

Clinical Suggestion/Unique Practice Technique

Radial, Median and Ulnar Nerve Flossing as Essential Preparatory Treatment for Baseball Pitchers in the Prevention of Ulnar Collateral Ligament Injury: A Clinical Suggestion

Sarah Hubball, LMT^a

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While smooth, efficient mechanics and robust therapeutic soft tissue treatment may reduce injury risk in overhead throwing athletes, a simple holistic pre-event treatment approach utilizing nerve flossing techniques may be an effective avenue to combat Ulnar Collateral Ligament (UCL) injury among baseball pitchers. The purpose of this clinical suggestion is to consider the impact of nerve care for elite athletes in the prevention of UCL injury.

Level of Evidence

5

INTRODUCTION AND BACKGROUND

The increasing prevalence of Tommy John surgeries among baseball athletes warrants a critical examination of the contributing factors and their broader implications for the sport. Many experts attribute the rise in injury rates to the ongoing 'velocity arms race' among young athletes,^{1,2} compounded by biomechanical overload³ and furthermore, elite pitching has become an inherently risky endeavor with an almost inevitable injury trajectory.^{4,5} Essentially, the body may not be biologically designed to withstand the repetitive strain of high-speed, high-volume throwing. While targeting smoother and more efficient mechanics may reduce injury risk in overhead throwing athletes,^{6,7} the following proposed holistic pretreatment approach utilizing radial, median and ulnar nerve glides prior to competition may proactively impede development of adverse neural tension and serve as an effective avenue to combat this sport damaging injury epidemic among baseball pitchers.

THE PROBLEM

Ulnar Collateral Ligament (UCL) injuries, and corresponding ulnar collateral reconstructions (commonly known as Tommy John surgery), have become increasingly prevalent in baseball, particularly among pitchers. Recent data in-

dicates that as of 2024, approximately 36% of active MLB pitchers have undergone Tommy John surgery.⁸ Although the procedure has a high success rate, with roughly 83% of athletes returning to play,⁹ the recovery process is extensive, often requiring 12 to 18 months to return to competition, and has a notable revision rate estimated to be around 15% of MLB pitchers.¹⁰ Suffice to say, while coaches of aspiring young athletes and major league clubs alike chase arbitrary pitch count limits and training periodization protocols,⁷ UCL injuries in baseball continue to trend in the wrong direction.

A relationship between muscle imbalance and overuse injuries is generally accepted and treatments are often aimed to mitigate these imbalances. However, managing force, motion, and energy efficiency involves a complex interplay of physics and biomechanics. Levers and fulcrums (bones and joints) in biological systems can contribute to efficient redistribution of potential energy. An analogy can be drawn to a suspension bridge, where cables, beams, and anchor points divide loads while maintaining stability; just as the body's joints and levers distribute forces without sacrificing control or efficiency. As research increasingly reveals the role of the fascial system in transmitting information from the central nervous system,¹¹ it prompts consideration of whether connective tissue could break down not only in response to external forces but also as

^a Corresponding Author:
Sarah Hubball, LMT
Pittsburgh, PA 15212 USA
(847) 644-2748
hubball.sarah@gmail.com

it adaptively isolates and redirects energy under central neural control.

Using baseball pitchers who suffer from injuries related to overuse as the example (while taking into account position players and overhead throwers in other competitive sports), throwing a baseball at an elite level is a complex integration of biomechanics and skill. This process begins with force production in the lower extremities¹²; progresses through the hips and trunk and culminates in the upper extremity and hand to deliver the ball. As the efficiency of this sequential energy transfer through the kinetic chain¹³ has been exploited, pitchers have achieved increased velocity ceilings and ball movement patterns despite varying body types.¹⁴ Elbow joint forces and torques are greatest during the arm-cocking and arm-deceleration phases of the pitch¹⁵ however the latissimus dorsi plays a critical role in the acceleration phase, where it helps generate humeral adduction, extension, and internal rotation. Theoretically it could be that over time, “overuse” could result in “shortening” of the latissimus dorsi, pulling the humerus inferiorly and depressing the shoulder girdle potentially mechanically tensioning the brachial plexus.

