Silicosis

Workers who are exposed repeatedly to crystalline silica particles over prolonged periods are at risk for developing silicosis.

Toxicokinetics

Silica is the most abundant mineral on earth and exists in crystalline (toxic) and amorphous (non-toxic) forms. Naturally occurring examples include quartz, volcanic rocks, and flint. Silicates—combined silicas—include asbestos, talc, and mica.

Toxicokinetic considerations relate to particle size of the silica. Crystalline silica particles that are greater than 5 μm are deposited in the upper airway. Particles in the 1-μm range travel to the alveoli. Instead of being engulfed by macrophages and cleared, a toxic reaction occurs. The resulting immune stimulation is significant and the inflammation response results in a progressive fibrotic process. This leads to a stiff smaller lung with a decreased capacity for gas exchange. Repeated exposure to crystalline silica particles promotes chronic inflammation and more fibrotic scarring. Over time, a restrictive lung function develops.

Symptoms

Clinically, there is very long latency with workers generally being asymptomatic until the later stages. Symptoms of excessive dyspnea and X-ray findings do not necessarily correlate. There may be significant X-ray changes and few symptoms or vice versa. Pulmonary function test (PFT) results show the expected pattern of restricted lung disease, with reduced forced vital capacity, reduced forced expiratory volume in 1 second, and reduced total lung capacity.

Diagnosis

If you have a patient who has worked in a variety of occupations and now has lung symptoms and PFT results compatible with a restrictive lung pattern, consider the possibility of silicosis. Diagnosis requires a history of exposure sufficient to cause silicosis and a chest X-ray with egg-shell opacities consistent with the disease. Complications of silicosis include lung cancer, renal disease, and collagen vascular diseases such as systemic lupus erythematosus, rheumatoid arthritis, and scleroderma.

Treatment

There is no specific treatment, but outcome is generally favorable with early removal from exposure.

Prevention

On construction sites, where workers are exposed to various types of dust particles, long-term lung health is a concern. Silicosis is preventable with worker education, engineering control of dust levels, appropriate use of respirators, and monitoring programs.

If you know a patient is at risk for workplace lung disease, or any other occupational disease, raise the issue of exposure control.

For more information

For more information on silicosis, please contact the medical advisor in the WorkSafeBC office nearest you.

Trivia

For you trivia buffs, pneumonoultramicroscopicsilicovolcanoconiosis, a lung disease caused by the inhalation of very fine silica dust found in volcanoes, is a 45-character word reputed, by some, to be the longest in the English language.

—D. Barry Carruthers, MD, CCFP, CIME, FCBOM
WorkSafeBC Medical Advisor

Annual WorkSafeBC Physician Education Conference
Saturday, 24 October 2009 at Laurel Point Inn in Victoria

- Guest Speakers confirmed to date:
  - Dr Colin Landels—**Shoulder Injuries**
  - Dr Lee Glass—**The Dreaded Discussion: How to Have it and Come Away Pleased with the Outcome**
- Panel discussion on opioids and the worker in pain: views from a psychiatrist, physiatrist, and addiction medicine specialist.
- Lectures and interactive workshops covering topics on orthopaedics, chronic pain, prescribing, forms, occupational medicine.
- Worksite visit: Meet the chef and staff at the Laurel Point Inn where you'll experience hands-on your patient's tasks at such a worksite.

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