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**Figure 1.** Bluish-black discoloration of nails and fingers.



**Figure 2.** Bluish-black patch over thigh. Used with permission of Praveen Aggarwal, Department of Emergency Medicine, All India Institute of Medical Sciences, New Delhi, India.

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A 24-year-old man presented to the emergency department with bluish-black discoloration of nails, nailbeds, hands, and gums for the last 5 days. He was a scrap worker in a shop where metals were recycled. On examination, he was afebrile, with a pulse of 86 beats/min and blood pressure of 152/80 mm Hg. The nails and fingers showed bluish-black patches (Figure 1). Similar patches were observed on the thighs (Figure 2). A systemic examination result was normal. His laboratory values were hemoglobin level 9.4 g/dL, total leukocyte count  $1,700/\text{mm}^3$ , and platelet count  $26,000/\text{mm}^3$ , with normal kidney and liver function tests. The chest radiograph result was normal.

*For the diagnosis and teaching points, see page 406.*

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## IMAGES IN EMERGENCY MEDICINE

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### DIAGNOSIS:

*Acute radiation syndrome caused by exposure to radioactive cobalt.* Cobalt-60, a radioactive isotope of cobalt, is widely used in hospitals, laboratories, and industries. To prevent exposure to radiation, it is stored in metallic housings. Because scrap workers deal with metallic items, cobalt contained in metallic housings can easily get mixed in with scrap metal and pass undetected into scrap metal recycling facilities. In this instance, a total of 7 people were exposed to cobalt-60 radiation. They presented with bluish-black discoloration of nails, nailbeds, hands, and gums; some had obvious loss of hair and bleeding manifestations. Pancytopenia was present in 6 patients. Investigations revealed that cobalt-60 inside a shielded container was sold as scrap. It was then opened and dismantled by scrap workers.

Cobalt-60 radiation injuries are mainly due to its  $\gamma$  radiation. This electromagnetic radiation is of very short wavelength that can penetrate deeply into tissues. Exposure of the entire body (or most of the body) to a large dose of radiation during a short period can lead to acute radiation syndrome,<sup>1</sup> which usually has 4 phases: prodrome, latent, radiation illness, and recovery/death. Exposure to radiation levels less than 1 Gy may produce mild radiation syndrome. It causes transient lymphocytopenia that lasts 2 to 3 weeks and improves by itself. At 0.7 to 4 Gy, hematopoietic stem cell depression is marked but bone marrow eventually recovers in almost all patients, with the use of hematopoietic growth factors. At 6 to 8 Gy, bone marrow may not recover and death can ensue because of bleeding and sepsis. Stem cell transplantation may be conducted, but results in patients involved in the Chernobyl accident were dismal. Exposure to high levels of radiation (6 to 30 Gy) produces gastrointestinal toxicity, whereas at levels greater than 20 Gy, the cardiovascular and nervous systems are affected. Effects of radiation on skin are inflammation and erythema; damage to hair follicles, causing loss of hair; increased skin pigmentation; and local burn. After acute exposure to radiation, absolute lymphocyte counts at 24 and 48 hours are excellent prognostic indicators. A 50% decrease in absolute lymphocyte count within the first 24 hours after exposure, followed by a further, more severe decrease within 48 hours, characterizes a potentially lethal exposure.<sup>2</sup>

Patients who are exposed from an external source without any skin contamination with radioactive material do not pose any danger of radiation to emergency physicians. If the source is present on the skin, the victim's clothing should be removed, after which a thorough wash with soap and water should be administered. Exposure of emergency physicians is usually negligible during this period.

### REFERENCES

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