To Needle or Not to Needle: That is the Question

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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.

Dry needling is a technique used to treat dysfunctions in skeletal muscle, fascia, and connective tissue, and diminish persistent peripheral nociceptive input, and reduce or restore impairments of body structure and function leading to improved activity and participation.

Used for many things:
- Trigger points**
- Most research is here
- Scar tissue
- Fascial adhesions
- Tendons
- Some research here
- Entheses
Dry Needling for tendinopathy

- In 2 runners with proximal hamstring tendinopathy, eccentric loading of the hamstrings, lumbopelvic stabilization exercises, and trigger point dry needling provided short- and long-term pain reduction and functional benefits.
  - Jayaseelan DJ, Moats N, Ricardo CR. Rehabilitation of proximal hamstring tendinopathy utilizing eccentric training, lumbopelvic stabilization, and trigger point dry needling: 2 case reports. JOSPT 2014 Mar;44(3):198-205

- Sonographically guided dry needling was shown to be beneficial for this patient as evident by sonographic changes pre- and post-procedure.

- Results from these studies are encouraging.

- Dry needling and autologous blood injection under ultrasound guidance shows promise as a treatment for patients with patellar tendinosis.

Trigger point

- Starts in the muscle
- Overload
- Posture

Overload

Hypomobility - EDS

Smallest first and last


Sarcomere Contracture


Palpation


Endplate Noise

Taut Band / Nodule


Blood flow problem

A

Ascending branch of transverse cervical artery

Transverse cervical artery

B

Ascending branch of transverse cervical artery in upper mediastinum

C

Blood vessel passing through an active MTrP in the upper trapezius

O₂ tissue saturation in TrPs


Noxious Milieu

Acidic pH has a profound effect on the initiation and perpetuation of muscle pain.

A more acidic milieu may activate ASIC1 or ASIC3 muscle nociceptors, which in turn could produce mechanical hyperalgesia.

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Peripheral Sensitization

- Hyperalgesia
- Pain?
  - Maybe
  - Maybe not
Latent trigger points influence muscle activation patterns (MAPs)

- Latent MTrPs altered MAP in scaption
- Latent MTrPs tx’d
- Results:
  - Placebo group: no significant difference in MAP
  - DN group: restoration of MAP

This study shows that MTPs are associated with reduced efficiency of reciprocal inhibition, which may contribute to the delayed and incomplete muscle relaxation following exercise, disordered fine movement control, and unbalanced muscle activation.

The presence of latent MTrPs may not affect the strength of the upper trapezius.

A latent MTP is associated with an accelerated development of muscle fatigue and simultaneously overloading active motor units close to an MTP.

Postural control in women with myofascial neck pain

Patients with MPS-related neck pain showed an increased surface area and a faster sway velocity than control subjects.
Higher intramuscular EMG RMS values at latent MTPs than non-trigger points in the upper trapezius muscle at rest and during isometric shoulder abduction at 90°.


Therapy? Maybe - Maybe not

Continuous Nociception
Central Sensitization

Secondary Hyperalgesia

Expansion of Receptive Field


**Dry Needling & Range of Motion**

DN to active TrPs in the masseter muscle:
- increased maximal jaw opening 34%
- significant hypoalgesic effects

when compared with "sham" dry needling


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**DRY NEEDLING & RANGE OF MOTION**

**DRY NEEDLING OF LATERAL PTERYGOID:**
- significant improvement of functional limitation and pain
- persisted up to 6 months after finishing the treatment.


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**Multimodal treatment approach**

Patients with TMD treated with:
1) MWM directed at the TMJ and cervical spine;
2) thoracic manipulation directed at the thoracic spine
3) TrP-DN

- Improvements in pain, disability, and maximum mouth opening (MMO)

**Effects of DN on the musculoskeletal system**

- The best results are accomplished when needling elicits a LTR.
- The electrical discharge is most significant at the MTrP.
- In the taut band, away from the MTrP, the LTR is much weaker.

**Accuracy is important…**

**Dry needling is not just done locally at the site of pain…. Many factors play into the choice of what is needled.**

**Patient**
- Neuro: Compression, Neuropathy
- Joint: Hypomobility
- Muscle: Hypertonic, Spasticity, Hypertonicity, Inhibition

**Neuro**
- Spinal
- Compression
- Neuropathy

**Joint**
- Hypomobility

**Muscle**
- Hypertonic
- Spasticity
- Hypertonicity
- Inhibition/Weakness/Stiffness
Latent Myofascial Trigger Points are associated with an increased intramuscular electromyographic activity during synergistic muscle activation.

- delayed and incomplete muscle relaxation following exercise,
- disordered fine movement control,
- unbalanced muscle activation.

Latent MTrPs are associated with increased intramuscular EMG amplitude during synergistic muscle activation.

- coherent muscle activation patterns of synergists
- development of new MTrPs.

