Dry Needling in the Pediatric Population

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Objectives

Following the presentation you will be able to:

– Define dry needling (DN) and describe the benefits, risks, indications, and contraindications.

– Describe the mechanism of trigger point dry needling and supporting literature.

– Describe clinical application and supplementary treatment options.
About Us

Dr. Mellony Mann, PT, DPT, CMTPT

- Associate of Science Physical Therapist Assistant – Washburn University 2008
- Bachelor Health Services Administration – Washburn University 2008
- Doctor of Physical Therapy – Rockhurst University 2014
- Dry Needling Certification (CMTPT) through Myopain Seminars

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- Bachelor of Science Athletic Training - Kansas State University 2010
- Doctor of Physical Therapy - University of Kansas Medical Center 2015
- Dry Needling Certification through Benchmark Rehab Partners

Disclosure: We have no financial or relationships to disclose in relation to today’s presentation.
Dry Needling is NOT Acupuncture
What is Trigger Point Dry Needling?

- "Rapid, short term needling to altered or dysfunctional tissue in order to improve or restore function."
  - PAANZ, 2014

- "Dry needling is a skilled intervention that uses a thin filiform needle to penetrate the skin and stimulate underlying myofascial trigger points, muscular, and connective tissues for the management of neuromusculoskeletal pain and movement impairments."
  - APTA, 2013
Benefits and Risks

• Benefits
  – Reduces local and referred pain
  – Improves ROM and muscle activation patterns
  – Alters chemical environment of trigger points
  – Reverses some central sensitization over time

• Risks
  – Soreness
  – Bruising
  – Raised area/swelling
  – Pneumothorax
Indications and Precautions of Trigger Point Dry Needling

**Indications:**
- Local and referred pain
  - Trigger points, taut bands, muscle spasm
- Impaired muscle activation patterns
- Decreased range of motion
- Headaches

**Precautions:**
- Abnormal Bleeding
- Implants
- Lymphedema
- Cognitive impairment
- Needle aversion or phobia
- Pregnancy
- Local or systemic infections
Muscle Pain Characteristics

- Aching
- Cramping
- Local
- Vague
- Referred to deep somatic tissue
- Activates emotional centers of the brain

Dommerholt et al, 2010
Commonly Treated with Dry Needling

- Back Pain
- Headaches
- Neck Pain
- Shoulder Pain
- Jaw Pain (TMJD)
- Elbow, wrist, and hand pain
- Pelvic Pain
- Hip Pain
- Knee Pain
- Foot Pain (including Plantar fasciitis)
- Tendinitis/tendinopathy
- Back Pain
- Chronic Pain
- And MORE!
Development of a Trigger Point

- Ischemia
- Increased CGRP
- Increased ACh and decreased AChE
- Taut band & trigger point

Bron, C, 2012
Simons, D, 1976
Performance of Dry Needling
Mechanism of Dry Needling

• Neuromuscular response
  – Motor endplate irritability is correlated with pain intensity.
  • Needling provides high pressure mechanical stimuli to "sensitive loci" or the sensitized afferent nerve fibers.
  • This stimulates alpha-motor neurons at the spinal cord to break the cycle of irritability.
Mechanism of Dry Needling

- Circulatory response
  - Vasodilation
    - Creates "wash out" scenario
    - Reduces Substance P (SP)
    - Calcitonin gene-related peptide (CGRP) increases vasodilation to increase delivery of B-endorphins.
Let's Talk Research!
Post Needling Soreness

- Effects of spray and stretching after needling
  - Performed upper trap stretch in addition to 3-5 sweeps of ethyl chloride spray and repeated 2-3 times.
  - Results:
    - Significantly reduced VAS rated soreness at 6 hours post needling.
    - No significant difference 6-72 hours post needling.

