

Ministry of Defence

Synopsis of Causation

Neck Pain

Author: Dr Sally Hobson, Queen's Medical Centre, Nottingham
Validator: Mr Martin F Gargan, Bristol Royal Infirmary, Bristol

September 2008

Disclaimer

This synopsis has been completed by medical practitioners. It is based on a literature search at the standard of a textbook of medicine and generalist review articles. It is not intended to be a meta-analysis of the literature on the condition specified.

Every effort has been taken to ensure that the information contained in the synopsis is accurate and consistent with current knowledge and practice and to do this the synopsis has been subject to an external validation process by consultants in a relevant specialty nominated by the Royal Society of Medicine.

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1. Definition

- 1.1. Neck pain is a very common, non-specific symptom. Of the adult population, 66% will experience it at some point during their lives.¹ The pain can be acute or chronic, and can arise due to pathology either within the neck or elsewhere in the body. The physical/anatomical cause of neck pain can be controversial, and is affected by a number of factors.

2. Clinical Features

- 2.1. Pain and soreness is commonly located in the posterior, paramedian neck muscles and may radiate into the shoulder, arm or head. The pain may be accompanied by stiffness and/or headaches. The underlying condition determines the nature, location, quality and severity of the pain.
- 2.2. Pathology within the neck can also result in symptoms due to associated nerve root compression (radiculopathy) or spinal cord compression (myelopathy).² These symptoms are considerably less common than neck pain alone.

3. Aetiology

3.1. Soft tissue injuries

- 3.1.1. Soft tissue injuries to the neck involve muscular and ligamentous structures. Symptoms are often poorly defined and the physiology of pain due to these injuries is unclear.
- 3.1.2. Neck pain of this type can occur due to postural adaptations to pathology within the shoulder, craniovertebral, or temporomandibular joint. Neck symptoms can persist due to these changes when the precipitating pathology/injury has resolved.
- 3.1.3. The symptom of neck pain is clearly affected by psychosocial factors.^{3,4} These can be workplace related (e.g. job demands), non-work related (e.g. marital or financial problems) or dependent on individual characteristics (e.g. personality, coping ability, job dissatisfaction).

3.2. Neck pain and degenerative changes

- 3.2.1. There is definite controversy with regards to attributing neck pain to degenerative changes within the neck. Cervical spondylosis is a natural consequence of aging, therefore, senescent and pathological processes are morphologically indistinguishable.⁵
- 3.2.2. Following soft tissue injuries to the neck, some patients will report pain in the absence of degenerative changes, whereas some patients with degenerative changes will not develop pain.⁶
- 3.2.3. Cervical discs and facet joints have been demonstrated to be possible pain generators,⁷ but this has not been specifically linked with neck injuries.
- 3.2.4. Certain morphological and genetic factors have been shown to contribute to cervical spondylosis and its resultant symptoms and signs. A large vertebral body and a narrow spinal canal have been associated with increased cervical myelopathy.⁸ There have been a number of case reports detailing first degree relatives with severe cervical spondylosis.⁹
- 3.2.5. Correlation between degenerative changes, symptoms and functional limitations is poor for neck pain alone. There is more consistency in the presence of additional neurological symptoms or signs.

3.3. Neck pain and fast jet pilots

- 3.3.1. Neck pain is a common transient symptom experienced by this group. In one study, 50% of pilots reported in-flight/immediate post-flight pain, with 90% describing at least one event during high G-turns.¹⁰ There are no reports on long-term symptoms or signs.
- 3.3.2. Magnetic resonance imaging (MRI) of the neck in asymptomatic pilots with a significant number of flight hours appears to reveal increased degenerative changes in the neck when compared to a control

group.^{11,12} There is no evidence to correlate this with symptoms or signs.

3.3.3. Exposure to acceleration in all 3 vectors with additional mass above the shoulders (helmet/mask/goggles) can magnify the moment of inertia of the head.¹³

3.3.4. There is evidence that dynamic muscle training exercises may be helpful in prevention of neck pain in pilots.^{10,14}

3.4. **Neck pain and other military and non-military occupational factors**

3.4.1. There is a high risk of acute neck injury due to ejection. There is a particular risk of spinal compression fractures.¹⁵

3.4.2. Repetitive manual work with prolonged loading and vibration exposure has been shown to increase the risk of development of neck pain in many non-military occupational groups (e.g. industrial workers, dentists, sewing machine operators, orchard workers).^{3,4} These are predominantly related to repetitive movements, forceful exertion and constrained or static postures.

3.5. **Other causes of neck pain**

3.5.1. Shoulder problems such as tendonitis and rotator cuff tears can present with neck pain.

3.5.2. Pathology of the heart, lungs and other viscera can send referred pain to the neck.

3.5.3. Associated symptoms of stiffness and other joint/systemic problems can suggest an inflammatory arthropathy.

3.5.4. Rarely, associated fever and weight loss can be suggestive of an infective or malignant neck pathology.

4. Prognosis

- 4.1. The prognosis of neck pain is difficult to predict. It is dependent upon the exact cause of the pain and also on psychosocial factors.
- 4.2. In one small study that followed up patients with a history of soft tissue injury to the neck, some symptoms were said to persist in 86% at 10 years with intrusive symptoms reported in 23%. A worse prognosis was associated with multiple symptoms and paraesthesia.⁶
- 4.3. Most patients with neck pain and cervical spondylosis do well with conservative treatment, providing 70-75% relief of symptoms. They are not at significantly increased risk of developing myelopathy.²
- 4.4. The NATO Research and Technology Association has hypothesised that although pilots exposed to high G-forces are at risk of premature degenerative cervical changes, in time, the level of cervical spine degeneration becomes equivalent with that of the general population.¹² This is supported by a 5-year follow up MRI study comparing military high performance pilots to age-matched controls without military flying experience.¹⁶
- 4.5. There is a need for further development of categorisation schemes for neck pain based on history and mechanical stresses rather than degenerative radiographic findings.¹⁵ This will allow targeting of specific prevention and rehabilitation strategies.
- 4.6. Areas of development include cockpit/workplace ergonomics and preventative muscle training programmes.

5. Summary

- 5.1. Neck pain is a common symptom arising from a number of causes, some of which are poorly defined in terms of their direct aetiology.
- 5.2. Prognosis is difficult to predict, depends on the cause, and is affected by a number of other variables.
- 5.3. Although exposure to high G-forces causes premature degeneration of the cervical spine, this degeneration has not been correlated directly with symptoms, and in time as ageing occurs, appears likely to match levels in the normal population.

6. Related Synopses

Spondylosis

Prolapsed Intervertebral Disc

Whiplash

Work Related Upper Limb Disorder

7. Glossary

cervical	Relating to the neck.
myelopathy	Pathology affecting the spinal cord.
paraesthesia	Abnormal tingling sensations.
radiculopathy	Pathology affecting a nerve root.
referred pain	Pain felt in a part of the body other than where it might be expected. Occurs because sensory nerves from different parts share common pathways to the spinal cord.
senescent	Due to ageing.
spinal canal	Space within the vertebrae through which the spinal cord and spinal fluid passes.
spondylosis	A generalised disease process of the spine, encompassing degenerative changes of the discs, osteophytosis of the vertebral bodies, facet and lamina hypertrophy, and ligament instability.
tendonitis	Inflammation of a tendon.
vertebral body	Largest portion of the vertebra; the 33 vertebrae make up the “backbone”.

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