

Be Prepared to Treat Cutaneous Radiation Injuries

U.S. Army dermatologist outlines injuries that could result from terrorist event and how to treat them.

BY NANCY WALSH
New York Bureau

NEW YORK — The mantra for the new world order is “It is not if, but when,” and physicians must be prepared to care for victims of radiation injury resulting from terrorist events, Lt. Col. Norvell V. Coots, MC, USA, said at the annual meeting of the National Medical Association.

Radiation injury can result from dirty bombs, which are devices that contain radioactive material along with conventional explosives, or small thermonuclear “suitcase” bombs, which proliferated in the former Soviet Union. It is thought that some have not been accounted for, Dr. Coots said. Additionally, explosives could be planted near a factory or hospital that uses significant amounts of radioactive material, in essence creating the same results.

Cutaneous injuries can result from the direct effects of radiation, especially on the basal layer, which is the most radiosensitive. Flash burns, which are caused by heat, can be particularly injurious if the victim is wearing dark clothing that will absorb the heat or even burst into flame, he said. Contaminants left on the skin can cause further injury.

The cutaneous damage from radiation injury may manifest as ecchymoses, petechiae, bullae, epidermal sloughing, ulceration, hair loss, hyperkeratosis, and stochastic radiation reactions with long-term carcinogenesis.

In treatment of these patients, the first concern is decontamination, which consists of removal of clothing and washing the body with soap and water. “Soap does exactly what it is supposed to do—it breaks the electrostatic and protein bonds that cause contaminants and dirt to adhere to the skin,” Dr. Coots said.

The wound should then be debrided and treated with topical antimicrobials. Because there may be damage to the vasculature and a lack of oxygenation in the area, hyperbaric oxygen may be beneficial for healing.

Aside from the cutaneous injury, acute radiation syndromes affect the hematopoietic, cardiovascular, gastrointestinal, and central nervous systems, beginning with a prodromal phase that typically consists of nausea, vomiting, and diarrhea. This is followed by a latent subclinical phase and then acute radiation illness, with effects ranging from moderate leukopenia to pneumonia, purpura, hemorrhage, and convulsions. The damage is progressive

and dose dependent, said Dr. Coots, who is the commander of the Andrew Rader U.S. Army Health Clinic, Fort Myer, Va., and a staff dermatologist at Walter Reed Army Medical Center, Washington.

Treatment also must include control of sepsis and pain, as well as surgical repair as needed. Flaps are used rather than grafts because with radiation injury the skin is devascularized and a graft would fail, he said.

Care of the victim will also require consultation with many colleagues—both specialist physicians and mental health care providers. “Fear is one of the biggest things we have to deal with any time we deal with a terrorist event, but particularly with radiation because its invisibility is particularly threatening,” he said.

“The purpose of terrorism is simple: It’s a psychological weapon aimed at the civilian population rather than the military population, and it is designed to force a nation to surrender when their military forces never would,” Dr. Coots said.

“We’re a big country but we’re a vulnerable country,” he said. The United States has thousands of miles of coastline and porous borders in both the north and south. Millions of people travel to or from the United States each year through hundreds of international airports.

Additionally, hundreds of ships dock here annually, depositing millions of containers that can be distributed across the



Care of radiation victims will require consultation with many colleagues, noted Lt. Col. Norvell V. Coots, MC, USA.

country within hours or days, he said.

The federal government maintains three main information sites on dealing with ionizing radiation injuries:

- ▶ Radiation Emergency Assistance Center/Training Site (REAC/TS), www.orau.gov/reacts/default.htm;
- ▶ Centers for Disease Control and Prevention, www.bt.cdc.gov/radiation/pdf/MassCasualtiesGuidelines.pdf
- ▶ Armed Forces Radiobiology Research Institute, www.afri.usuhs.mil.

