BioMechanics
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Occupational Therapy:
De Quervain's management starts with differential diagnosis

De Quervain's disease is often confused with carpal tunnel syndrome, arthritis and intersection syndrome. Accurate diagnosis requires skilful use of Finklestein's test and therapeutic modalities. Once diagnosed, attention to pain-relief modalities, job-site evaluations, and home exercise are essential for recovery.

By Sherry Benisch, OTR, and Sean Melicher, CMT

De Quervain's disease is well known in repetitive stress injury treatment circles. However, its symptoms can be confused with those of carpal tunnel syndrome, arthritis, and intersection syndrome. Because of this, typical de Quervain's protocol may not effectively address the symptoms. Accurate diagnosis requires skillful use of Finklestein's test and therapeutic modalities, as well as attention to the patient's posture, occupation, and daily routine.

De Quervain's disease is recognized as a form of tenosynovitis. It affects the extensor pollicis brevis and abductor pollicis longus tendons and their ability to glide normally through the synovial sheaths. The problem often ensues from repetitive use, resulting in friction and thickening of the fibrous sheaths and preventing normal function of the tendons. Complaints are primarily in the radial aspect of the wrist and forearm and the base of the thumb. These are noted during ulnar deviation, supination of the wrist, moving the thumb away from the hand, or grasping with the hand.[1]

Finklestein's Test

This technique is used to assess for de Quervain's disease. It is performed with the thumb flexed and held within the fingers. Most often the elbow is locked at the side of the body, bent in a 90° position. The therapist then cocks the wrist into ulnar deviation to see if pain is reproduced. The test may be performed without the therapist in the same fashion with the patient actively placing his or her wrist into ulnar deviation.[2] This active technique may not conclusively prove a positive indicator because of the patient's guarding against possible pain, or deviation in the ulnar cocking of the wrist.

The Finkelstein test can be performed with the elbow and shoulder in any position. Generally speaking, when a joint is placed into different positions, some muscle groups go slack, and others stretch. Changing proximal joint positions in the upper extremity may directly affect distal soft tissue integrity due to fascial plane connections. These positional changes affect force placement on the soft tissue structures of the shoulder, elbow, and wrist.

Testing in various positions can assist with differential diagnosis, but the practitioner should be aware of the potential for false positive or false negative results. One example involves placing the elbow into extension. This may produce a false negative or a false positive Finklestein's sign based on the soft tissue integrity of the upper extremity. If the elbow is extended and the flexors are tight, a false positive may result. Likewise, if the elbow is flexed and the extensors are tight, a false positive may be produced.

Differential Diagnoses

De Quervain's disease can be referred to as carpal tunnel syndrome's little brother. Recent CTS studies confirm that other etiologies, such as cervical neuropathy, brachial plexus injuries, and other median and radial nerve entrapments,[3] may produce the same or similar symptoms that are diagnosed as carpal tunnel syndrome. This differential diagnosis challenge applies equally to de Quervain's disease. Involvement of the thoracic outlet or brachial plexus, radial nerve entrapment at the elbow, entrapment of the second extensor compartment, and soft tissue dysfunction may actually cause de Quervain-like symptoms.[4]

Soft tissue components may play a vital role in determining involvement. Trigger points, myofascial restrictions, and adhesions can wreak havoc with a normally functioning system. The triceps, biceps, forearm extensors—specifically, the brachioradialis—pectoralis, and subclavius muscle groups must be addressed. Nerve entrapment at the radial tunnel of the elbow should not be overlooked. Mechanical dysfunction and referral pains of these groups may mimic de Quervain symptoms.[3,5]

Mechanics

Mechanics of the shoulder, wrist, and elbow are additional factors in defining dysfunction. The shoulder, wrist, and elbow can be looked at as a multitier pulley system. These systems are complex. Problems in one joint segment will directly affect another area. For the purpose of demonstration and simplicity (since joint motions are significantly more complex than those described here), we can imagine that the elbow and shoulder joints are isolated in planes of flexion and extension, and the wrist is isolated for ulnar and radial deviation. Our pulley model (Figure 1) characterizes the joints as the casters and muscles as the cables.

In a normally functioning system, there should be an easy give-and-take relationship between all of the joints and all opposing muscle groups When dysfunction occurs, there is a dramatic change in the system's overall ability to function. By shortening or tightening the biceps "cable," we keep the other casters from operating normally. Myofascial restrictions may prevent the triceps from returning to its normal position. This prevents the wrist pulley from moving through its full range, leading to pain and dysfunction in the system. This is not DQ, but rather a muscle imbalance problem that, over time, can cause pain in soft tissue that may mimic DQ. By loosening or lengthening the biceps cable back to its normal position, the "pain" or dysfunction of the wrist pulley returns to normal. This is seen in the pectoralis and subclavius regions as well. These muscles directly affect the position of the shoulder.

