OCCUPATIONAL STRESS AND ERGOMETRICS

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ABSTRACT

In this review, work related muscular disorders, demonstrated in industrialized and developing countries is explained. One of the major complications are cervical spondylosis, caused by degenerative disc disease at the level of C5-C6 & C6-C7 and produces complications like neck immobilization, activity modification in middle aged and elderly patients manifesting in anatomical damage of both central and peripheral nervous systems. The literature provides strong evidence for the role of job satisfaction, monotonous work, social support at work, high work demands, job stress, and emotional effort at work for inducing the above complications. While the literature on upper extremity disorders are available, higher levels of perceived job demand is positively (job stress) a psychosocial factor most consistently linked to upper extremity disorders. Certain factors that are not work-specific (e.g., general worry/psychological tension, depression/anxiety, general coping style, and response to pain) were also associated with both back and upper extremity disorders. Nonwork-related variables tend to be more commonly related to back pain than to upper extremity disorders. Till date only the posterior operative technique is found to be the most effective technique for treatment. The study will high-light the current scenario, pathogenesis, risk factors and finally ergometric rules to eradicate pain.

Key words: cervical spondylosis, lower extremity and back disorder, ergometric rules.

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INTRODUCTION

Occupational stress occurs when there is a discrepancy between the demands of the workplace and the individual’s ability to compete the demand of the workplace. The occupational stress is caused due to the various factors A) Ability of the employee B) Lack of rewards and recognition. C) Lack of organizational stress. D) Factors unique to the job E)
Interpersonal work relationships Cervical Spondylosis is a chronic degeneration of the bones (vertebrae) of the neck (cervical spine) and the cushions between the vertebrae (disks), mostly between the C5-C6 or C6-C7. Cervical spondylosis affects both sexes, men usually develop it at an earlier age than women, with an occurrence ratio of 3:2 (men: women). (01) Various drugs like corticosteroids, NSAIDS and surgical measures are the most commonly used therapies readily available for the treatment of cervical spondylosis. The main complication in the cervical spondylosis is the narrowing of the spinal canal leading to compression of spinal cord. The professionals in the fields of marketing, information technology, construction are more prone to cervical spondylosis.

**SYNDROMES PRONED TO CERVICAL SPONDYLOSIS**

- Transverse lesion syndrome - Corticospinal and spinothalamic tracts, as well as the posterior columns, are involved.
- Motor syndrome - This primarily involves the corticospinal or anterior horn cells.
- Central cord syndrome - Motor and sensory involvement is greater in the upper extremities than the lower extremities.
- Brown-Séquard syndrome - Unilateral cord lesion with ipsilateral corticospinal tract involvement and contralateral analgesia are present below the level of the lesion.
- Brachialgia and cord syndrome - Predominant upper limb pain is present, with some associated long-tract involvement.

**PATHOGENESIS**

Myelopathy is the presence of long tract signs, which are the result of the spinal afferent or efferent (pyramidal) nerve tracts. Some myelopathic signs include hyperreflexia of deep
tendon reflexes of the upper and lower extremities, increased muscle tone or clonus, and the presence of pathological reflexes, including Babinski’s sign (plantar reflex) and/or Hoffman’s sign. The upper extremities may be affected with compression of the cervical spinal cord. Hoffman’s sign is referred to as the “upper extremity Babinski’s sign”. It is elicited by stimulating the extensor tendon to the third digit by forcible flexion of the distal phalanx, followed by a sudden release, resulting in a flexion and adduction of the thumb and concurrent flexion of the index finger. Sometimes there is flexion of the other fingers as well. The sign is incomplete if only the thumb or only the index finger responds. Hoffman’s sign occurs predominantly in young women, and care must be taken with interpreting this sign. There may be weakness and wasting of the hand muscles. Slow, stiff opening and closing of the fists may be seen. It is not always appreciated, that some patients with spinal cord compression will present with atrophy of the small muscles of the hands, described as “myelopathic hand”, as a result of segmental anterior horn cell necrosis. There is often proximal weakness of the lower extremities (mild to moderate iliopsoas muscle weakness occurs in about 50%) and a spasticity of the lower extremity.¹

