

Brief Report

Overuse Tendinitis of the Intrinsic Muscles

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A B S T R A C T

Repetitive strain injuries are currently the leading cause of occupational illnesses. This report describes seven patients who presented with the sole symptom of hand pain and subsequently were diagnosed with intrinsic tendinitis. Six of the 7 patients were given injections of a local anesthetic and steroid solution into the region of the lumbrical tunnels for both diagnostic and therapeutic purposes. All 6 patients had immediate short-term resolution of their symptoms in the office, there-

by confirming the diagnosis. Complete resolution of symptoms after both the injection and other treatment interventions occurred in 4 patients, and partial resolution of symptoms occurred in the remaining two patients. Follow-up ranged from 3 to 20 months for 6 patients, and the seventh patient was lost to follow-up. The clinical presentation, diagnostic work-up, and treatment of intrinsic tendinitis are described.

With the advent of personal computers in the late 1970s, we have been witness to a virtual epidemic of repetitive motion disorders of the hand and upper extremity.¹⁻¹¹ A host of inflammatory conditions involving hand and wrist tendons have been described. Characterized by pain with active movement and passive stretching of the involved tendon, erythema, swelling, and local tenderness, the diagnosis of this condition is clinically based, relying primarily on the history and physical examination.^{1,10,11}

Tendon entrapment may or may not be the precipitating clinical event. Rather, the histopathology shows peritendon fibrosis without inflammation and fibrocartilage metaplasia of tendon sheath tissue with or without calcification.¹²

Many types of tenosynovitis have been described, including de Quervain's disease, trigger thumb/finger, and intersection syndrome. Tenosynovitis of many of the individual muscle tendons in the upper extremities also has been described including flexor carpi radialis, extensor carpi ulnaris, extensor pollicis longus, and extensor digitorum communis. The treatment for these various syndromes is well-documented.^{9,10,13} In addition, "nonspecific" hand pain frequently is attributed to a general nerve condition, but this can be difficult to diagnose and often does not correlate with known anatomic nerve distributions.

Interestingly, there has been no description in the literature of overuse tenosynovitis of the small intrinsic muscles of the hand, ie, the lumbricals and interossei. This article describes such a group of patients and discusses diagnostic criteria, treatment regimen, and outcome.

MATERIALS AND METHODS

One hundred-fifty charts of patients with a diagnosis of upper extremity tendinitis during the past 18 months were reviewed; 7 patients with the sole diagnosis of intrinsic tendinitis without a history of trauma comprised the patient population for this review. Patients who were not selected for review included those without the diagnosis of intrinsic tendinitis, those with multiple diagnoses including intrinsic tendinitis, and those with intrinsic tendinitis secondary to trauma.

Five of the seven patients worked

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TABLE
Patient outcomes

	Patient						
	1	2	3	4	5	6	7
Length of follow-up (months)	<1*	3	6	3	5	15	20
Nonsteroidal anti-inflammatory drugs	No	No	No	Yes	Yes	No	No
Home exercise program	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Occupational therapy	No	Yes	Yes	Yes	Yes	No	No
Splint	No	Yes	Yes	Yes	Yes	No	No
Contrast baths	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Injection	No	Yes	Yes	Yes	Yes	Yes	Yes
Ergonomic equipment counseling	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Resolution	?	Complete	Partial	Complete	Partial	Complete	Complete

*This patient only had 1 visit.

extensively on computers. One of the two remaining patients was employed by an insurance company and spent most of her day filling out insurance forms longhand, and the second was an avid golfer who began experiencing hand pain while golfing.

Six of the seven patients were women. Follow-up ranged from 3 months to 20 months for six patients; the remaining patient was seen only once and did not come back for follow-up. Two patients who underwent extensive follow-up are presented as in-depth case studies.

All seven patients presented exclusively with hand pain without any associated numbness, parasthesia, or weakness. Physical examination for all patients was remarkable for web space tenderness, pain with passive abduction of the fingers, and normal strength and sensation.

Six patients had pain with the intrinsic tightness test, which involves hyperextending the metacarpophalangeal joints and flexing the proximal and distal interphalangeal joints.¹⁴ Tinel's and Phalen's tests were negative in all patients.

Radiographs were taken in three patients. Electrodiagnostic studies were not performed on anyone because of the lack of clinical evidence suggesting a neuropathy.