- Psychological factors influencing post needling soreness
  - Effects of catastrophic thinking, kinesiophobia, pain anxiety, and fear of pain
  - Results:
    - Catastrophic thinking was associated with lower levels of soreness.
    - Pain-related anxiety was linked to greater soreness.

Martin-Pintado-Zugasti, A et al, 2014

Martin-Pintado-Zugasti, A et al, 2017
The Local Twitch Response

• What is a local twitch response?
  – "LTR is characterized by a visible contraction of part of the taut band in the involved muscle upon mechanical stimulation with needling or palpation to a sensitive site in a trigger point region."

• What is pistoning?
  – It is a "fast-in and fast-out" movement of the needle in a fan or cone pattern performed to the taut band or trigger point

• What is winding?
  – It is a rotation of the needle once inserted into the taut band or trigger point.
  – Pistoning and winding can be performed together to enhance stimulation to the receptors and elicit an LTR.
Is a Local Twitch Response Needed?

• Review of 6 prior studies
  – LTR
    • High nerve irritability broken by stimulating afferent fibers
    • No conclusive evidence LTR was needed
  • Poor short term results and no long term results
  • Winding may be just as or more effective than pistoning.
  • Amount of pistoning correlated to increased post needling soreness
  • Study by Cagne et al, 2012 showed a 72% increase in upper trap blood flow for 15 post needling and it stayed elevated for 60 min post.

Perreault A et al, 2017
Comparative Treatment Options

• Systematic review of 15 studies
  – Treatment of myofascial pain syndrome, mechanical neck pain, temporomandibular pain, and total knee arthroplasty

• Effects on pain intensity:
  – DN vs. Sham/control
    • DN had better short term reduction in pain
  – DN vs. Pharmacological Intervention (wet needling)
    • Similar results in short term, inconclusive in medium and long term
  – DN vs. Manual Therapy
    • Similar effects

Espejo-Antunez et Al, 2017
General Overview

• Effects of DN on secondary outcomes:
  – DN vs Sham/Control:
    • DN is effective in the short term for improving Pressure Pain Threshold (PPT), quality of life, and improving ROM of the neck and shoulder.
    • No improvement in ROM for temporomandibular joint and knee.
    • Insufficient evidence for effects on disability, medication intake, and sleep quality.

  – DN vs Pharmacological Interventions:
    • Similar effects on ROM and quality of life.
    • Insufficient evidence on PPT, depressive symptoms, sleep quality and medication intake.

  – DN vs manual therapy:
    • Similar effects on PPT, ROM, and disability.

Espejo-Antunez et. Al, 2017
Talking to the Young Athlete

- Trigger Point and Taut Bands
- The needle
- The "poke"
- What it might feel like
- Why they should do it
- What to expect after

If at ANY point you want to STOP, we STOP.
Back Pain

- Dry needling vs. classic PT on chronic low-back pain.
  - Test group: Dry needling to gluteus medius, quadratus lumborum, multifidus, and erector spinae plus massage.
  - Results:
    - Decreased TrP number and sensitivity in DN group.
    - Significant changes in depression in DN group vs control.
12-year-old male soccer player (goalie)
- Chronic low back pain >6 months located in lower thoracic and upper lumbar spine on the left
- Imaging showed concerns for irregularity at L5
- Pain with trunk forward and backward bending.
- Dry needling completed to left longissimus and iliocostalis.
- Immediate decrease in pain
- Increase in trunk backward bending
Neck and Headache Pain

- Chronic tension type headache and referred pain
  - 100% had multiple active trigger points.
  - Referred pain: neck>head

- Most common muscles impacted:
  - Suboccipitals
  - Upper trapezius
  - Sternocleidomastoid (SCM)
  - Splenius Capitis
  - Levator Scapulae
  - Superior Oblique

Fernandez-de-las-Penas, 2010
Neck and Shoulder Pain

• Survey of 72 people with shoulder pain showed:
  – Active trigger points
    • Infraspinatus – 77%
    • Upper Trapezius – 58%
  – Latent trigger points
    • Teres Major – 49%
    • Anterior Deltoid – 38%

