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INMAS (INTEGRATED NEUROMUSCULAR ACUPOINT SYSTEM) AS AN ADJUNCT THERAPY FOR TREATMENT OF TRIGGER FINGER: A CASE REPORT

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ABSTRACT

Introduction: Trigger finger is a common, underdiagnosed finger aliment, thought to be caused by inflammation and subsequent narrowing of the A1 pulley, which causes pain, clicking, catching, and loss of motion of the affected finger in long standing diabetic patients. Till now steroid injections or surgical management has been a main stay for the treatment. **Case presentation**: We present the case of an otherwise physically-adept 58-year-old Diabetic Indian serviceman, with signs and symptoms consistent with volar flexor middle finger tenosynovitis (Trigger finger) in left hand. Range limitations in all motions of the left metacarpo-phalangeal joints complicated his presentation. **Methods and Measures**: Physical therapy included conventional intervention with superficial heat, ultrasound, stretching and transverse friction massage directed to the second volar flexor tendon. Conventional joint mobilization techniques addressed the motion limitations of the ii- iv metacarpophalangeal joints, radiocarpal, and midcarpal joints. In addition, INMAS technique was utilised at trigger site to promote pain-free wrist and finger mobility. Patient's sugar levels were closely monitored throughout the treatment. **Results:** The described treatment regime, which involved conventional physical therapy interventions, along with INMAS aided in the early complete resolution of this patient's impairments and functional limitations.

Conclusion: The combination of conventional physical agents, exercise, and manual therapy, and the less conventional INMAS techniques, proved successful with this patient. INMAS involving needling of SA's which developed due to injury or disease. INMAS involving inoculation of minute trauma into the body to restore the mechanisms of self-healing was an effective and efficient adjunct to physical therapy intervention.

Keywords: Superficial dry needling (INMAS), Trigger finger, tenosynovitis

INTRODUCTION

Diabetes mellitus has reached epidemic proportions worldwide as we enter the new millennium. The World Health Organization (WHO) has commented there is 'an apparent epidemic of diabetes which is strongly related to lifestyle and economic change'. Over the next decade the projected number will exceed 200 million. Most will have type-2 diabetes, and all are at risk of the development of complications[1]. Diabetes may affect the musculoskeletal system in a variety of ways. The metabolic perturbations in diabetes (including glycosylation of proteins; microvascular abnormalities with damage to blood vessels and nerves; and collagen accumulation in

skin and periarticular structures) result in changes in the connective tissue[2].

Musculoskeletal complications are most commonly seen in patients with a longstanding history of type 1 diabetes, but they are also seen in patients with type 2 diabetes[4]. Some of the complications have a known direct association with diabetes, whereas others have a suggested but unproven association.

Diabetic cheiroarthropathy[3], also known as diabetic stiff hand syndrome or limited joint mobility syndrome, is found in 8–50% of all patients with type 1 diabetes and is also seen in type 2 diabetic patients. The prevalence increases with duration of diabetes. Increased glycosylation of collagen in the skin and periarticular tissue, decreased collagen degradation, diabetic microangiopathy, and possibly diabetic neuropathy are thought to be some of the contributing factors.

Trigger finger is a common disorder as a result of a disproportion in size between the digital flexor tendons and the A1 pulley. Several authors have noted that, in patients with diabetes mellitus, trigger finger is more common, often occurring in multiple digits. More commonly the nodule is proximal to the A-1 pulley[4], and the patient's digit is more likely to become stuck in the flexed position[6]. A mismatch between the flexor tendon and the proximal pulley mechanism occurs in most cases. Several studies have demonstrated a correlation between this condition and activities that require exertion of pressure in the palm while a powerful grip is employed or that involve repetitive, forceful digital flexion (e.g., arc welding, use of heavy shears). Proximal phalangeal flexion in power-grip activities causes high annular loads at the distal edge of the A1 pulley. Hueston and Wilson have suggested that bunching of the interwoven tendon fibres causes the reactive intratendinous nodule.[7]

Till now corticosteroid and surgical release[11] are a main stay of management of Trigger finger. However few studies have proved physiotherapy to be efficacious in prevention of re-occurrences[8].The techniques used conventionally is: superficial heat, ultrasound, stretching and transverse friction massage directed to the second volar flexor tendon. Conventional joint mobilization techniques [8]addressed the motion limitations of the ii- iv metacarpophalangeal joints, radiocarpal, and midcarpal joints and splinting[11] . But unfortunately these techniques are sometimes insufficient to relieve patient's symptoms. This scenario demands for a deeper look into other available therapeutic options.