Rolling the shoulder forward places abnormal strain on the shoulder pulley, causing it to turn inward, shortening the cable to the elbow pulley; affecting the wrist pulley. If the brachioradialis cable presents abnormal myofascial restrictions in a lengthened position, it increases the strain on the elbow pulley, increasing the load beyond what the joint can bear and still function normally, thereby preventing normal ulnar deviation. Radial deviation is not affected if the elbow is slightly flexed, because tension in the brachioradialis cable is released when the wrist is moved out of ulnar deviation. Extension of the thumb is painful unless the wrist is placed into radial deviation, providing slack for the extensor pollicis brevis muscle. Understanding these dysfunctions will help pinpoint specific causes of pain, which may or may not be DQ.

Pinpointing Causes of Dysfunction

Compressing, or "pinching," the triceps during the Finklestein maneuver may assist in determining its involvement. The triceps group is grabbed or "pinched" while the elbow is locked at 90°. If the patient reports decreased or no pain with ulnar deviation, the triceps may have myofascial restrictions placing additional strain on the fascial system that leads to the wrist and thumb. The pinching sensation effectively changes the displacement force, acting as a tennis elbow brace does, allowing normal function of the elbow. This enables the wrist to move through its normal path of ulnar deviation. Short biceps or other elbow flexors can be identified if ulnar deviation is difficult when the Finklestein test is carried out with the elbow extended. The subclavius should be evaluated along with the pectoralis major, as they can form trigger points that refer to the radial region of the forearm and thumb.[6] The brachioradialis is often overlooked when the chief complaints of pain are at the thumb and wrist. Applying compression to the brachioradialis during ulnar deviation will produce an effect similar to compressing the triceps. This may decrease the intensity of the pain experienced during the Finklestein maneuver if the brachioradialis is involved.

Understanding your patient's occupation, posture, and daily routine is essential for effective treatment. Often practitioners become focused on the injury itself, and don't look at other components that may affect the patient's ability to heal.

Occupation, Posture, Daily Routine

What do your patients do for a living? Their jobs may promote muscle imbalances. Do they hold static positions? Are their elbows extended or bent? Holding static positions for long periods of time may cause myofascial shortening to occur. Do they repetitively pull or push, placing excessive stress on the upper extremity flexors and extensors? Are their shoulders hunched up or pulled across the body to one side? Are they close to their workspace? Or far away, causing them to reach? These positions may cause compression of the radial nerve, resulting in de Quervain-like symptoms. Do they use fine or gross movements? Gross movements may indicate stress on muscle groups responsible for a particular activity. Fine movements may draw one's attention to specific muscles or tendons of the hand that are used for that task. What forces are involved with lifting, grasping, pinching, or pulling? The greater the force, the greater the chance of inadequate recovery times for soft tissue structures.

How do your patients present themselves? Do they stand upright? Are their heads and necks slumped or thrust forward compared to the rest of the body? Do their shoulders round forward? Do they slump? Are their knees bent or hyperextended? Postural issues may significantly impact biomechanics of the entire upper extremity.

What do your patients do before and after work? Are they active? Do they have difficulties with activities of daily living? If so, with which activities? Are their activities similar to their work tasks? Addressing these areas is important for effective job-site analysis and treatment management. If one or more factors are ignored, delayed recovery or relapse may result.

De Quervain's treatment protocol currently consists of splinting the thumb, limiting activities, and prescribing anti-inflammatory drugs. Ultrasound, iontophoresis, and surgical release of the involved tendons are other approaches.[7] To make this protocol more effective, mechanical stresses and soft tissue involvement must be decreased or eliminated.

Comprehensive Approach

For effective treatment results, a comprehensive approach is needed. These include pain-relief modalities, soft tissue manipulation, job-site evaluations, and an effective home exercise program.

Modalities used to reduce pain and inflammation and improve muscle balance include thermal agents, iontophoresis, and electrical stimulation. These are used after a comprehensive evaluation of all causative factors is completed. They are used in conjunction with postural education, work-site modifications, and an effective home exercise program. Passive modalities work very well in conjunction with manual and active therapy techniques. When used alone, progress will be slow at best.