All patients were treated with an exercise program and contrast baths. Six patients underwent injections with a mixture of lidocaine, bupivacaine, and betamethasone directly into the involved web spaces dorsally (aiming for the lumbrical tunnels). The remaining patient was offered an injection but declined this intervention.

Five patients underwent supervised occupational therapy and wore hand-based cradle splints for 4 weeks. Two patients were treated with nonsteroidal anti-inflammatory medications. All patients were counseled on ergonomic workstation adjustments and equipment.

RESULTS

Of all of the treatment modalities, injections seemed to provide the most immediate and lasting pain relief. All six patients who received injections had immediate relief of their symptoms following the injection. The only patient who did not receive an injection was the one who did not return for follow-up. Of the remaining six patients, four had complete long-term relief of their symptoms (Table) following the injection. The remaining two had significant relief; however, they continued to have some residual symptoms. Supervised occupational therapy, contrast baths, nonsteroidal anti-inflamma-

tory medications, and a home exercise program produced mixed results in the patients reviewed (Table).

CASE REPORTS

Case 1. A 44-year-old right-hand dominant man employed as a computer software designer presented with severe pain in his right hand. The pain began 6 months prior to his initial visit after a weekend spent working with a caulking gun. Working on his computer 6 to 8 hours a day exacerbated his symptoms, and by the end of the day his right hand was exquisitely painful and tender.

Although his pain did not limit his ability to perform his job or his activities of daily living, the patient believed that his symptoms were becoming increasingly severe, and he recently found that he was unable to greet others with a handshake. He had no associated numbness, parasthesias, weakness, or neck pain. His past medical history was unremarkable.

Physical examination was remarkable for tenderness to palpation between the 3rd and 4th and the 4th and 5th metacarpals. Intrinsic tightness test did not provoke pain, and Tinel's and Phalen's tests were negative. Strength, sensation, and reflexes were all normal. There was no evidence of swelling or triggering of the fingers.

A diagnosis of intrinsic tendinitis was made, and the patient was treated initially with an injection of lidocaine and betamethasone into the two involved web spaces. Immediately after the injection, he was able to shake hands without pain and no longer had tenderness to palpation between the 3rd and 4th and the 4th and 5th metacarpals.

He was given instructions on stretching exercises for his intrinsic muscles and told to try contrast baths for pain relief. Because he presented with severe pain initially, he was given a prescription for a mild narcotic medication to be used as needed.

At his 2-week follow-up appointment, symptoms had resolved completely without any narcotics. The patient was started on a strengthening program and encouraged to continue stretching. Nineteen months later, he remained completely asymptomatic. The only ergonomic change he made to his workstation was to obtain wrist rests.

Case 2. A 32-year-old right-hand domi-

nant woman employed as a writer/editor presented with history of several months' duration of severe pain in her right hand without numbness, weakness, paresthesias, or neck pain. Another physician had treated her for carpal tunnel syndrome with a wrist splint and nonsteroidal anti-inflammatories; however, she had not obtained any relief and was now seeking a second opinion. No electrodiagnostic studies had been done.

The patient reported that she was unable to maintain her previous level of performance at work, where she generally used a computer 7 hours a day. Although she had cut back substantially at work, she continued to experience severe pain that also limited her ability to perform activities of daily living and awakened her at night.

Her past medical history was unremarkable, and her physical examination was remarkable for tenderness to palpation along the intrinsic metacarpal ligaments between the 3rd and 4th and the 4th and 5th metacarpal heads. The patient had pain with passive abduction of her fingers, and the intrinsic tightness test was notable for pain with normal range of motion. Strength, sensation, and reflexes were normal. Two-point discrimination was normal.

A diagnosis of intrinsic tendinitis was made, and the patient was given a prescription for occupational therapy for stretching and strengthening exercises for the hand intrinsic muscles as well as an ergonomic workstation evaluation. She also was instructed to try contrast baths.

At a follow-up visit 1 month later, the patient reported that her pain was improving, but she still was quite limited at work. Because she was improving, no changes in her treatment were made at that time. Three months later, the patient was still symptomatic, and an injection of lidocaine, bupivacaine, and betamethasone was administered into the web spaces of the 3rd and 4th and the 4th and 5th fingers. Following the injection, she had immediate relief. She was started on naproxen and treated with a hand splint that blocked metacarpophalangeal flexion, abduction, and adduction.