Severe cases of cervical spinal canal stenosis can also cause paraplegia, and significant loss of function also rarely, if ever, occurs. In more than 70% of the cases, the reflexes are hyperactive at a varying distance below the level of cervical spinal canal stenosis; clonus or Babinski’s reflex may also be present. Additional signs of CSM include: • inverted radial reflex – tested by stimulating the distal brachioradialis tendon through gentle percussion, producing hyperactive finger flexion; • finger escape sign – provoked by placing the patient’s arms forward with the elbow pronated. A positive sign is noted if the patient is unable to maintain their hands
in an extended position with the third to fifth digits abducted; • occasionally, patients describe an electric shock like sensation shooting down the spine, with flexion of the neck, known as Lhermitte’s sign.

Myelopathy may also involve the loss of proprioception (80%), and, more commonly, gait or fine motor dysfunction, such as difficulty buttoning one’s shirt or change in handwriting. The early phase of CSM is also characterized by clumsiness and unsteadiness with gait. Severe muscle atrophy caudal to the level of stenosis is uncommon with spondylotic myelopathy, unless it is detected in much later stages. Therefore if atrophy is present, physicians must evaluate for fasciculations, particularly proximal to the level of stenosis (i.e. tongue), and exclude the possibility of amyotrophic lateral sclerosis. Bladder sphincter symptoms are common (usually urgency), with anal sphincter disturbances being rare. Degeneration of the joint surfaces and ligaments decreases motion and can act as a limiting mechanism against further deterioration. Thickening and ossification of the posterior longitudinal ligament (OPLL) also decreases the diameter of the canal.2-5

THEORIES INVOLVED IN CERVICAL SPONDYLOSIS

Compression Theory

The compression theory states that the spinal cord is compressed between a spondylotic bar anteriorly and the ligamenta flava posteriorly. The oldest' and still most often cited theory is that CSM is caused by mechanical compression. It is thought that the spinal cord is compressed between a spondylotic bar anteriorly' and the ligamenta flava posteriorly. The spinal cord is most vulnerable to such compression during extension of the neck, when the ligamenta flava bulge
into the spinal canal, decreasing its anteroposterior depth, while the anteroposterior dimension of the spinal cord itself increases.

**Dentate tension theory**

The dentate tension theory states that the spinal cord is pulled laterally by the dentate ligaments, which are tensed by an anterior spondylotic bar. The tensile stresses transmitted to the spinal cord from the dentate ligaments, which attach the lateral pia to the lateral dura. The spondylotic bar displaces the spinal cord posteriorly, but this displacement is resisted by the dentate ligaments. The dural attachments of the dentate ligaments provide a fixed point, so that dentate tension can increase when the spinal cord is displaced posteriorly. The dural attachments do not move because the dural sac is constrained by the dural root sleeves, which are held fixed in the neural foramina. The spinal cord is most vulnerable during flexion of the neck, when the dura is unfolded, and the nerve roots and dentate ligaments are relatively taut.

The most important causes of cervical spondylosis are the mechanical stress and ischaemia. The pathologic course of cervical spondylotic myelopathy is characterized by early involvement of the corticospinal tracts and later destruction of anterior horn cells, demyelination of lateral and dorsolateral tracts, and relative preservation of anterior columns. 6

**COMPLICATIONS INVOLVED IN CERVICAL SPONDYLOSIS**

Cervical spondylosis is the disorder of degeneration of the cervical vertebrae mainly the C5, C6 and C7. It causes inflammation of the spinal canal due to the degradation and breakdown of the respective bones. This may be caused by a volley of causes like pressure in the neck, wrong positioning of the neck during sleep, continuous pressure on the same site of due to profession. It encompasses a sequence of degenerative changes in the intervertebral discs,
osteoarthrosis of the vertebral bodies, hypertrophy of the facets and laminal arches, and ligamentous and segmental instability. The natural history of cervical spondylosis is associated with the aging process. Senescent and pathologic processes are thus morphologically indistinguishable. The changes that accompany the degeneration, such as developing abnormal growths (bone spurs) on the spine, can lead to pressure on the spinal nerves and, sometimes, the spinal cord itself. Mild cases of cervical spondylosis often require no treatment or may respond to conservative treatment, including wearing a neck brace and taking analgesic medication. 