Expert Describes Skin Signs of Deep Fungal Infections in Children

BY DOUG BRUNK
San Diego Bureau

SAN DIEGO — Although deep fungal infections are rarely seen in North American children, they can present in those who visit or emigrate from tropical or subtropical areas of the world, Hector Caceres-Rios, M.D., said at the annual meeting of the Society for Pediatric Dermatology.

Dr. Caceres-Rios, professor of dermatology at Cayetano Heredia University, Lima, Peru, discussed several deep fungal infections:

▶ **Mycetoma.** This infection is seen mostly in Africa, India, Mexico, and Brazil. It typically peaks in the 3rd to 5th decade of life, but in Mexico it has been reported in 35% of citizens aged 16-30 years.

Infection occurs from inoculation with thorns, splinters, and sometimes animal bites, and incubation ranges from weeks to years. The disease course can last from months to decades.

The two main forms are eumycotic mycetoma and actinomycotic mycetoma.

Eumycotic mycetoma is typically restricted to the lower limbs (the foot in 70% of cases).

Causative agents include eumycota, dark grains, and white grains.

Eumycotic mycetoma is characterized by a painless swelling with multiple fistulae that discharge grains.

It may spread to the spinal cord, muscles, bones, and viscera. Treatment includes surgery and long-term use of ketoconazole or itraconazole.

Actinomycotic mycetoma is clinically similar to eumycotic mycetoma but is more painful. Causative agents typically include the *Nocardia* and *Streptomyces* species of aerobic bacteria. *Nocardia brasiliensis* may cause inflammation at the affected site, while *Actinomyces madurae* causes the site to take on a “woody consistency,” he said.

Long-term antimicrobial therapy with streptomycin plus sulfamethoxazole and trimethoprim is required for these patients.

▶ **Sporotrichosis.** This infection is caused by skin injury with contaminated material or inhalation into the lungs. The culprit is *Sporothrix schenckii*, a dimorphous fungus. The infection primarily affects cutaneous tissue and lym-



Eumycotic mycetoma of the foot is treated with surgery and long-term use of ketoconazole or itraconazole.

phatic tissue but may also affect bones, joints, and viscera.

Dr. Caceres-Rios said that Mexico, Peru, and Colombia are the major endemic areas. Incubation varies from 1 week to 6 months, and first lesions usually appear on the extremities, followed by regional adenopathy. Treatment involves itraconazole 5 mg/kg per day for 16 weeks.

The infection occurs mainly in adults, but in some endemic areas of Peru, 60% of the cases occur in children under age 15.

▶ **Chromoblastomycosis.** This infection is caused by pigmented dematiaceous fungi, which generate dark yeasts. The disease is most prevalent in Madagascar,

Brazil, and the Caribbean, and it presents in five clinical forms: nodular, tumoral, verrucous, plaquelike, and scar.

The disease typically peaks in the 3rd to 5th decade of life, but infection in children has been reported (Ann. Trop. Paediatr. 1990;10:273-7). Adults commonly present with the verrucous form, whereas children typically have nodular and plaquelike lesions.

This disease “may be extremely indolent, lasting for more than 20 years,” Dr. Caceres-Rios said.

▶ **Paracoccidioidomycosis.** According to Dr. Caceres-Rios, this is “the most important systemic mycosis in Brazil, Peru, and Mexico.” This infection is caused by *Para-*

coccidioides brasiliensis, a dimorphous fungus. Common signs include warty, ulcerated, crusty lesions on the face and limbs.

The disease peaks in middle age, but in Brazil nearly 6% of affected patients are children. Paracoccidioidomycosis is mainly a pulmonary infection, but it may disseminate to other organs.

The most common form, disseminated paracoccidioidomycosis, is characterized by pulmonary, mucocutaneous, and lymph node involvement. Oral lesions occur in 80% of adults with this form.

Skin lesions are usually painful ulcerative or verrucous plaques. He said he treats severe cases with amphotericin. ■



Localized sporotrichosis in a child is treated with itraconazole 5 mg/kg per day for 16 weeks.