Cumulative Trauma Injury

By Theodore Osay, DC

Cumulative trauma injury is collective terminology for what is commonly known as work-related disorders of the head and upper extremities. There are a very large number of back injuries that can be established as cumulative in nature as well.

Basically, cumulative trauma is a wide range of injuries that collectively affect muscles, tendons, and ligament structures.

Cumulative trauma is caused by prolonged static postures and repeated dynamic body postures (repetitious movements) or the combination of both. These postures or combination of postures produce an overload of muscles beyond their inherent capacity for immediate recovery.

The following is a list of terminology that encompasses most of the terminology applied to this "condition."

Cumulative Trauma Disorders of the Upper Extremity

General Terminology:

- repetitive strain injury (RSI)
- cumulative trauma disorder (CTD)
- overuse syndrome

Examples of Specific Clinical Conditions:

- supraspinatus tendinitis
- lateral epicondylitis (tennis elbow)
- medial epicondylitis (golfer’s elbow)
- tenosynovitis/tenovaginitis
- trigger finger
- ganglion cyst
- carpal tunnel syndrome
Examples of General Clinical Conditions:

- cervical syndrome
- cervicobrachial syndrome
- bursitis

It is commonly recognized that these conditions arise out of or occur from repetitive overuse. Further, they are most associated with the short cycle repetitive tasks commonly found on the assembly line. Cumulative trauma can be broken into separate causative factors for a better understanding of this process that afflicts the worker.

Use of Excessive Force Due to:

- inexperience of the job tasks performed (an important factor when implementing a policy of mandatory job rotation);
- improper supervision of the job tasks, allowing bad habits to return or develop;
- a belief that more force does a better job or makes it look like a better job is being done;
- competition on the line among workers or a general aggressive working attitude;
- broken or faulty equipment that requires more effort to accomplish the job task;
- poorly designed equipment that requires more effort to accomplish the job task;

**Fixed Working Postures**

Work activities which require prolonged periods of static posture can also enable an area of primary stress to the body as well. A worker on the rear back line is accumulating static (postural) loading of the neck and shoulder muscles and rapid repetitive contractions of the forearms. Muscles develop "trigger points" (a condition that refers pain from one area to another area), due to the chronic stress state of the muscle, a common finding among all workers on the line. A very common condition among most assembly workers is pain referral from the supraspinatus, (a small shoulder muscle). The arms are used in a raised position quite often which refers pain down the outside of the arm into the thumb.

The nerves that supply the upper extremity originate in the neck and upper back (C5-T2), and joining with large blood vessels, form a neurovascular bundle that must pass through an outlet in the neck and shoulder area. Any malfunction in the cervical spine can put pressure on this bundle and cause pain and dysfunction.
throughout the whole arm and into the fingers.

A large number of people (recent research shows 81 percent) experiencing symptoms of cumulative trauma in the arms and hands, also have cervical spine dysfunction.

**Speed of Workers’ Movements**

This is very important consideration on the assembly line. There are many times when a change in scheduling by the customer results in a faster paced, higher volume of work. The speed of the assemblers movements can be very fast. There are usually a high number of motions for certain stations.

There are sometimes work policies that allow employees to perform high volumes of work, in very short times, in order to leave early. This puts a very heavy demand on the rest of the population that must follow this pace.

When there is machine-paced work, especially at the higher volumes, it puts a good deal of stress on the individual. Humans work in sporadic bursts, do a lot, then enjoy the feeling of accomplishment, and rest. Machines are unforgiving and produce at the rate of the production schedule. Humans do not function well like this. There is psychological stress as well.

**Psychological Stress**

Studies have shown that 50 percent of the people that have upper extremity problems, also have low back pain as well. Many people with chronic/recurrent back problems have at times had symptoms elsewhere. One day the back will hurt, the next there is pain between the shoulder blades.

Statistically, office workers that have reported musculoskeletal pain and discomfort are more likely to suffer from eyestrain, headaches, and report glare problems, etc.

I have mentioned earlier that most low back pain is cumulative in nature, aside from the obvious acute injury. It is not yet classified as a cumulative trauma disorder in many circles.

Numerous studies concerning cumulative trauma have shown that many times stress-related symptoms accompany the expected symptoms based on our knowledge of anatomical structure. These stress-related symptoms have been determined to be manifestations of chronic fatigue or the common condition associated with repetitive work, and myofascial dysfunction.
The Respondex process was developed to specifically reduce, eliminate or prevent myofascial dysfunction, as a result of chronic or acute fatigue of musculoskeletal systems.

One of the primary precursors to cumulative trauma is fatigue, of which there are two basic types.

**Local Fatigue**

Listed below are three general categories of the body in which the resultant symptomatology is described, due to local fatigue:

- biomechanical: involves the mechanical structures that support and move the body (bones, tendons, ligaments, and muscles);
- aching and dull pain of the head and neck, the upper back, especially between the shoulder blades, and lower back and buttocks;
- tenderness, pain, weakness, swelling and temperature differences can be noted in the wrist and hands;
- circulatory: muscles chronically stressed develop myofascial dysfunction and compress the circulatory vessels that pass through the area;
- feelings described as asleep, tingling, numbness, itching, temperature differences, and swelling are common signs;
- neurophysiological (nerve function): When biomechanics become altered by prolonged postures and repetitive contractions, myofascial dysfunction occurs. Nerve tissue becomes compressed and irritated;
- periods of weakness and loss of functional skills associated with these symptoms, i.e., dropping a coffee cup.

**Systemic Fatigue**

There may be any combination of the following signs and symptoms when systemic fatigue is involved with or without local fatigue, although local almost always precedes systemic:

- general feelings of fatigue described as chronic tiredness, and a "worn-out" feeling that does not seem to change, even with adequate sleep;
- inability to sleep that has led or is leading to a general state of anxiety and/or irritability;
- general feeling of heaviness or lack of mobility;
- general or specific pain that has been described as constant or intermittent dull pain, sharp and/or
shooting sensations occurring constantly or intermittently, and burning pain descriptions throughout the
body.

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