New perspectives on dry needling following a medical model: are we screening our patients sufficiently?

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ABSTRACT

Myofascial trigger points are not an isolated neuromusculoskeletal phenomenon and have been implicated in systemic, visceral, and metabolic pathology, as a side effect of some medications and in the presence of psychological risk factors. This complexity can complicate adequate screening of patients prior to choosing dry needling as a treatment intervention. Regardless of whether clinicians practice in a direct access setting, they should be cognizant of medical conditions, comorbidities, and risk factors that will influence clinical decisions for dry-needling appropriateness, technique chosen, and potential adverse responses to treatment. Of primary concern are conditions that can either manifest with myalgia and/or myopathy or masquerade as a more common musculoskeletal condition. This clinical commentary reviews system-specific considerations and other common disorders that should be screened for and discusses not only whether dry needling is appropriate but comments on technique and dosage considerations when initiating dry needling.

KEYWORDS

Dry needle; trigger point; safety; screening

Introduction

A myofascial trigger point (MTrP) is defined as a hyper-irritable spot in skeletal muscle that is painful on compression, stretch, overload, or contraction of the tissue, which usually responds with a referred pain that is perceived distant from the spot [1]. MTrPs are identified during palpation and are commonly treated with, but not limited to, trigger point injection, ischemic compression, myofascial release, soft tissue mobilization, and dry needling [2]. While there has been a recent focus on the safety of dry-needling application [3–7] and the potential for adverse events [4–6,8], one area that seems to be missing is context. Most papers focus on proper and deep knowledge of anatomy for safe application of dry needling [4,5]. For instance, proper anatomical knowledge and clinician's skill can avoid adverse events such as pneumothorax when needling thoracic muscles [8]. The presence of MTrPs is not pathognomonic with mechanical neuromusculoskeletal dysfunction. MTrPs have been implicated in chronic pain conditions involving sensitization, systemic autoimmune pathology, and visceral pathology, as a side effect of some medications, and in the presence of psychological risk factors [9]. This underscores the complexity that goes into

adequately screening our patients prior to choosing dry needling as a treatment intervention. In 2013, The American Physical Therapy Association (APTA) [10] released a resource paper summarizing the contraindications and precautions that should be considered prior to dry needling. These include needle phobia, cognitive impairments, communication impairments, patient refusal, isolated skin lesions, systemic infections, local lymphedema, severe hyperalgesia or allodynia, allergies to metals, immunocompromised patients, pregnancy during the first trimester, vascular disease, and increased bleeding tendencies [10]. While screening for conditions on this list is necessary, many clinicians may view it as common sense with any invasive technique.

In 2015, The Federation of State Boards of Physical Therapy (FSBPT) [11] released competencies that physical therapists should possess to safely integrate dry needling into clinical practice. Their conclusion was that clinicians should be well rounded in all areas of patient care including subjective history, medical screening, systems review, objective examination, selection of treatment techniques in conjunction with dry needling, and continuing reassessment. Unfortunately, there is a paucity of literature, save for textbooks [9,12],

that addresses more thorough medical screening of at-risk patients who may be inappropriate for dry needling or have an adverse reaction to dry needling. In fact, many of the areas recommended to screen [10,11] are either obvious or broad and lack sufficient detail to provide adequate context when integrating dry needling into patient care.

Regardless of whether clinicians who utilize dry needling practice in a direct access setting, they should function within the medical model context and be cognizant that patients are attending physical therapy with a potential litany of risk factors and comorbidities that will influence clinical decisions for appropriateness of dry needling, dry-needling technique chosen, and potential adverse responses to treatment. Of primary concern are medical conditions that can either manifest with myalgia and/or myopathy or present with symptoms that may be mistaken for more common musculoskeletal conditions. It merits reviewing some of the system-specific considerations and other common disorders that should be screened for and discuss not only whether dry needling is appropriate but comment on technique and dosage considerations when initiating dry needling.