• Dry needling vs. Control/Sham
  – Needling superior in short and medium term
  – No difference in long term

• Dry needling vs. Wet Needling
  – Wet needling superior in medium term
  – No difference in short or long term

Liu et al, 2015
Neck Pain Case Study

- 16-year-old female cheerleader
- Practicing as a base when a flyer landed on her neck and shoulder
- Diagnosed with neck strain and referred to physical therapy
- Pain on left with decreased and painful side bend right, and right rotation
- Dry needling: left upper trap, left splenius capitis and cervicis, and left cervical multifidi
- Immediate improvement in AROM
- Improvement in pain by next visit
Neck Pain Case Study
Shoulder Pain

• Elite swimmers unilateral shoulder pain
  – Studied active and latent trigger points
  – Levator scapulae, upper trapezius, infraspinatus, SCM, scalenes, and subscapularis
  – More active TrP in those with shoulder pain than without

• Scapular elevation
  – Studied effect of latent TrP on muscle activation pattern during scapular elevation
  – Trapezius, serratus anterior, levator scapulae, rhomboids, pectoralis minor, infraspinatus, and middle deltoid
  – Presence of latent TrP altered muscle activation pattern during elevation

Hidalgo-Lozano et al (2011)

Lucas et al, 2010
Shoulder Case Study - 1

- 14-year-old female swimmer
- Chief complaint of left shoulder pain and popping
- Previous PT intervention with no improvement in pain and continued compensation patterns
- Referred for dry needling
- Dry needling: Left upper trapezius, levator scapulae, and infraspinatus followed by focused therapeutic exercise.
- Following two sessions patient had 1/10 pain with decreased compensation patterns
- After third session the patient returned to full competition pain free
Shoulder Case Study - 2

- 18-year-old cheerleader
- Boating accident with left bicep trauma
- Chief Complaint: Left arm pain and decreased active shoulder elevation
- Interventions: Aquatic and land based physical therapy
- Dry needling: Upper Trapezius, Infraspinatus, Teres Major and Minor, and Middle Trapezius
- Immediate improvement in AROM and pain
Shoulder Case Study 2
Muscle Performance

• Volleyball players unilateral shoulder pain
  – Month long tournament
  – Measured range, pain, strength
  – Dry Needled: Infraspinatus and teres minor
  – All scores improved despite continuing to participate in tournament

• Review of needling on muscle force production
  – No change in force production after needling
  – Possible increase in cervical isometric strength in sedentary individuals

Osborn, et al, 2010
Mansfield, et al, 2019
ACL and Knee Pain

• Study on quadriceps late stage ACL rehabilitation
  – EMG and passive mechanical properties before and after dry needling
  – Results:
    • Flexion AROM improved
    • Decreased resting activation of vastus lateralis
    • Decreased resistance of vastus medialis
    • Changes in pain

Ortega-Cebrian et al, 2016
Hip Pain

• Lateral hip and thigh pain
  – Studied dry needling, stretching, and strengthening on pain and function
  – Assessed immediately after study and at 12 months
  – Improvements in pain, sleep, and functional mobility

Pavkovich et al, 2015
Effects of Dry Needling on Muscle Strength and Joint ROM

• Elite soccer players
  – Effects on thigh muscle strength and hip flexion range of motion
  – Dry needing plus water pressure massage vs placebo laser plus water pressure massage

• Results:
  – Improved muscular endurance of knee extensors and hip flexion for 4 weeks post needling
  – Improved hip flexion range of motion for 4 weeks post needling
  – Improved hip extension force production
  – No reduction in muscle injuries

Haser et al, 2016
References

- Fernandez-de-las-Penaset all. 2010. Referred pain areas of active myofascial trigger points in head, neck, and shoulder muscles in chronic tension type HA. J BodywMovTher, 14, 391-396


