After a Fall Event – Quick Tips

Often, employers believe their job is complete if they can keep their workers safe from an impact injury during a fall event. Unfortunately, according to the Occupational Safety and Health Administration (OSHA), timely rescue and post-fall suspension trauma are often ignored when employers are building a fall protection plan. To the employee waiting for rescue, suspension trauma is a real and very serious threat. Greater knowledge of what suspension trauma is and how it affects the body is needed to develop a plan to control the hazards it presents.

What Is Suspension Trauma?

Suspension trauma, also referred to as orthostatic intolerance, is a natural human reaction to being upright and immobile and can be caused by a situation when a person is forced to stay upright without standing. The use of a personal fall arrest system during a fall event can be the cause of this situation.

During a fall event, several things occur that can lead to suspension trauma. Because the worker is suspended in an upright position with his/her legs hanging, blood begins to accumulate in the legs. This is commonly called venous pooling (the accumulation of too much blood in the veins) which reduces the flow of oxygenated blood to the heart and brain.

Additionally, in a post-fall suspension event, the leg straps on a worker's safety harness can exert pressure on veins in the legs, compressing them and further reducing blood flow back to the heart.

When venous pooling happens to someone in a standing position, he or she loses consciousness, faints and falls to the ground, resulting in the head (brain), heart and legs on the same level and normalized blood flow. Unfortunately, during a fall event, the harness keeps the worker upright. The worker faints but cannot collapse and circulation isn't restored.

Under the most ideal circumstances, when a rescue plan is in place, suspension trauma should always be treated as an emergency situation because, according to the Emergency Medicine Journal, it can become fatal in less than 30 minutes.

Suspension Trauma Warning Signs

It is important to know the warning signs associated with suspension trauma. They include faintness, breathlessness, sweating, paleness, hot flashes, increased heart rate, nausea, dizziness, unusually low heart rate, unusually low blood pressure and loss of vision.

Taking Steps to Reduce the Potential for Suspension Trauma

Suspended workers awaiting rescue can take some action to guard against injury. Preventative steps for suspended workers include:

- Adopting a sitting position if possible
- Moving into a horizontal position as much as possible
- Using legs to push off from a hard surface, keeping the muscles active
- Pumping legs frequently to maintain blood flow and prevent venous pooling

One of the primary ways to slow the progression of suspension trauma is to stand up. When standing, the leg muscles must contract to provide support and maintain balance and these actions also put pressure on the veins. This pressure, along with a series of one-way valves in the veins, helps blood get to the heart and reduces the amount of blood pooling in the legs.

How Does a Worker Stand While Hanging in a Harness?

A worker can stand in a harness by employing suspension trauma relief straps. Suspension trauma relief straps typically come packaged in two pouches that attach to each side of a harness. During a fall event, the worker can deploy the trauma relief straps – creating a loop that the worker can put his feet into and press against to simulate standing up.

Figure 1: Suspension trauma relief straps

This allows the leg muscles to contract and can relieve pressure from the leg straps to help improve circulation.

Preparedness is Key

Too often, a worker is saved by his personal fall arrest system, only to succumb to suspension trauma while waiting for rescue. Everyone who works at heights should be fully trained in fall prevention and protection procedures. Those procedures should also include provisions for rescue in the event a fall does occur.

Rescue Procedures

Under 29 Code of Federal Regulations (CFR) 1926.502(d) (construction standard) and 29 CFR 1910.140(c)(21) (general industry standard), OSHA requires that employers provide for “prompt rescue of employees in the event of a fall or shall assure that employees

are able to rescue themselves." Rescue procedures should address the potential of suspension trauma and how rescued workers will be handled to avoid any post-rescue injuries. They should include:

- Employee training on how to "pump" their legs to activate the muscles and reduce the risk of venous pooling as well as how to use footholds to alleviate pressure, delay symptoms and provide support for "muscle pumping."
- Continuous monitoring of the suspended worker for signs and symptoms of suspension trauma.
- Ensuring that a worker receives standard trauma resuscitation once rescued.
- Keeping the worker's air passages open and obtaining first aid if the worker is unconscious.
- Monitoring the worker after rescue and ensuring the worker is evaluated by a health-care professional. The worker should be hospitalized if appropriate. Possible delayed effects, such as kidney failure, which is not unusual in these cases, are difficult to assess on the scene.

Training

When personal protective equipment (PPE) is used in the workplace, per 29 CFR 1910.132(f)(1(i-v), employers must train each employee on:

- When PPE is necessary
- What PPE is necessary
- How to properly don, doff, adjust and wear
- The limitations
- Proper care, maintenance, useful life and disposal

OSHA also states in their Safety and Health Information Bulletin on Suspension Trauma that any workers who wear fall arrest devices while working, and those who may perform rescue activities, should also be trained in:

- How to ascertain whether PPE is properly fitted and worn, so that it performs as intended
- How orthostatic intolerance/suspension trauma may occur
- The factors that may increase a worker's risk
- How to recognize the signs and symptoms of suspension trauma
- The appropriate rescue procedures and methods to diminish risk while suspended

Frequently Asked Questions

Q: What constitutes a prompt rescue per 29 CFR 1926.502(d)(20) and 29 CFR 1910.140(c)(21)?

A: In an interpretation letter from OSHA dated 12/18/2003 the word "prompt" requires that rescue be performed quickly – in time to prevent serious injury to the worker.

Q: When does the rescue provision apply?

A: Rescue must be provided anytime an employee is utilizing a personal fall arrest system. If employee is using restraint system that prevents exposure to a fall hazard then rescue provision is not required.

For more information on fall protection equipment and the associated standards, check out these Grainger articles:

Quick Tips #131: Construction Fall Protection, Subpart M
Quick Tips #347: ANSI Z359: A New Lift to Fall Protection Standards

Sources

Spencer Lane, Suspension Trauma. Occupational Health & Safety. January 2017.

29 CFR 1926.502(d): Fall Protection Systems Criteria and Practices

29 CFR 1910.140: Personal Fall Protection Systems

OSHA, Suspension Trauma/Orthostatic Intolerance, Safety and Health Information Bulletin (SHIB) 03-24-2004, 2011

Dr. Caroline Lee and Dr. Keith M Porter, Suspension Trauma. Emergency Medicine Journal, April 2007

Bill Weems and Phil Bishop, Will Your Safety Harness Kill You? Occupational Health & Safety, March, 2003

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