CASE REPORT

A 58 years old diabetic (from past 18 years) man was referred to our centre for the management tenosynovitis (Trigger finger) at volar flexor of middle finger in left hand, insidious in onset 1 month back. The patient came to us after receiving 15 sessions of conventional physiotherapy comprising of superficial heat, ultrasound, stretching and transverse friction massage directed to the second volar flexor tendon. He was also wearing a finger splint.

Physical examination revealed:

- Finger stiffness, particularly at night & in the morning
- A popping or clicking sensation as he moves finger
- Tenderness or a bump (nodule) at the base of the middle finger
- Finger catching or locking in a bent position, which suddenly pops straight
- Pain in stretching fingers outwardly/ making a fist
- Radiation of pain towards wrist along the line of middle phalynx
- Palpation of the A1 pulley and joint play of the distal interphalangeal joint reproduced/exacerbated the reported pain.

MATERIALS AND METHODS

According to Green's classification of triggering: Grade II (active) - Demonstrable catching, but with the ability to actively extend the digit. After taking approval from BNDC review board and patient's written informed consent we added INMAS technique along with conventional therapy at trigger site to promote pain-free wrist and finger mobility. The INMAS techniques involved needling of the symptomatic acupoints (SA's) in the affected region. In the first and second session INMAS was given only at the nodule on the base of the middle finger (Fig1). In the third and the fourth session the long flexor muscle of the middle finger was also needled (Fig 2). Patient's sugar levels were closely monitored throughout the treatment. Patient was given 5 sittings in 3 weeks' time.

RESULTS

After the **FIRST treatment** involving INMAS, Stretching & Ultrasound, the subject had increased range of motion (ROM) however moderate pain was still present at end range.

After SECOND session, there was no clicking with flexion or extension and the extension of the ii MCP was restored to full range.

After **the THIRD treatment**, there was minimal pain upon palpation and the ROM was full without pain. The patient reported to be utilizing his stick shift handle in his car to help self-mobilize.

By the **FOURTH treatment**, there was full pain free ROM and only minimal pain at the capsule with deep palpation, although some weakness/fatigue was becoming evident with repeated flexion. Flexor pollicis longus was rated a 4/5 (patient could hold the position against strong to moderate resistance with full range of motion). At this point the subject reported that he was able to perform all activities of daily living.

At the **FIFTH treatment,** ROM remained full with no recurrence of pain, snapping, or clicking. There was mild weakness (4/5) present as noted in the previous visit but no palpable adhesions were present. The patient had full normal range of motion restored. The subject was given "theraputty" and released with FINGER exercises (flexion, extension, abduction & adduction) to continue on with strengthening at home. Two months after discharge and 6 months after discharge, he was contacted over telephone and he reported no re-aggravations or further complications. His sugar levels were also under control.

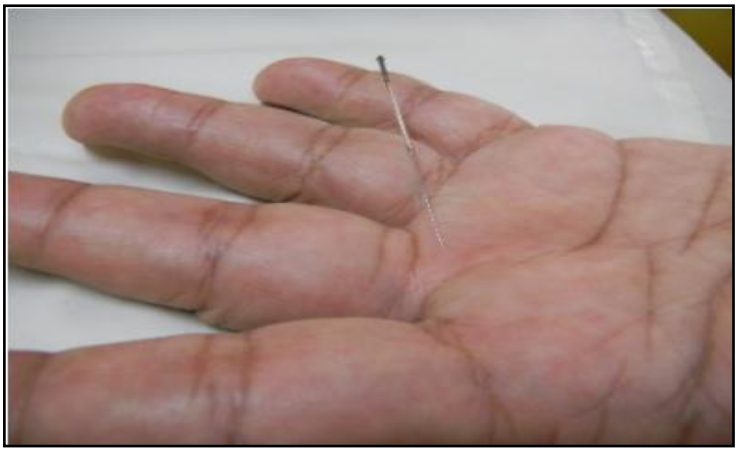

Figure 1 Darshpreet K., INMAS as an adjunct therapy for treatment of Trigger Finger