Many different manual techniques address both hyper- and hypotonicity of soft tissue structures. Both direct (e.g., myofascial release, neuromuscular techniques, soft tissue mobilization) and indirect (e.g., strain-counterstrain [used to treat myofascial restrictions], functional techniques, and reciprocal inhibition) approaches may be used to regain normal muscle balance. This may “turn off” pain referral patterns that are influencing a positive Finklestein’s test.

Splinting

Splinting may be used in conjunction with other modalities to decrease inflammation. This allows soft tissue structures ample time (one to three weeks) to recover from overuse. The type of splint depends on the cause of the symptoms.

The hand-based thumb spica is used to immobilize the metacarpophalangeal (MP) joint of the thumb. Inflammation of the extensor pollicis longus and abductor pollicis brevis tendons or their muscle bellies may be reduced if the thumb MP is immobilized. Additionally, if there is pain on resisted extension of the thumb interphalangeal (IP) joint, then this, too, should be immobilized.

The wrist/thumb spica splint is used to restrict movements of the wrist and the thumb. The IP and/or MP joints of the thumb can be immobilized depending on where pain is reproduced with resistance.

The splinting schedule varies depending on pain intensity and whether it is constant or provoked by movement. A splint should not be worn at all times. If the patient is able to move through some range of motion without pain, the practitioner should encourage him or her to do as much as possible. The splint should not be used during an activity that may exacerbate symptoms.

It is valuable to evaluate the patient’s environment. Pay special attention to the positioning of the shoulder, chest, arm, elbow, and wrist. A general rule is to avoid extreme ranges of joint motion. Try to keep the joint working within the middle third of its range.[8]

Active strengthening and stretching should be part of a regular home exercise program. Initially, stretches are given for structures that are hypertonic, along with instruction in passive modalities for pain reduction. As pain is reduced, strengthening exercises are progressed from isometric to eccentric/concentric contraction for muscles that may be underused or weak. The ultimate goal is to restore healthy muscle balance and soft tissue integrity.[9] The home environment and factors inducing stress must also be examined.

Although common, and expected within our daily routine, stress may greatly affect the patient’s ability to recover from injury. Stresses from home, work, or outside of the work environment add to the strain of a task, cause loss of concentration on the task, and affect the overall ability of the biomechanical system to function normally. Working with biofeedback specialists and stress management consultants may be valuable.

Often, practitioners over focus on the work site, making necessary modifications only to find that the patient is still having difficulties at home. We also forget that patients’ injuries stay with them, regardless of what environment they are in. The injury may be made worse by leisure or homemaking tasks.

Differential diagnosis is an essential component in treating de Quervain's disease. This approach will greatly improve treatment outcomes. Accurate assessment includes a comprehensive palpatory exam of the entire upper extremity and quadrant, applying Finklestein's test in multiple positions, addressing functional issues, and other assessments including muscle testing, provocative shoulder and neck evaluations for nerve impingement, and job site analyses to rule out other diagnoses. A comprehensive treatment approach for a de Quervain's diagnosis is essential to an effective recovery.

References

1. Putz-Anderson V, ed. Cumulative trauma disorders: a manual for musculoskeletal diseases of the upper limbs. Philadelphia: Taylor and Francis 1998:16.
2. Kasdan ML, ed. Occupational hand and upper extremity injuries and diseases, 2nd ed. Philadelphia: Hanley and Belfus, 1998:185-186.
3. Hunter J, Mackin E, Callahan A, Rehabilitation of the hand: surgery and therapy, vol. 1. New York: Mosby, 1995:68-69.
4. Kasdan ML, ed, Occupational hand and upper extremity injuries and diseases, 2nd ed. Philadelphia: Hanley and Belfus, 1998:84-85.
5. Kasdan, ML, ed. Occupational hand and upper extremity injuries and diseases, 2nd ed. Philadelphia: Hanley and Belfus, 1998:89-90.
6. Travell JG, Simons DG, Myofascial pain and dysfunction: the trigger point manual, vol 1. Baltimore: Williams and Wilkins, 1983:577-580.
7. Stanley BG, Tribuzi SM. Concepts in hand rehabilitation, Philadelphia: F.A. Davis, 1992:437-439.
8. Putz-Anderson, V, ed. Cumulative trauma disorders: a manual for musculoskeletal diseases of the upper limbs, Philadelphia: Taylor and Francis, 1998:53-55.
9. Chaitow L. Modern neuromuscular techniques, Singapore: Longman Singapore Publishers, 1996:109-134.