td>
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Literature Review

APPLICATION
Application

• 2016 – Systematic Review
  – Role of the LTR
    • Is it important?

Application

- DN effectiveness by region
  - TMJ:
    - Good reduction in pain but conflicting results for ROM
  - Cervical Spine & Shoulder:
    - Effective for pain reduction and improved ROM
  - Upper Extremity:
    - One study: ECRB
  - Lumbar:
    - One study: Little benefit?
  - Lower Extremity:
    - Insufficient high quality studies to draw firm conclusions

Application

• 2014 - Literature review
• Trigger point dry needling
  – Craniofacial pain and upper quarter pain
    • Effective short term
• 2013 – Systematic Review and Meta-analysis
• Trigger point dry needling
  – Recommended for pain reduction immediately
  – Cautiously recommended for pain reduction at 1 month

Case Studies

- **Thoracic pain**
  - 2014, Rock et al. *Int J Sports PT*
- **Adhesive capsulitis**
  - 2014, Clewey et al. *JOSPT*
- **Chronic LBP**
  - 2013, Rainey. *Int J Sports PT*
- **Hamstring strain**
  - 2012, Dembowski et al. *Int J Sports PT*
- **Chest wall pain**
  - 2012, Westrick et al. *Int J Sports PT*
- **Chronic headache**
  - 2006, Issa et al. *JMMT*
Technique

- Pistoning / Sparrow Pecking
- Twisting
- “Twistoning”
- Leaving in-situ
  - 5-30 minutes

- Elicitation of LTR = more immediate and longer lasting pain relief than no LTR

Technique

• Manipulation of the needle
  – Mechanical coupling of collagen fibers to the needle
  – Direct pull on collagen fibers
    • Improved collage bundle alignment
    • Stimulates cells via mechano-transduction
  – Needle rotation resulted in significantly greater C-fiber activation, distal superficial and deep mechanoreceptors and stretch receptors compared to lifting, thrusting, scraping, shaking and flicking.

Adverse Events

- Significant – None
  - RISK RATE <0.04%
- Common – bleeding, bruising, pain
- Uncommon – aggravation of symptoms, drowsiness, headache, nausea
- Rare – fatigue, altered emotions, shaking, itching, claustrophobia, numbness

Adverse Events

• It can even happen to the best and most experienced!

Precautions

- Cognitively impaired
- Language barrier
- Skin lesions
- Immunocompromised
- Lymphedema
- Anti-coagulant medication
- Pregnancy
- Implants – Breast, chest, calf, triceps, buttocks, etc.
Contraindications

- Needle phobia
- Unable to obtain consent
- Patient refusal
- Infection
- *Post-surgical*

More thorough screening for medical diagnoses and co-morbidities is needed to reduce adverse events and improve identifying the most appropriate patients.
CONCLUSION
Resources

Dry Needling Competencies:


APTA:


Other:

Scope of Practice

- The Federation of State Boards of Physical Therapy
  - [www.fsbpt.org/](http://www.fsbpt.org/)

- Left up to each individual state’s licensing body

- Texas – Open practice act and does interpret dry needling within our scope of practice
Interprofessional Collaboration

• Pain management
• Pre-operative care
  – Pre-hab*
• Conservative care for those unable/unwilling to take pain medications
  – Polypharma

Brachioradialis

- **Anatomy**: Courses from supracondylar ridge of the humerus to the radial styloid
- **Innervation**: Radial Nerve (C5, 6, 7)
- **Action**: Elbow flexion
- **Potential Pain Referral**: Lateral elbow, forearm, wrist and thumb
- **Technique**: *Position*: Sitting or Supine. Grasp the muscle via pincer palpation and insert the needle towards your fingers
- **Needle**: 0.25 x 30 mm – 0.30 x 40 mm
- **Precautions**: Radial Nerve
Technique: Position: Sitting or Supine. Grasp the muscle via pincer palpation and insert the needle towards your fingers.