Overuse phenomena and RSI

Synonym: cumulative trauma disorder

What are overuse phenomena?

Overuse phenomena are usually seen in the wrists and hands. Cumulative microtrauma causes tendinopathy and tenosynovitis (inflammation of the tendons and synovial sleeve). When tenosynovitis is the result of repetitive movements (eg, using a keyboard) the condition is called repetitive strain injury (RSI).

What is RSI?

RSI can be classified into type 1 and type 2.

Type 1 repetitive strain injury

This includes well-defined syndromes such as:

- Carpal tunnel syndrome: pain and squashing (compression) of a nerve in the wrist.
- Tendinopathy: inflammation of a tendon.
- Tenosynovitis: inflammation of a tendon sheath.

See the separate leaflets called Carpal Tunnel Syndrome and Tendinopathy and Tenosynovitis (Tendinosis) for more details.

These conditions may be due to, or be made worse by, repetitive tasks. However, these syndromes are also common in people who have not done repetitive tasks. These syndromes may have other symptoms such as swelling, inflammation, and nerve compression problems.

Type 2 repetitive strain injury

This is where symptoms do not fit into a well-defined syndrome. Also, there are no objective or measurable signs such as inflammation, swelling or problems with nerve function. It is sometimes called diffuse RSI, or could be classified as a non-specific pain syndrome.[1]

The mechanisms involved in the production of the 'inflammation' associated with cumulative trauma are not clearly understood but many factors have been implicated including mechanical fatigue involving ligaments, tendons and soft tissues. Damage to neural tissue from ischaemia has been mooted, as has damage to muscle tissue relating to adenosine triphosphate (ATP) depletion. Psychosocial factors also seem to play a part, particularly in RSI.[2]

Research suggests a role for co-ordinative variability (the variability of the interaction between segments or joints). There is a normal range of variability at either extreme of which overuse injury is possible.[3] Another development is the identification of chemical agents called alarmins, thought to be involved in a variety of inflammatory processes, including repetitive strain tendinopathies.[4]

How common is overuse phenomena and RSI? (Epidemiology)

- The exact incidence of overuse phenomena is unknown because the condition has not been clearly defined.
- An American study of high school runners found that 68% of female subjects and 59% of male subjects had a history of overuse injuries.[5]
- One study found that the number of repeated trauma cases accounted for 4% of total workplace injuries and 65% of all occupational illnesses, with work-related upper extremity disorders accounting for most cases.[6]

Risk factors[7]

- Several occupations have a high incidence of overuse injury - this includes those who work as ultrasonographers, assembly line workers, tailors, surgeons, dentists, nurses and anyone involved with heavy computer work.

- Many sporting activities are susceptible - these include those who are equestrian athletes, runners, swimmers, golfers and martial artists.[8] [9] [10] [11]

Recent research aims to establish ergonomic factors, their effects and outcomes.[12] [13]

Symptoms of overuse phenomena and RSI (presentation)[14]

History

- The presenting symptoms depend on the site of the inflammation and various syndromes have been reported. All have in common pain as the primordial feature.
- A careful history should be taken to identify any aggravating or relieving factors.
- The patient may have already identified an occupational or leisure-related activity that brings on the pain.
- Associated symptoms may include clicking, 'popping' or rubbing of a tendon, or overlying erythema.

Examination

- Examination findings will depend on the underlying condition and cause.
- Commonly, swelling, erythema and tenderness may be found over the affected tendon.
- Crepitus may be demonstrated on movement and the range of motion may be found to be limited on active and passive movement of the relevant joint.

Differential diagnosis

Depending on the site of inflammation, the following may need to be considered:

Neck and shoulders

- Other causes of neck pain.
- Acromioclavicular degeneration (eg, acromioclavicular joint injury).
- Suprascapular nerve compression.
- Subacromial pain.

Upper limbs

- Carpal tunnel syndrome (CTS).
- Elbow degeneration.
- Gamekeeper's thumb.