Dry-needling technique and dosage considerations

There is currently a lack of consensus on the most appropriate technique and dosage of dry needling. This may complicate clinical reasoning during medical screening to identify patients that are appropriate to receive dry needling. There are many theoretical models [2,13–17] that have influenced clinicians practicing dry needling. The ‘fast-in-and-fast-out’ technique described by Hong [17] is probably the most widely practiced but the literature is controversial in relation to the use of this technique [18] and scarce in relation to dry-needling dosage [19] or comparison of different techniques [20]. Some variables that should be considered for a single treatment session include the number of needles used, the number of muscles treated, the speed and depth of pistoning [21], and the type of needle manipulation. While there is little in the literature on this topic, clinical experience suggests that some techniques and dosages such as multiple needle manipulations and entries are more aggressive than others such as minimum needle manipulations and few entries, which may be better suited in specific patient presentations. In addition, the targeted region or specific muscle should be also included in this equation to determine the benefit–risk ratio in each patient (Table 1).

The following sections have been organized in alphabetical order of potential comorbidities and medications interactions to be considered while screening patients prior to dry-needling treatment application. While most statements are referenced using the literature, some are

derived from clinical judgment due to the lack of literature on selected topics.

Biopsychosocial

Recently, much attention has been devoted to risk factors such as anxiety, stress, and fear avoidance in the presence of chronic pain states. Adequate screening for such risk factors can be gleaned from a thorough subjective history or using standardized outcome measures such as the Fear Avoidance Beliefs Questionnaire [22], The McGill Pain Questionnaire [23], Pain Catastrophizing Scale [24], and Central Sensitization Inventory [25]. While the presence of these risk factors should not preclude dry needling as an intervention, the clinician should consider how these risk factors could impact safely applying dry needling or exacerbating the risk factors. With patients in chronic pain states, proper screening for the presence of allodynia, hyperesthesia or hyperpathia is essential to determine whether the patient is an appropriate candidate for manual therapy [26], including dry needling. More aggressive dry-needling techniques or overdosage may be perceived as excessively noxious to the patient and may result in a poor outcome or pain exacerbation. This emphasizes the importance when selecting dry needling, to choose appropriate dosing to avoid overtreatment and gentler techniques to minimize the risk of symptom exacerbation.

Cancer

There is growing evidence for the presence of MTrPs and their potential role in oncologic pain [27–29]. While there is support for conservative treatments targeting MTrPs [29], including ultrasound-guided injections [28] and dry needling [27], clinicians should perform a thorough screening of medical treatments including radiation and chemotherapy. Some of the pertinent side effects of chemotherapy and radiation include immunosuppression, anemia, infection, increased bleeding, atrophy and weakening of soft tissues, and delayed wound healing [30]. Patients receiving oncology treatment should be viewed with caution before initiating dry needling as there may be an increased risk of infection, hematoma, bruising, delayed healing, or a poor response to more aggressive techniques. Should dry needling be chosen, a trial of a gentler technique [21] such as fewer number of needles with minimal needle manipulation [27] would be warranted.

Cardiovascular and hematologic disease

Bleeding and bruising are two of the more common dry-needling side effects [7]. Being aware of hematologic disorders such as thrombocytopenia, hemophilia, and other factor deficiency clotting disorders [12,31] is

Table 1. Dry-needling screening tool for clinicians.