One month later, the patient reported a 50% improvement in her symptoms; however,

she was still limited to 1 to 2 hours a day on the computer. Ergonomic changes to her workstation included a split keyboard and track ball, and she is in the process of ordering a voice-activated word processing program.

DISCUSSION

Repetitive strain injuries are the plague of modern-day workers. This article has described a syndrome of intrinsic tendinitis or strain of the small hand muscles that presents primarily with pain without associated numbness, paresthesia, or weakness. The position of the hands on the computer keyboard (metacarpophalangeal flexion with relative proximal interphalangeal and distal interphalangeal extension) as well as the constant adduction and abduction of the fingers while typing predisposes computer users to this injury. However, this disorder can be seen with various repetitive motions using the hands.

Because this syndrome is not described in the literature, our treatment approach has been to use accepted treatments and modalities for repetitive strain injuries.^{9,10,13} Although our sample size was far too small to draw any conclusions about the efficacy of treatment for this disorder, our patients had relatively good immediate subjective results with local injections of an anesthetic and steroid combination. Immediate pain relief with injections into the painful intrinsic muscles of the hand also convinced us that our diagnosis of intrinsic tendinitis or strain was correct.

Other treatment interventions provided mixed results in our small patient population. Of the six patients who returned for follow-up, four had complete relief of symptoms and the remaining patients had partial relief. While the initial challenge in treating this syndrome is recognizing it in the first place, larger prospective studies are needed to establish reasonable treatment protocols for this potentially disabling disorder.

REFERENCES

1. Pascarelli EF, Kella JJ. Soft-tissue injuries related to use of the computer keyboard: a clinical study of 53 severely injured persons. *J Occup Med*. 1993; 35:522-532.
2. Cannon LJ, Bernacki EJ, Walter SD. Personal and occupational factors associated with carpal tunnel syndrome. *J Occup Med*. 1981; 23:255-258.
3. Armstrong TJ, Radwin RG, Hansen DJ, Kennedy KW. Repetitive trauma disorders: job evaluation and design. *Hum Factors*. 1986; 28:325-336.
4. Arnot R. Work pace, stress, and cumulative trauma disorders. *J Hand Surg Am*. 1987; 12:866-869.
5. English CJ, Maclaren WM, Court-Brown C, et al. *Clinical Epidemiological Study of Relations Between Upper Limb Soft Tissue Disorders and Repetitive Movements at Work*. Edinburgh, Scotland: Institute of Occupational Medicine; 1989. Report no. 7M/88/19 UDC 616.74.
6. Nathan PA, Meadows KD, Doyle LS. Occupation as a risk factor for impaired sensory conduction of the median nerve at the carpal tunnel. *J Hand Surg Br*. 1988; 13:167-170.
7. Pinkham J. Carpal tunnel sufferers find relief with ergonomic designs. *Occup Health Saf*. 1988; 57:49-53.
8. Barton NJ, Hooper G, Noble J, Steel W. Occupational causes of disorders in the upper limb. *BMJ*. 1992; 304:309-311.
9. Falkenburg SA, Schultz DJ. Ergonomics for the upper extremity. *Hand Clin*. 1993; 9:263-271.
10. Mackinnon SE, Novak CB. Clinical commentary: pathogenesis of cumulative trauma disorder. *J Hand Surg Am*. 1994; 19:873-883.
11. Cohn L, Lowry RM, Hart S. Overuse syndromes of the upper extremity in interpreters for the deaf. *Orthopedics*. 1990; 13:207-209.
12. Amadio PC. De Quervain disease and tenosynovitis. In: Gordon SL, Blair SJ, Fine LJ, eds. *Repetitive Motion Disorders of the Upper Extremity*. Rosemont, Ill: American Academy of Orthopaedic Surgeons; 1995:435-448.
13. Hess GP, Cappiello WL, Poole RM, Hunter SC. Prevention and treatment of overuse tendon injuries. *Sports Med*. 1990; 8:371-384.
14. Converse JM. The digital extensor flexor system. In: *Reconstructive Plastic Surgery: Principles and Procedures in Correction, Reconstruction, and Transplantation*. Philadelphia, Pa: WB Saunders Co; 1977:3166-3174.

EDITORIAL DISCUSSION

ORTHOPEDICS: Did you consider Allen's test or any noninvasive tests for any of these patients?

Silver & Rozmaryn: Such tests were not necessary as there were never any symptoms associated with a vascular etiology.