DIAGNOSIS & TREATMENT

- Flexibility test of the neck by having bend the head to the shoulder and turn the head from side to side.
- Nerve functions test. Check for neurological changes due to compression of the spine by testing the reflexes and seeing how the nerves and muscles in the arms and legs function.
- Walking watch to determine whether spinal compression is affecting the gait.
- Neck/spinal X-ray. show abnormalities – bone spurs, that indicate cervical spondylosis.
- **Computerized tomography (CT) scan or magnetic resonance imaging (MRI).** MRI uses a magnetic field and radio waves and can produce detailed, cross-sectional images of the spine. These tests may help to determine the extent of damage to the cervical spine. MRI results and clinical findings should be used when interpreting root compression.
- **Myelogram.** This test involves generating images using X-rays or CT scans after dye is injected into the spinal canal. The dye makes areas of the spine more visible.
- In cervical spondylosis, somatosensory evoked potential (SSEP) responses are delayed or have a low amplitude.
Cortical motor evoked potentials (MEP) may be more sensitive than SSEPs in evaluating spinal cord dysfunction.8-12

A) INITIAL STAGE

- Neck immobilization is a reasonable treatment in patients presenting with mild cases in whom an operation is contraindicated. This simple remedy will result in improvement in 30% to 50% of patients.
- Taking NSAIDs – ibuprofen (Advil, Motrin, others) for pain relief.
- Doing exercises prescribed by a physical therapist to strengthen neck muscles and stretch the neck and shoulders. Low-impact aerobic exercise – walking or water aerobics.

B) ADVANCED STAGES

- Hospitalization with bed rest and traction on the neck for a week or two to completely immobilize the cervical spine and reduce the pressure on spinal nerves.
- Taking muscle relaxants – methocarbamol (Robaxin) or cyclobenzaprine (Flexeril), particularly if neck muscle spasms occur, and taking narcotic medications to relieve severe pain.
- Injecting corticosteroid medications into the joints between the vertebrae (facet joints). The injection combines corticosteroid medication with local anesthetic to reduce pain and inflammation.13-16

C) SURGICAL TREATMENT

- Prosthetic intervertebral disc replacement – This relatively new surgical technique involves removing a worn disc in the spine and replacing it with an artificial disc. The results of this technique have been promising, but as it is still new, there is no evidence about how well it works in the long term or whether there will be any complications.
Anterior cervical discectomy – This is used when a slipped disc or osteophyte (lump of extra bone) is pressing on a nerve. The surgeon will make an incision in the front of your neck and remove the problem disc or piece of bone. This procedure results in a fusion across the disc joint. Some surgeons will insert a bone substitute to encourage fusion and occasionally put a metal plate across the disc if there is slippage of one vertebra on the one beneath.17

Cervical laminectomy – The surgeon will make an incision (small cut) in the back of your neck and remove pieces of bone contributing to compression of your spinal cord. A similar approach is known as a laminoplasty in which bones are spread open to widen the space, but not removed(18)

Anterior cervical approaches are generally preferred, although there are still indications for laminectomy. Surgical results are modest, with good initial results expected in about 70% of patients.18

CONCLUSION

Work has been well documented to be an important risk factor for a range of musculoskeletal disorders. While there is still much debate about classification of the various syndromes, particularly related to upper-limb disorders, there is sufficient evidence that particular types of work-place activity – such as those involving abnormal postures, repetitive movements, and the carrying of heavy loads – result in a range of musculoskeletal disorders, including osteoarthritis. The prevalences of these WRMSDs in developing countries are generally similar, but are sometimes higher than those seen in the developed countries. The types of jobs resulting in these disorders in developing countries are sometimes unique to the
developing world, requiring on the part of the practitioner some knowledge of the working environment. Interventions at a workplace level are key to preventing either primary or recurring disease. Generally, low cost interventions are possible, even in work-places in the developing world, but they require the active participation of the physician, worker and employer.

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References