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Evidence-Based Complementary and Alternative Medicine Volume 2013, Article ID 694941

Mayoral et al. Efficacy of Myofascial Trigger Point Dry Needling in the Prevention of Pain after Total Knee Arthroplasty: A Randomized, Double-Blinded, Placebo-Controlled Trial. Evidence-Based Complementary and Alternative Medicine Volume 2013, Article ID 694941

40 subjects

- Groups:
  - True dry needling
  - Sham dry needling
  - Control

- Muscles examined:
  - TFL, adductors, quadriceps, hamstrings, gastrocnemius, popliteus

Immediately following anesthesiology and before surgery started, subjects were treated.
45 patients with headaches reproduced with palpation of MTrPs

3 groups:
- Botox injection
- Lidocaine injection
- Dry needling

All groups showed favorable results except botox had better results for post-injection sensitivity and use of rescue medication.

3 studies met the criteria of 76 found

Included if:
- Effect of DN on CTTH or cervicogenic HA severity and frequency discussed.
- Met ICHD classifications

Each study showed improvement in their outcomes

Supports use of DN in conjunction with other treatments for management of HA.
Acupuncture and dry-needling for low back pain

Meta Review

Respectable data-base

Dry needling appears to be a useful adjunct to other therapies for chronic low back pain.


Needling therapies in the management of myofascial trigger point pain: a systematic review.


A cupuncture and D N in the management of myofascial trigger point pain: a systematic review and meta-analysis of randomized controlled trials


Need better research!!!

Needling therapies in the management of myofascial trigger point pain: a systematic review and meta-analysis of randomized controlled trials


7 studies

1 study showed that deep needling directly into myofascial trigger points has an overall treatment effect when compared with standardized care.

Need good quality placebo controlled trials in this area!!

Dry needling safety

DRY NEEDLING

SAFETY
Regardless of how safe a technique is!!!
1,463 minor AEs
19.8%

Table 2: Types of Adverse Events reported in 7,620 treatments with TIP-2DN

<table>
<thead>
<tr>
<th>Event</th>
<th>Cases reported</th>
<th>Number per 100 treatments</th>
<th>Number (%) of Investigator reports</th>
<th>Serious AEs recorded by individual participating center per 100 treatments</th>
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</thead>
<tbody>
<tr>
<td>Headache</td>
<td>11</td>
<td>0.14</td>
<td>0.03 (0.00)</td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td>Nausea</td>
<td>10</td>
<td>0.13</td>
<td>0.03 (0.00)</td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td>Fatigue</td>
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<td>0.06 (0.00)</td>
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<td>3</td>
<td>0.04</td>
<td>0.06 (0.00)</td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td>Itching</td>
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<td>0.01</td>
<td>0.02 (0.00)</td>
<td>0.00 (0.00)</td>
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<td>0.01</td>
<td>0.02 (0.00)</td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td>Hypokalemia</td>
<td>1</td>
<td>0.01</td>
<td>0.02 (0.00)</td>
<td>0.00 (0.00)</td>
</tr>
</tbody>
</table>

No Significant AEs Reported

RISK of Significant AE: ≤ 0.04%
Risk of a significant adverse event with:

- Aspirin: 18.7%
- Ibuprofen: 13.7%
- Paracetamol: 14.5%

Blood borne Pathogen Standard

According to Regulations (Standards - 29 CFR) published by the US Occupational Safety and Health Administration, "gloves shall be worn when it can be reasonably anticipated that the employee MAY have hand contact with blood, other potentially infectious materials, mucous membranes, and non-intact skin;…"

Dry Needling performed by PT’s is safe

OSHA

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Universal Precautions:

“a set of precautions designed to prevent transmission of human immunodeficiency virus (HIV), hepatitis B virus (HBV), and other blood-borne pathogens when providing first aid or health care. Under universal precautions, blood and certain body fluids of all patients are considered potentially infectious for HIV, HBV and other blood-borne pathogens”

Not OSHA compliant!!

Some precautions to think about...

- Please note breast, pectoral, deltoid, biceps, triceps, buttock, and calf implants are more and more common.

- Dry needling is in the area of implants is absolutely contraindicated.
Nickel and/or Chromium Allergy/Sensitivity

- Nickel needles left in place for about 10-20 minutes.
- Later that day, patient noticed an itching feeling at the needle sites.
- Common symptoms include:
  - Rash/bumps on skin
  - Itching
  - Redness/skin color changes
  - Dry patches of skin resembling a burn
  - Blisters/drainage fluid (if severe)

Peuker E. Case report of tension pneumothorax related to acupuncture. Acupuncture in Medicine, 2004;22(1):40-43

Acupuncture is also considered safe, but accidents can happen and we can all learn from them.....