	Screening considerations	
	Conditions requiring precautionary care	Treatment considerations and potential adverse responses
Biopsychosocial	Fear Anxiety Stress Central sensitization	Symptom exacerbation Fear Avoidance Beliefs Questionnaire The McGill Pain Questionnaire Pain Catastrophizing Scale Central Sensitization Inventory
Cancer	Chemotherapy Radiation	Infection Hematoma Bruising Delayed healing Immunosuppression
Cardiovascular and hematologic disease	Thrombocytopenia Hemophilia Sickle cell disease Leukocytosis Leukopenia Thrombocytopenia Other deficiency clotting disorders	Hematoma Bruising Infection Immunosuppression
GI/Hepatic/Biliary	Ulcerative colitis Crohn's disease	Emergence of GI or constitutional symptoms
Inflammatory autoimmune disorders	Rheumatoid arthritis Reactive arthritis Ankylosing spondylitis Systemic lupus Erythematosus Psoriatic arthritis	Symptom exacerbation during active phase
Integumentary	Open wounds Inflammation	Infection Delayed healing
Medications	Anticoagulants Statins Glucocorticoids Immunologics Antimicrobials Antiviral therapy Antimalarials Polypharma	Myopathy Hematoma Bruising
Metabolic and endocrine disorders	Diabetes Hyperthyroidism Hypothyroidism Hyperparathyroidism Hypoparathyroidism Primary adrenal insufficiency Cushing's syndrome	Impaired sensation Infection Delayed healing
Urogenital disease	Upper urinary tract pathology Early presentations of kidney infection or inflammation	T10–L2 area pain/Hypersensitivity Emergence of urogenital or constitutional symptoms
	Muscle considerations	
	Muscles	Potential adverse events
Muscles	Lateral pterygoid Obliquus capitis inferior Cervical multifidus Scalene Supraspinatus Upper trapezius Thoracic longissimus Thoracic iliocostalis Rhomboid Pectoralis major and minor Serratus anterior External oblique Rectus abdominis Quadratus lumborum Psoas Tibialis posterior	Neurovascular puncture Spinal canal, epidural/subarachnoid, spinal cord, or foramen magnum puncture Cervical epidural hematoma Pneumothorax Pneumothorax Pneumothorax Pneumothorax Pneumothorax Pneumothorax Pneumothorax Pneumothorax Pneumothorax Abdominal visceral puncture Kidney or abdominal visceral puncture Kidney or abdominal visceral puncture Neurovascular puncture or compartment syndrome

GI: Gastrointestinal.

imperative to minimize the risk of hematoma and bruising. Should dry needling be chosen, a trial of a gentler technique [21] such as fewer number of needles or minimal needle manipulation would be warranted. Clinicians should ensure adequate hemostasis in this at-risk population. For instance, two case reports describe acute

cervical epidural hematoma after dry needling of the cervical multifidus [32,33]. Although not directly related to the presence of vascular disease in these particular patients, dry needling of a patient with a comorbid vascular condition could further complicate a more serious adverse event such as epidural hematoma. Additionally,

patients with blood disorders such as sickle cell disease, leukocytosis, leukopenia, and thrombocytopenia often have a potentially higher risk of infection [31] due to possible concomitant immunosuppression. Cardiovascular and hematologic risk factors should not be viewed as a contraindication to dry needling, rather, regarded with caution to minimize the risk of bleeding, bruising, or infection. Application of dry needling with these populations may be considered following adequate screening of risk factors and education of the patient regarding potential adverse events.

Gastrointestinal/Hepatic/biliary

While most gastrointestinal (GI) conditions do not manifest with musculoskeletal complaints, it bears mentioning both ulcerative colitis and Crohn's disease. Collectively inflammatory bowel disease, one hallmark of both conditions, is migratory arthralgias that can often precede the emergence of GI symptoms such as nausea, diarrhea, constipation, or other constitutional signs and symptoms [31]. Although arthralgia is commonly present, myalgia [34,35] may also be one of the first manifesting symptoms. This underscores the importance of screening for prior history of ulcerative colitis or Crohn's disease. Close reassessment of palpation findings posttreatment and patient response to treatment must be viewed in conjunction with continual monitoring and reevaluation of the emergence of any GI symptoms.

Patients with gallbladder disease, especially in early presenting cases, have been reported to display associated pain in right-sided spinal muscles supplied by the anterior horn of segments innervating the affected portion of the gallbladder [31]. Without adequately screening for associated constitutional symptoms, worsening of symptoms with intake of food, prior history of GI pathology, or thorough abdominal screen including assessing for the presence of a positive Murphy's sign [31], a scenario is presented where provocative palpation may lead to choosing dry needling as an intervention. It is important to consider that GI conditions may activate the viscerosomatic reflex producing MTrPs in muscles such as the rectus abdominis or thoracic paraspinals that are supplied by common spinal segments of the diseased organ. Without placing palpation findings in the overall context of the patient's presentation, dry needling may be applied to a patient that is inappropriate or may require referral to a physician. Clinicians should be prudent in screening GI conditions when considering needling of the trunk musculature [6].

