

IMAGES IN INTERVENTION

Cutaneous Radiation Injury After Complex Coronary Intervention

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A 57-year-old man who presented with exertional chest discomfort underwent stenting of a high-grade, calcified lesion in the distal right coronary artery (RCA). An ostial dissection, which resulted from deep intubation of the guiding catheter during delivery of the stent, was also treated. The procedure time was 171 min with 59.1 min of fluoroscopy recorded. Thirty-four of the 47 cine runs were performed in left anterior oblique 39, caudal 0 projection. One week later, the patient presented with recurrent chest pain. Repeat angiography revealed a filling defect within the distal RCA stent. The stent was redilated. The second procedure required 108 min with 34.6 min of fluoroscopy recorded. Of the 38 cine runs, 27 were obtained in left anterior oblique 32, caudal 0. The estimated skin dose from both interventions was 3.75 Gray (Gy).

The patient presented to his primary care physician 5 weeks later complaining of a rash over his right scapula. Topical steroids were prescribed. Later that week, he again developed exertional chest pain. Physical examination revealed a 5 cm × 10 cm area of erythema and dry desquamation over the patient's right scapula (Figs. 1A and 1B). A grade I cutaneous radiation injury was diagnosed. The affected area was marked with radio-opaque rulers (Stent Guide, LeMaitre, Burlington, Massachusetts). Diagnostic angiography was performed taking care to avoid exposing the demarcated area to additional radiation. Severe in-stent restenosis was observed in both the proximal and distal RCA stents. The patient was referred for surgical bypass of the RCA and left anterior descending

coronary artery. The radiation injury was treated with topical silvadene and resolved over the next month.

In contemporary practice, operators routinely perform complex interventions in the coronary and peripheral circulation that may expose patients to large radiation doses. Patients who receive a skin dose of >2 Gy may develop cutaneous radiation injury (CRI). The incidence of CRI is thought to be less than 0.01% but is likely under-reported as radiation burns may be unrecognized or misdiagnosed (1). In grade I CRI, a prodromal phase consisting of pruritis, tingling, or transient erythema may be observed 1 to 2 days after exposure. After a latent phase of 2 to 5 weeks, cutaneous erythema, slight edema, and increased pigmentation may be seen. Dry desquamation is observed 6 to 7 weeks after exposure (2). Mainstay therapy for grade I CRI includes controlling pain and preventing infection. Complete recovery is expected 3 to 6 months after exposure. Larger radiation doses produce greater injury. In grade IV CRI, which is associated with skin dose >550 Gy, patients develop blisters and ischemia 1 to 4 days after exposure. Within 2 weeks, skin necrosis may occur. The affected area may require skin grafting.

Radiation exposure to patients and operators may be decreased by minimizing source-to-image distance, angling the tube towards right anterior oblique projection or utilizing less steep left anterior oblique angles, collimating the fluoroscopy beam, and avoiding high-intensity fluoroscopy mode (3). During lengthy procedures, the tube angle should be altered periodically. In cases where patients have received high-dose radiation and are slated to undergo repeat intervention, the skin entrance site should be excluded from the fluoroscopy field to decrease the cumulative skin dose (4).

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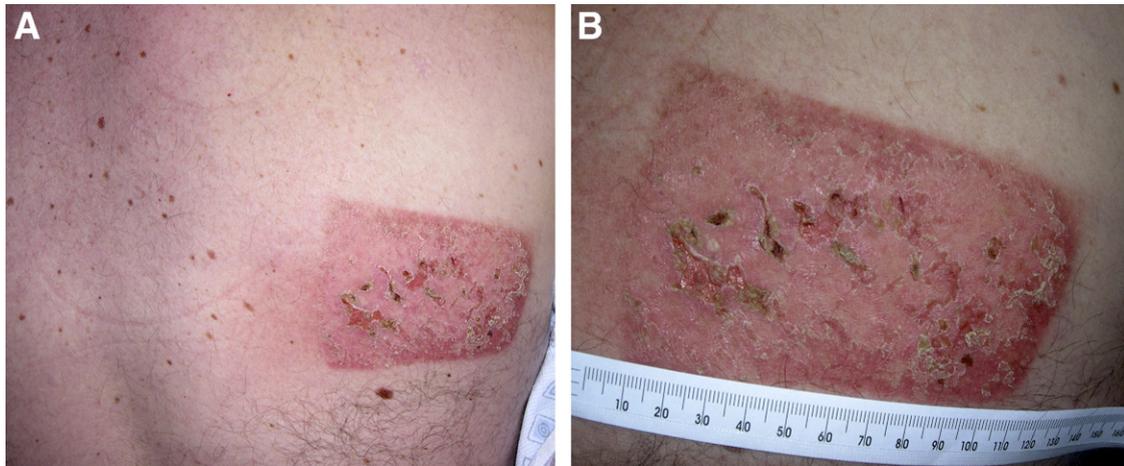


Figure 1. Photograph and Close-Up of Cutaneous Radiation Injury

(A) Grade I cutaneous radiation injury over scapula. Photograph showing a 5-cm by 10-cm rectangular area of erythema over the right scapula of a patient 7 weeks after 2 complex percutaneous coronary interventions of the right coronary artery. The index procedure was performed principally in left anterior oblique 39, caudal 0 projection, while the second procedure was performed primarily in left anterior oblique 32, caudal 0. The estimated skin dose from both interventions was 3.75 Gray (1 Gray = 100 rads, a unit of absorbed dose that reflects the amount of energy deposited in a mass of tissue). **(B)** Close-up photograph of grade I cutaneous radiation injury. The burned skin is sharply demarcated and features dry desquamation. A lighter area of erythema is present medially (**left edge** of photograph) that reflects the damage produced during the second procedure when the camera angle was shallower. Several blisters have resolved. There was no evidence of infection.

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