Lower limbs

- Knee degeneration.
- Anterior cruciate laxity (eg, anterior cruciate ligament injury).
- Pronator teres syndrome.
- Shin splints.
- Tibialis anterior tendinopathy.
- Tibialis posterior tendinopathy.
- Achilles tendinopathy and rupture.
- Ankle degeneration.
- Tarsal tunnel syndrome.

Diagnosing overuse phenomena and RSI (investigations)

The diagnosis is usually made clinically but investigations may be contributory in certain situations.

Laboratory studies

These are rarely helpful, although inflammatory markers and autoantibody screening may be helpful in excluding systemic joint conditions.

Imaging

Imaging is not performed on most patients, unless surgery is being considered, in which case it is vital to support the diagnosis.

- **Radiography** may show bony avulsions, stress fractures, cartilage atrophy or calcification of a tendon.[15]
- **Ultrasound** has been used in ilio-tibial band syndrome.[16]
- **Bone scanning** is sometimes required to reveal stress fractures.[15]
- **MRI** may contribute in a variety of ways, demonstrating damage to muscles, tendons and ligaments, although it is more specific in acute than in chronic injury. It may demonstrate bone marrow oedema associated with stress fractures and may also assist in the diagnosis of nerve compression syndromes.[17]
- **Electromyography (EMG) and nerve conduction studies** may be helpful in diagnosing peripheral nerve compression or injury.[18]

Management of overuse phenomena and RSI

Non-drug

Physiotherapy

- The patient should be encouraged to avoid any activity or movement which is a clear aggravating factor.
- A balance between reducing the extent of movement whilst maximising performance quality needs to be achieved in certain occupations, arts and sports (eg, shoulder movements in baseball).[19]
- There is good evidence for the efficacy of manual therapy for symptom improvement in CTS.[20]

Occupational therapy

- This can help to modify work and leisure activities in order to prevent the condition from recurring (see 'Prevention', below).

Drug

- Non-steroidal anti-inflammatory drugs (NSAIDs) or simple analgesics are useful..
- Other treatments that may be of benefit include muscle relaxants and tricyclic antidepressants.[21]
- Corticosteroid injections, often used in combination with local anaesthetic, are beneficial in treating local tendinopathy or tenosynovitis.

Surgery

- This may be indicated when conservative treatment fails, to decompress nerves or repair ligaments.
- Surgery should only be undertaken if a specific diagnosis has been established, not simply because pain has persisted despite medical treatment.

Controversies concerning RSI

Diagnosing a patient with RSI has always been a controversial issue, not least because of the litigation issues surrounding action against an employer.[22]

- Psychological factors would appear to play a part and stress at work is a known aggravating factor. One study focused on 'liminality' - a state in which often previously conscientious workers would become so self-absorbed with their condition that this inhibited their recovery.[23]
- Many authorities recommend diagnosing RSI only in the presence of consistent subjective symptoms, demonstrable gross and microscopic pathological features and appropriate responses to therapy.[24]
- This leaves a large section of patients who have a rather vague unclassified condition which would not fit these criteria.

Complications of overuse phenomena and RSI

- Complications are mainly iatrogenic, arising from adverse effects of drugs and infection or bleeding after surgery.

- However, there may be adverse effects on employment or leisure activities, especially sports activities.

Prognosis[25]

Most injuries recover after three to six months. However, recurrences are common unless the original aggravating factor is removed.

Prevention of overuse phenomena and RSI

This involves minimising the overuse or repetitive microtrauma and reducing exposure to force, vibration and repetitive movement.

- Occupational therapists can be helpful. Often, simple modifications are sufficient. Occupational therapists are often called upon to advise employers about wider-scale changes to reduce the risk of workforce injury in the commercial sector.[26] Currently there is no firm evidence base for ergonomic interventions in the workplace.[27] [28]

Further reading

- Kiel J, Kaiser K; Stress Reaction and Fractures.

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Originally Published: 20/11/2023	Next review date: 21/08/2023	Document ID: doc_2554

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