Inflammatory autoimmune disorders

Inflammatory autoimmune disorders such as rheumatoid arthritis, reactive arthritis, ankylosing spondylitis, systemic lupus erythematosus, and psoriatic arthritis may be

encountered in clinical settings for conservative management of associated neuromusculoskeletal impairments causing activity limitations [30,36–39]. While clinical presentation is variable, many of the common musculoskeletal manifestations include myalgia and arthralgia [30]. One concern in this population is overly aggressive treatment during relapses or active symptomatic flares. Most relapses or flare of symptoms has been attributed to tapering off or stopping biologics [40] or poorly controlled states. While nothing has been addressed in the literature specific to physical therapy treatment causing worsening of flares while tapering off biologics, Goodman et al. [41] found an increased frequency of symptomatic flares in patients with rheumatoid arthritis following total hip and total knee arthroplasty. While inflammatory autoimmune disorders should not preclude dry needling, proper screening of the stability of the disease and medication status is merited to avoid overly aggressive dry-needling dosage and technique in unstable or active flares to prevent exacerbating symptoms. Despite support for needle-based therapies such as acupuncture in rheumatoid arthritis [42], clinicians should consider avoiding the application of dry needling during the active phase of chronic autoimmune inflammatory diseases, however may consider application during the stationary or remittent phase.

Integumentary

Aside from routine screening [31,43] for signs of active infection, open wounds, or inflammation, the tissue integrity and healing potential should be considered prior to dry needling [12]. Tissue integrity can be affected by chronic systemic conditions such as rheumatoid arthritis, ankylosing spondylitis, systemic lupus erythematosus, and diabetes [30]. Chemotherapy, radiation treatment, and prolonged use of medications such as corticosteroids also may impact the ability of tissues to heal [30,44,45]. These considerations must be viewed with caution before proceeding with dry needling in these patients as there may be an increased incidence or severity of hematoma, bruising, or a poor response to more aggressive techniques.

Medications

Screening for potential deleterious effects of medications that increase the probability of posttreatment bleeding such as anticoagulants is common [12]. Additionally, immunosuppressive medications should be viewed with extreme caution for increased risk of infection [12]. Little attention, however, has been given to myalgia as a potential side effect of medications. Medications that may present with myalgia or myopathy include statins, glucocorticoids, immunologics, antimicrobials, antiviral therapy, and antimalarials [46–48]. Polypharmacy in patients presenting with pain may be

viewed as a reason to choose a non-pharmacologic intervention such as dry needling for pain relief, but not adequately considering side effects of medication and over relying on provocative palpation findings, clinicians may inappropriately apply dry needling into a population that requires physician consultation. Continual reassessment of patient response to treatment is essential to ensure subjective, objective, and functional progress is occurring.

Metabolic and endocrine disorders

Diabetes is one of the more common metabolic disorders seen as a comorbidity in patients presenting to physical therapy [49,50]. Of particular concern to the clinician performing dry needling are the pathological neural and vascular complications of long-term or poorly controlled diabetes. Diabetic neuropathy is one of the more severe consequences of diabetes and can result in sensory impairment (paresthesia and numbness), complaints of burning pain, and extreme sensitivity to touch [31]. There are several considerations for choosing dry needling in patients with diabetic neuropathy. If impaired sensation is present, the patient's ability to accurately subjectively report pain provocation during both assessment and treatment may be impaired. Additionally, impaired sensation should be viewed as a precaution to invasive techniques. Lastly, if hyperesthesia is present, clinicians should consider whether needle insertion with subsequent manipulation will be noxious to the patient, resulting in increased pain perception. Should dry needling be initiated, choosing a trial of a lighter technique [21] such as fewer number of needles or minimal needle manipulation would be warranted to gauge patient response.