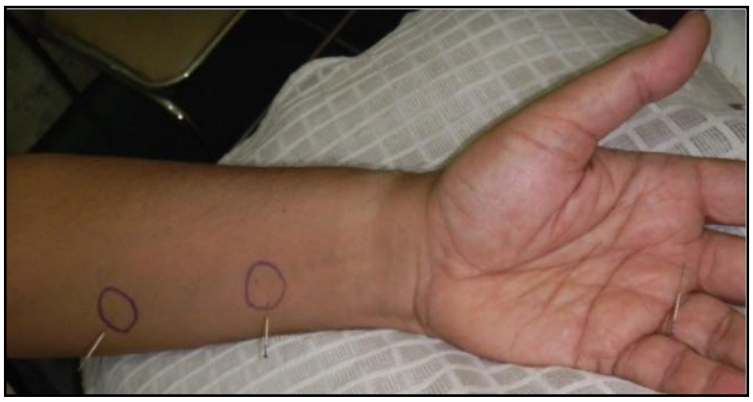

Figure 2 Darshpreet K., INMAS as an adjunct therapy for treatment of Trigger Finger

DISCUSSION

Integrated Neuromuscular Acupoint System (INMAS) is a unique treatment protocol developed by **Dr. Yun-tao Ma**[12]. Acupuncture needling creates a tiny lesion and bleeding in the contractile muscle and surrounding tissues. As a result, the tight muscle relaxes immediately and blood circulation improves. Thus vicious cycle of energy crises is broken. Once the acupuncture needle becomes coupled to tissue, movements of the needle (rotation or pistoning) may send a signal through connective tissue via deformation of the extracellular matrix[13]. The needled lesion disturbs the surrounding tissue and generates a small electrical current up to 500 mA/cm. The importance of this effect is that pulling of collagen fibers during needle manipulation may transmit a mechanical signal, through deformation of the extracellular matrix, to cells such as fibroblasts that are abundant in connective tissue. The subsequent signal transduction events may contribute to the therapeutic effect.

These observations suggest that the mechanical signal created by acupuncture needle manipulation can induce intracellular cytoskeletal rearrangements in fibroblasts and possibly in other cells present within connective tissue, such as capillary endothelial cells. Cytoskeletal reorganization in response to mechanical load signals has been shown to induce cell contraction, migration, and protein synthesis.

Downstream effects of the mechanical signal generated by acupuncture needle manipulation therefore potentially include synthesis and local release of growth factors, cytokines, vasoactive substances, degradative enzymes, and structural matrix elements. Release of these substances may influence the extracellular milieu surrounding connective tissue cells. Changes in matrix composition, in turn, can further modulate signal transduction to and within the cell. In summary, the insertion and manipulation of acupuncture needles may have both local and remote therapeutic effects based on the same underlying mechanism: mechanical coupling of needle to connective tissue, winding of tissue around the needle, generation of a mechanical signal by pulling of collagen fibres during needle manipulation, and mechano-transduction of the signal into cells. Downstream effects of this mechanical signal may include cell secretion, modification of extracellular matrix, amplification and propagation of the signal along connective tissue planes, and modulation of afferent sensory input via changes in the connective tissue milieu.[13]

A needle induced lesion may last at least 2 days or longer before the body heals it, which means after the needles are removed; the needle-induced lesions keep working for at least 48 hours[12]. This

lesion also triggers the local and systemic immune and anti-inflammatory reaction. Determination of this technique's effectiveness with a given patient required some clinical trial and error. The decision to use this technique was guided by substantial ineffectiveness of only conventional physiotherapy treatment and strong support in favour of INMAS. If the involved joints demonstrate an immediate increase in range of motion and pain reduction, then this intervention can be safely used in the patient[12]. The purpose of this case report is to introduce INMAS as an adjunct intervention method for the treatment of Trigger Finger.

CONCLUSIONS

This case report serves as **an initial step in a research process** that would explore INMAS as a useful addition to conventional physical therapy intervention, as there is a paucity of clinical research studies that examine the efficacy of this technique. Thus far, the evidence supporting INMAS is chiefly anecdotal. As with any novel physical therapy intervention, research at all levels is necessary to prove efficacy. In this case study, one interesting conceptual question is raised:

Can Superficial Dry Needling / INMAS at acute stage positively influence tendon disorders?

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Competing interests

The authors declare that they have no competing interests.

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