Non-mechanical disorders: warning signs

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Most cervical spine syndromes are activity-related or mechanical. They result from disc lesions and/or degeneration of the spine. Syndromes that are not activity-related are called non-mechanical disorders. They stem from inflammatory diseases, tumours and metabolic disorders. Though they can influence mobility, they are intrinsic diseases of the cervical structures and do not have a mechanical origin.

Warning signs

Mechanical lesions of the cervical spine usually demonstrate very typical behaviour. They present with so-called 'inherent likelihoods' – the sequence of symptoms and signs that make up the clinical picture of a certain pathological disorder and that are likely to be found. Hence, when symptoms and signs come forward during the clinical assessment which show rather unlikely behaviour, examiners should be on their guard. Such symptoms and signs are called 'warning' signs. The examiner should consider them as the hallmark of a (serious) non-mechanical disorder until there is proof to the contrary. An unusual disorder is immediately suspected and further complementary investigations (blood tests, radiography, CT scan, bone scan, MRI) should be requested.

Warning signs disclosed by the history

Gradually increasing pain

Mechanical lesions tend to present with acute pain, as episodic pain that comes and goes in a rather irregular way, or as a constant, unchanged pain over a considerable length of time. Sometimes with a disc lesion, pain gradually increases over a short period of time, after which it remains unaltered for a certain period and then diminishes again. If, in contrast, the intensity of the pain increases progressively over a couple of weeks, then a serious lesion is likely.

Expanding pain

Pain typically changes location with a disc lesion. In a discodural conflict the pain moves within the zone of multisegmental reference, and when the conflict becomes discoradicular it shifts from the neck or scapular area to the arm. In other words, it shifts from one area to another. In the case of expanding pain, however, the evolution is different: for example, the pain starts in the centre of the neck, then becomes bilateral and spreads to the scapular area, and may finally radiate down one upper limb or both limbs. Another possibility is pain that develops in one dermatome and gradually spreads beyond its borders into other dermatomes. Increasing scapular pain together with an increase of brachial pain is also suspect. Pain that expands very often indicates a lesion that expands (a tumour or metastasis).

First-time neck pain in an elderly person

A middle-aged or elderly patient who, for the first time in life, complains of neck pain or who describes rapidly increasing pain and neck stiffness, coming on in the course of 1 or 2 months, should be suspected of having malignancy in the cervical spine.

Bilateral arm pain

A discal lesion seldom causes pain in both arms. Either the disorder is discodural, causing bilateral cervicoscapular pain, or there is a discoradicular conflict, in which case pain will be felt in one arm only. A disc displacement that is large enough to cause pain in both arms would certainly also threaten the spinal cord. Other possibilities are: large osteophytes at one particular level and other bony lesions of the cervical spine. Bilateral arm pain is therefore a warning sign for a serious disorder.

Arm pain in a person younger than 30

Root pain as the result of pressure by an ordinary cervical disc is very rare in people under the age of 30. Therefore, if there is evidence of radicular pain and the patient is younger than 30, another cause has to be sought.

Arm pain lasting longer than 6 months

Most lateral disc protrusions tend to resolve spontaneously. For lumbar disc lesions this may take up to 12 months (see Ch. 33). For cervical disc protrusions causing discoradicular pain, the process is faster and most protrusions will have disappeared after 2–4 months, depending on the size of the protrusion (the larger the protrusion, the faster it fades).[1] Therefore, if the pain lasts longer than 4 months, it is unlikely that an ordinary discoradicular lesion is responsible and another cause should be sought.

Wrong time sequence

The symptoms that result from discoradicular root pain follow a typical timeline. Initially there is cervicoscapular pain that later moves distally to become strictly segmental pain. Other symptoms follow: first pins and needles and later numbness. When the reverse is true – root pain starting distally and later moving proximally, or distal paraesthesia occurring before the root pain starts – examiners should again be on their guard because this time sequence makes a discal problem very unlikely.

Warning signs disclosed by the functional examination

Full articular pattern

A full but painless articular pattern with a hard end-feel is normal in elderly patients, and results from the normal degeneration of the cervical spine. However, a full articular pattern that is painful and has a more spastic end-feel points to a serious disorder and warrants further investigation.

Muscle spasm on passive movements

Muscle spasm is a defence mechanism. It is an involuntary muscular contraction that stops the passive movement, thereby protecting the cervical spine against further painful and possibly harmful movement. The muscles contract with a sudden vibrant twang, even when the movement is performed gently. This phenomenon is typical of very acute conditions, like acute arthritis or fractures, and never occurs in ordinary disc lesions; therefore it is always suspicious.