THE SOLUTION

Trigger points and muscle tension patterns may serve an important function of inhibition of free motion to prevent self-inflicted injury.^{16,17} Muscle contraction at the microscopic level occurs due to the impulse of the nervous system by way of the motor nerves,¹⁸ which can be affected by overuse.¹⁹ The first to publish the term ‘myofascial trigger point’, former White House physician Janet Travell and her co-author David Simons asserted the basis for myofascial trigger points was an *energy crisis* at the neuromuscular junction, robbing a muscle of its metabolic supply of resources in their *Myofascial Pain and Dysfunction: The Trigger Point Manual*.²⁰ They also acknowledged that deactivating so-called trigger points come with a risk of further stimulating chemical messengers that would encourage muscle contraction. This raises the question: what if therapeutic goals were redirected from targeting the muscle tissue itself toward modulating the underlying neural impulses?

Beyond emerging evidence that the sympathetic nervous system is activated during exercise activity, possibly to protect tissues from harmful environmental changes^{21,22} and to regulate skeletal muscle motor innervation²³; perhaps we can conclude the nerves themselves, particularly the essential peripheral nerves of the extremities which do not respond favorably to tension and stretching, possess a built-in protection system by which they can initiate muscle contraction along their length. Nerves have built-in slack and are designed to function optimally in low-tension environments by gliding and sliding. Reframing the traditional assumption that external compression on nerves is the primary cause of symptoms, it is plausible that in conditions such as cubital tunnel syndrome,²⁴⁻²⁶ especially those exhibiting neuropathy with unclear cause,²⁷ irritated or entrapped nerves might signal to the perineural tissues to enable dynamic accommodation, muscle guarding or

withdrawal reflexes to limit motion and protect the nerve. This mechanical intelligence could hypothetically function as a braking system, modulating muscular and fascial tension to counter rapid traction, elongation, or compression of the brachial plexus during the high-stress ranges of motion in the cocking, acceleration, and deceleration phases of pitching.

Persistent ‘guarding’ contractions would increase tension through the length of the lever, increasing rigidity and decreasing range of motion of the associated joint. These cellular-level contractions may occur at such a low threshold that they initially escape detection by proprioceptive and nociceptive systems. However, over time, elbow flexion and extension range decreases,²⁸ and the same muscle forces and motion being forced through an ever-stiffer lever may result in muscle pain and tightness. These symptoms are the alarms. Muscles can be massaged, needled, stretched, strengthened, or rested; however, such treatments do not directly address the primary source: the brachial plexus and its originating cervical nerve roots.

This is where thoracic outlet syndrome (TOS) in elite athletes could be considered. Small studies have demonstrated not only a link between cervicobrachial pain and elbow extension range,²⁹ but neural tissue mobilization intervention having resulted in significant improvement in pain.³⁰ Although surgery can relieve surrounding tension or excise compressive structures along neural pathways, it does not address dysregulated sympathetic nervous activity, which may predispose athletes to recurrent injury even after surgical intervention.

Using carbon fiber as an example of increased rigidity and stiffness: its strong tensile strength comes with the inherent weakness of brittleness. While fatigue-resistant, breaks are sudden and dramatic. This trade-off illustrates an impressive adaptation, potentially comparable to the body’s design to limit extreme ranges of motion and mitigate high-velocity forces. Flexible systems like soft tissues spread out forces^{31,32} while rigid ones concentrate them. Stiffness, and in turn stability,³³ is generated through muscle contraction, but contractile strength limits elasticity and spring function.³⁴ With reduced ability of surrounding tissues to sense strain, dampen vibration and prevent overload in a rigid arm lever, the entire load is passed directly to the fulcrum, in this case the elbow joint.³⁵ Usually preempted by sprain or strain in the surrounding soft tissue of the forearm or triceps, the ligaments of the elbow eventually become the single point of mechanical stress and more susceptible to fatigue, wear, or outright failure. The advantages of biomechanical leverage come with a trade-off: concentrated forces ultimately fall on the most vulnerable structures. In this case, the rigid arm functions like a brittle lever under extreme stress, leaving the ulnar collateral ligament particularly susceptible to injury.

Without using counter forces to overstretch already tight muscles or induce recoil, one technique in particular applied prior to gameplay to engages with the body’s nervous system and potentially improve range of motion (ROM)^{36, 37} has been observed to promote relaxation in the connected muscles of the arm and shoulder and may help de-

crease baseline tension throughout the pitching arm complex. Rather than directing interventions at the muscles to address entrapped nerves, passively mobilizing the nerves themselves can help ease tension in the surrounding musculature without overstimulating or overtaxing the muscle tissue.