Both large and small vessel disease occur at an earlier age and progress faster in patients with diabetes [31]. Particularly in the extremities, microvascular changes result in poor perfusion of the tissues, potential ischemic pain, and increase the chance of poor or delayed healing as well as a higher risk of infection or cellulitis [21,31]. With these pathologic changes, clinicians should use caution when considering dry needling, especially aggressive techniques, in diabetic patients to reduce the chance of infection or adverse responses, particularly when needling lower extremity muscles.

Other comorbidities that may be encountered in the clinical setting include endocrine disease processes. While there are more serious systemic manifestations, conditions such as hyperthyroidism, hypothyroidism, hyperparathyroidism, hypoparathyroidism, primary adrenal insufficiency, and Cushing's Syndrome may manifest with early musculoskeletal complaints of myalgia, muscle cramping, and fatigue [31]. Although dry needling is not contraindicated in these conditions,

clinicians should continually screen for endocrine disease and the appearance of any additional systemic symptoms that may require physician referral.

Urogenital disease

Pain presenting in the thoracolumbar spinal region, although not common, can be attributed to musculoskeletal pathology and impairments [51–53] that include provocation of pain with palpation of muscles in this region. James Cyriax, M.D. [54] described the forbidden area in the lower thoracic and upper lumbar spine, emphasizing that many of the pain presentations in this region are from pathology outside of the musculoskeletal system and should be viewed with suspicion before proceeding with treatment. Upper urinary tract pathology, particularly early presentations of kidney infection or inflammation, can closely mimic musculoskeletal pain and present with lower thoracic costovertebral tenderness and T10–L2 skin hypersensitivity [31] before the emergence of urinary or constitutional symptoms. Clinicians must be aware and screen for prior history of kidney disease, continue to monitor the emergence of additional symptoms such as dysuria, hematuria, or change in frequency or urgency [31], and may utilize the Murphy Percussion Test over the kidneys [31,55] as a screen to cluster with other findings suggestive of kidney disease.

Similar to screening for gallbladder dysfunction, provocative palpation cannot be the sole determining finding that guides choosing dry needling as an intervention. Without placing the palpation findings into the overall context of the patient's presenting complaints, dry needling can be misapplied to a patient requiring referral to a physician. In fact, the term chronic pelvic pain syndrome, which include conditions such as bladder pain syndrome, endometriosis pain syndrome, interstitial cystitis, prostatic pain syndrome, dysmenorrhea, and vulvodynia, is associated to the presence of MTrPs [56]. While these conditions may be responsive to needling therapies [57], they may also warrant physician consultation.

Conclusion

The APTA [10] and FSBPT [11] have provided a concise summary of pertinent screening considerations as well as skills clinicians should possess to adequately ensure patients are appropriate for dry needling. Clinicians must reason and make treatment decisions within the context of the medical model being particularly aware of screening for disease processes or conditions that can manifest with myalgia or influence how a patient will respond to dry needling. Clinicians should be strongly cautioned against relying solely on palpation findings when choosing dry needling without thorough systems screening and viewing provocative findings

within the patient's overall presentation. While many of the conditions mentioned require precautionary care and are not absolute contraindications to performing dry needling, special consideration of appropriate dosage and technique chosen may reduce the risk for an adverse response to treatment and improve clinical outcomes. Most clinical decisions regarding patient care, including dry needling, require clinical reasoning where it is essential that physical therapists use the patient history to establish and test hypotheses related to potential dry-needling adverse events. Physical therapists are responsible to recognize and weigh the risks to benefits ratio for each patient and to do whatever is reasonable to minimize risks and enhance the benefits associated with dry-needling intervention using their clinical reasoning skills.

Disclosure statement

No potential conflict of interest was reported by the authors. The primary author teaches dry needling as a guest faculty member for the North American Institute of Orthopaedic Manual Therapy. Cesar Fernandez-de-las-Penas and Josue Gan are instructors in Trigger Point Therapy and Dry Needling for David G. Simons Academy. Jacqueline Doidge is Co-Director and Senior Lecturer for Optimal Dry Needling Solutions.

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