Resisted movements of the neck that are painful and weak

Resisted movements may be painful in acute discal conditions but are never weak. If an attempt to contract the muscles against the examiner's resistance is immediately stopped because it is too painful, full strength is not perceived and the movement is thus interpreted as being weak. This is always a sign of a serious disorder. Painful weakness is mainly caused by a pull on bony lesions (tumours and metastases).

Side flexion away from the painful side as the only painful movement

As mentioned earlier, this partial articular pattern is always suspicious and suggests a costoscapuloclavicular lesion (see online section *The shoulder girdle*) or a visceral lesion in the upper part of the thorax: the apex of the lung or mediastinum.

Limited scapular elevation

Limitation of active elevation alone is extremely rare. In theory, it could result from a C4 palsy or from a spinal accessory palsy, but in practice this is not detected. Limitation of both active and passive elevation of the scapula points to a lesion of the shoulder girdle and not to a cervical lesion. When this sign is found, the examiner should perform a more thorough examination of the shoulder girdle and upper thorax.

Horner's syndrome

This syndrome is caused by an interruption of the sympathetic nerve supply to the eye and is characterized by the classic triad of miosis (constricted pupil), partial ptosis, and loss of hemifacial sweating (anhidrosis). Horner's syndrome may result from several nervous conditions: a lesion of the primary neurone, a brainstem stroke or trauma to the brachial plexus. When the syndrome is accompanied by cervicoscapular pain, the cause is involvement of the cervical sympathetic ganglia at the base of the neck that results from a tumour of the lung apex (e.g. Pancoast)[2] or a dissecting carotid aneurysm.[3]

Hoarse voice

Paralysis of the vocal cords gives rise to typical hoarseness (when a lot of air is released). The cause may be local lesions or involvement of the recurrent laryngeal nerve by an invasive lesion in the neck or upper thorax (bronchial and oesophageal carcinoma, malignancy of the mediastinal lymph nodes and aortic aneurysm).

T1 palsy

Palsy of the first thoracic nerve root leads to atrophy and weakness of the intrinsic hand muscles. The palsy is never caused by a disc lesion. Therefore, the detection of weakness in the

adduction movement of the little finger is always a sign that must be taken seriously. It is one of the first signs of amyotrophic lateral sclerosis, but is also often present in the initial stages of cervical spondylotic myelopathy and in brachial plexus lesions.

Excessive loss of power

Root compression as the result of a protruded disc results in a slight muscular paresis (stage 1 or 2). When more extensive paralysis is found, the condition is, by definition, serious.

Involvement of two or three nerve roots

Unlike in the lumbar spine, root syndromes resulting from cervical discoradicular lesions are always monoradicular. It may be, however, that a radicular weakness does not precisely match the classic pattern. This is somewhat exceptional and is explained by intradural connections between the ventral rootlets of C5, C6 and C7 segments. So it is possible for an individual to have some overlap between myotomes, with one myotome encompassing one or two adjacent segments.[4] It may also be possible to have two disc lesions at two (consecutive) levels at the same time. These situations are rare, however, and therefore, when there is involvement of two or more nerve roots, a more serious lesion should be assumed until there is proof to the contrary.

Muscular weakness in the absence of root pain

In a discoradicular interaction, segmental pain is one of the most striking features and results from a compressed and inflamed dural nerve root sleeve. It is only when the compression continues and increases that paraesthesia and neurological deficit will also follow. For a parenchymatous lesion to develop in the nerve root that is large enough to cause neurological damage, there must have been considerable pressure and pain. Silent radicular weakness therefore means that the cause of the damage is not acute external pressure from a protruded disc.

Warning signs and symptoms are summarized in Box 9.1.

Box 9.1

Warning signs and symptoms

Warning symptoms	Warning signs
• Gradually increasing pain • Expanding pain • First time neck pain in an elderly person • Bilateral arm pain • Arm pain in a person younger than 30 • Arm pain lasting longer than 6 months • Wrong time sequence	• Full articular pattern • Muscle spasm on passive movements • Resisted movements of the neck that are painful and weak • Side flexion away from the painful side as the only painful movement • Limited scapular elevation • Horner's syndrome • Hoarse voice • T1 palsy • Excessive loss of power • Involvement of two or three nerve roots • Muscular weakness in the absence of root pain

Warning signs and imaging techniques

It is the clinical approach that suggests serious disorders. If history and/or clinical examination show one or more warning signs, the examiner should consider the disorder as a serious, non-mechanical disorder until there is proof to the contrary. The presence of a normal X-ray or computed tomographic scan is not always a guarantee of the absence of a serious lesion; nor is the presence of degeneration, bulging discs or herniated discs proof of a symptomatic mechanical lesion.

Access the pathology of non-mechanical disorders of the cervical spine and the complete reference list online at **www.orthopaedicmedicineonline.com**

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