Though limited research indicates the excessive stiffness mitigating effects³⁸ of nerve glides are temporary in their performance enhancement capability,^{36,39} this clinical suggestion proposes that performing nerve flossing of the radial, median, and ulnar nerves prior to maximum-effort throwing may be a practical strategy to support the integrity of neural and connective tissues, potentially reducing the risk of ligamentous strain or injury.

An example warm-up protocol for a pitcher could involve three sets of 15 practitioner-assisted repetitions of radial, median, and ulnar nerve flossing, with each set alternated by passive range of motion (PROM) mobilization or contract-relax stretching techniques such as proprioceptive neuromuscular facilitation (PNF) or muscle energy technique (MET). Alternating these interventions leverages their complementary mechanisms: nerve flossing enhances neural excursion and mobility, while PNF/MET techniques utilize brief isometric contractions followed by relaxation to promote increased range of motion through post-isometric relaxation. Combined with PROM to facilitate joint mobility, these methods may progressively reduce neuromuscular tension in the shoulder, forearm, wrist, and hand. By downregulating sympathetic dominance, this sequence may help restore the body to a relaxed baseline before advancing to more dynamic pregame warm-up activities.

In addition to standard recovery methods, post-game interventions that improve mobility of the elbow, sternoclavicular (SC), and acromioclavicular (AC) joints may help reduce neural mechanosensitivity that contributes to diffuse or difficult-to-localize tension sensations in athletes. Instrument-assisted soft tissue mobilization (IASTM) of the lateral cervical region, combined with cervical stabilization/strengthening, may further assist in alleviating restrictions on cervical nerve roots associated with adaptive or protective scar tissue. Correcting postural deficits of the neck and shoulder, addressing overactivity of the latissimus dorsi, and improving SC and AC joint mobility where limited, foster the mobility and neuromuscular balance necessary to reduce undue strain on neural pathways. Importantly, clinicians should consider how symptoms originating in the cervical spine may influence the entire upper extremity, while also recognizing that repetitive, forceful gripping and release of the baseball at the fingertips during pitching can not only place significant stress on the fingers and hand, contributing to overuse⁴⁰ but also drive dysfunction proximally toward the shoulder and neck. This integrated approach aims to treat these patterns comprehensively rather than in isolation.

DISCUSSION

While nerve flossing has been found useful in rehabilitation or in cases of documented neural tension, much of the limited research to date has focused on the lower limbs,⁴¹ which may support the conceptual validity of the technique for neuromuscular function in a warmup routine⁴² but does not replicate the dynamic motions of the shoulder in sports-relevant arm movements. One study has incorporated the use of 'floss bands',⁴³ which are not necessary when adapting a practitioner-assisted nerve mobilization routine for athletes. Median nerve mobilization techniques have been discussed in context of carpal tunnel syndrome (CTS) literature, with outcomes varying across treatment approaches⁴⁴; however, there remains insufficient evidence to determine their comparative effectiveness.

Existing research on neural tissue management generally demonstrates that interventions such as nerve flossing can provide immediate symptom relief with minimal adverse effects.⁴⁵ While these techniques have been established primarily for pain reduction and functional improvement, there is limited investigation into their potential role in injury prevention. Elite pitchers represent a particularly relevant population for such studies, as they often experience mild musculoskeletal discomfort following previous outings while preparing for subsequent games and have access to trained practitioners who can ensure correct technique. Once proper cueing is established, home exercise programs could be safely adapted to support neural mobility and potentially reduce injury risk.

The central goal of the approach described herein is to prevent UCL injuries by protecting the ligament before damage occurs rather than attempting to restore it afterward. Once injured, the UCL requires months or even years of rehabilitation, and full return to pre-injury performance is not guaranteed. As young pitchers continue to push the boundaries of their sport, applying fresh insights into UCL injury mechanisms and rapidly translating these findings into practice could unlock a new era of pitching performance, enabling pitchers to push their limits while minimizing the risk of career-altering injury.

CONFLICT OF INTEREST

The author reports no conflicts of interest.

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