Central Nervous System Injuries
(Peuker and Grönemeyer, 2001)
- 10 cases with injury to SC or nerve roots
- 4 due to migrated needle fragments
- 6 due to direct injury

Did you know that the distance from the surface of the skin to the spinal cord or the roots of the spinal nerves ranges from 25 to 45 mm
Cardiac Tamponade
- 6 cases reported (Peuker and Grönemeyer, 2001)
- 26 cases reported (Ernst and Zhang, 2011)

Peripheral Nerves Injuries (Peuker and Grönemeyer, 2001)
- Foot drop secondary to needle in peroneal nerve
- Median nerve neuropathy after breaking off in carpal tunnel

Needle into the left anterior parasternal area at the level of the 4th intercostal space by a professional acupuncturist...into the right ventricle

The deceased received acupuncture on the abdomen, provided by an acupuncturist...Died of hemoperitoneum.

Postmortem examination revealed a well-defined vascular tumor was identified on the front of the liver, It was assumed these injuries were complications of acupuncture.

Hemoperitoneum Resulting From Injuries to Liver with a Benign Vascular Tumor During Acupuncture: A Case Report
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Dry needling by a family physician to neck and arm
✦ 1 hour after treatment: sudden weakness and numbness (R) UE and LE
✦ Dx: cervical epidural hematoma
✦ Had emergency decompressive laminectomy C3-T1
Intrathecal injection: unusual complication of trigger-point injection therapy.

- A 28-year-old woman experienced respiratory depression and hemiplegia after the injection of a superficial trapezius trigger point.
- The patient required emergency tracheal intubation for ventilatory support.
- Computed tomography of her head revealed pneumocephalus.
- She recovered fully over the course of 24 hours.


“All of the traumatic injuries described in this article (and other publications added ML) could have been avoided if practitioners had had better anatomical knowledge, applied existing anatomical knowledge better, or both.”

…and don’t forget about common sense!!

Elmar Peuker, Dietrich Grönemeyer
Rare But Serious Complications of Acupuncture: Traumatic Lesions
www.medical-acupuncture.co.uk/aimintro.htm

It is not advised to needle yourself...
Especially in the neck

Risks and causes of cervical cord and medulla oblongata injuries due to acupuncture
World Neurosurgery 73(6): 735-741, June 2010

** This person was an acupuncturist who was needling himself when this happened**
Dry needling
Anatomical Considerations

Temporalis muscle

- Extends from the temporal fossa (except that portion of it which is formed by the zygomatic)
- Anterior border of the mandibular coronoid process and to the anterior border of the ramus of the mandible.

Precautions
**Dry Needling**

- The superficial temporal artery should be identified and avoided.
- Threading of the needle through the entire muscle with a long needle is not recommended due to the many branches off the temporal artery and variations.

**Oblique capitis inferior muscle**

- Begins at the spinous process of the axis (C2)
- Attaches to the transverse process of the atlas (C1).

**Precautions**

- Note that the vertebral artery is well within reach of a 3 cm or 5 cm needle.
Dry Needling

- The muscle is needled in a point in the medial one half between the transverse process of C1 and the spinous process of C2 towards the patient's opposite eye.

Video courtesy Seth Fibriaio, DPT

Lateral pterygoid muscle

- The superior division (head) arises from the infratemporal surface of the greater wing of the sphenoid bone.
- The inferior division arises from the lateral surface of lateral pterygoid plate.
- They insert to the internal surface of the neck of mandible, and the intraarticular cartilage of TMJ joint.

Dry Needling

- Hans Werner Weisskircher, DDS (Igel, Germany) determined that the distance from the skin to the lateral pterygoid muscle via the mandibular fossa is at least 32 mm, which determines the length of the needle (photo used with permission).

- We recommend using a 50 or 60 mm solid filament needle.
Precautions

- It is possible to needle the maxillary artery or the deep temporal artery which may run over the mandibular fossa.
- The presence of these arteries is relevant for injection techniques—recommend aspiration of the syringe prior to trigger point needling.
- There are no known complications with solid filament needles, but caution is warranted when patients are taking anti-coagulants as hemostasis is not an available treatment option following needling.
**Posterior Tibialis**

- Originates on the inner borders of the tibia and fibula and interosseous membrane
- Distally attaches to bases of second, third, fourth, metatarsals, the three cuneiforms, cuboid, tuberosity of navicular and sustentaculum tal of calcaneus

**Precautions**

- Anterior N/V structures: Anterior tibial artery, Deep fibular nerve
- Posterior N/V structures: Posterior tibial artery, Tibial nerve

The needle must be kept close to the tibia bone to avoid touching the neurovascular bundles.

If the needle is inserted too deep, it will pierce the interosseous membrane and could touch the deep peroneal nerve, which the patient will experience as an electrical shooting pain towards the ankle and foot.

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*Note: this is how the therapists in Spain needle the muscle.*

A few things to think about
Variations in the neurovascular bundles:


Adverse events with acupuncture in the posterior compartment have been reported:


It is not recommended to needle this muscle based on the variations of both neurovascular bundles and the structures being very deep unless ultrasound is used.

Thank you for your time!