

New aids to the treatment and prevention of work-related upper limb disorders

There is now a wide measure of agreement about case definitions for many work-related upper limb disorders (WRULDs)^{1,2,3,4}. Diagnosis is largely based on location of pain and tenderness to palpation, and on provocative testing. However research into work-related upper limb disorders highlights nerve entrapment and other syndromes that frequently co-exist with the better known musculoskeletal disorders. This has opened up new opportunities for treatment and prevention:

Workplace assessment

Occupational Health Advisers in primary care will assess job design and can visit the workplace to carry out an full ergonomic assessment. Insights into the cause of WRULDs come from patients' descriptions of eliciting activities at work (or outside); particularly awkward postures, forceful and/or repetitive movements, and recent changes of pace or workload (see table).

Early referral for Physiotherapy

Early referral for assessment and treatment by a physiotherapist will reduce the risk of progression from an acute condition to a chronic one.

Management of WRULDs at work

Reduction of exposure to cause is essential in any management plan for WRULDs. Med 3s with additional comments can start the process, but a more detailed investigation, possibly as part of a return-to-work plan is often needed.

Upper limb neuropathies

There is an increasing body of clinical evidence that uses vascular and neural symptoms to identify patterns of upper limb neuropathy (see over).

Risk factors for WRULDs	Meaning
Extreme posture	Over half of the Range of Movement of a joint with respect to the movement of interest present regularly during the working day
High repetitiveness	Actions performed more than 2-4 times a minute, or cycles less than 30 seconds
High force	Hand weights of more than 4 kgm
Too little recovery time	Less than 10 minute break possible within every 60 minutes that highly repetitive movements are performed
Low social support	Worst 25% of distribution
High psychological demands	Highest 25% of distribution

From Sluiter et al.³

This bulletin is produced by Sheffield Occupational Health Advisory Service. We aim to provide advice tailored to the needs of clinical workers in primary care in the Sheffield area.

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Hand-arm vibration syndrome

The vascular effects of hand-arm vibration are now well recognised. Hand-arm vibration can also cause numbness and tingling by direct effects on sensory structures in the hands, affecting the tips of the fingers first, and affecting the fingers most heavily exposed to vibration. Because vibrating tools are often heavy and used in awkward postures these symptoms may occur alongside other WRULDs.

Compartment syndromes

Another group of overuse problems not included in most diagnostic keys are the compartment syndromes where, because of an over-restrictive fibrous capsule around the muscle, pressure builds up to an unacceptable degree during exercise, to give symptoms that often resemble other WRULDs. Standard surgical treatment of decompression can largely alleviate symptoms.

Predisposition

Patients with inherited joint hypermobility may be more susceptible to an overuse syndrome in comparison to their colleagues of normal joint laxity. Professor Howard Bird at University of Leeds believes that compared to the individual with stiffness, a greater amount of muscular effort is required to stabilise the joints in the position of optimum function before the individual starts to use them. As a result, there is a strong risk of early overuse.

Patients with a slight thoracic scoliosis (and sometimes a compensatory cervical scoliosis) may be at risk of unilateral RSI, particularly for actions that require use of the arms from the elbows upwards.

The evidence for upper limb neuropathy in work-related upper limb disorders

Clinical evidence includes

- testing the strength of upper limb muscles
- defining patterns of numbness and tingling
- defining exacerbating movements and postures
- gentle manual pressure along nerve trunks
- Tinel's sign, Phalen's test

Research evidence includes

- Ultrasound imaging which has demonstrated reduced nerve mobility in office workers with repetitive strain injuries
- Lowered sensitivity to vibration amongst RSI sufferers and office workers.
- Increased vasoconstriction in repetitive strain injury sufferers.
- Reduced strength in muscles innervated by affected nerves
- Upper limb tension testing

The underlying pathologies include

- Nerve entrapment in the median nerve, radial/posteriorinterosseus nerve, and ulnar nerve
- Nerve entrapment at multiple sites
- Neural symptoms travelling proximally as well as distally from the site of entrapment.
- Brachial plexus disorders
- Pain-induced sensitisation of neurons in the spinal cord resulting in increased sympathetic activity and/or reflex vasoconstriction
- Pressure on cervical nerve roots: A common cause of upper limb pain is pressure on cervical nerve roots through damage to cervical intervertebral discs or cervical spondylosis.

The role of occupational factors in management of upper limb neuropathies

The history of onset of upper limb neuropathies will often include a recent increase in forceful movements at the extreme of ranges of movement at the wrist, elbow or shoulder, direct pressure close to the site of the nerve entrapment, or pain at a distal site resulting in compensatory overuse of proximal joints. A history of hand-arm vibration is a common finding in cases of carpal tunnel syndrome.

The implications for clinical management of upper limb disorders displaying symptoms of the kind described are as follows:

- A careful description of movements, forces, postures and repetition rates for all the different tasks carried out by patients at work (and where indicated at home or in leisure activities) should be recorded by an occupational health adviser or physiotherapist and a programme of control instituted.
- Physiotherapy techniques aimed at nerve mobilisation may be beneficial.
- Patients with nerve involvement should avoid any tasks that result in aggravation after use. In particular they should avoid the use of force and repetition. Work is best performed in comfortable positions with the upper limbs close to the body.

Neuropathy	Some eliciting patterns of over-use
Brachial plexus neuropathy	Repeated reaching above shoulder level Flexion at the shoulder, for example when reaching forward Prolonged carrying loads at side Bracing shoulders while carrying loads
Median nerve: pronator syndrome	Repetitive movement of elbow Rapid or resisted pronation and forceful pronation of forearm with wrist flexion
Anterior interosseus nerve syndrome	Heavy muscular exertion involving forearm (rare)
Ulnar nerve at the elbow (cubital tunnel syndrome)	External pressure, e.g. support on elbows. Repetitive flexion and extension of elbows
Posterior interosseous nerve	Repeated rotary movements of forearm, Repetitive wrist flexion with pronation or wrist extension with supination
Median nerve at the wrist: Carpal tunnel syndrome	Trauma, repeated deviation of wrist from neutral, Hand-arm vibration
Ulnar nerve at the wrist: Guyon tunnel syndrome	Prolonged flexion/extension of wrist and repeated pressure on hypothenar eminence
Radial nerve sensory branch to hand	Heavy use of mouse or touch pad involving flexor tendons of first finger
Increased sympathetic activity including sympathetic algodystrophy	Pain in the upper limbs secondary to occupational overuse. Pain that is worse after rather than during use.

References

(a longer list of references is available on the SOHAS website www.sohas.co.uk; copies are available from SOHAS)

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