Chronic Radiodermatitis Following Repeated Coronary Interventions in a Patient with Psoriasis: A Case Report

Lara Vasari[1], Gordana Krnjević-Pezić[1], Lucija Tomić Babić[1], Mirna Bradamante[2]

[1]Naftalan – Special Hospital for Skin and Rheumatic Diseases, Ivanić-Grad, Croatia; [2]Department of Dermatovenereology, University Hospital Center Zagreb, Croatia

The article should be attributed to: Department of Dermatovenerology, University Hospital Center Zagreb

Corresponding author:

Assist. Prof. Mirna Bradamante, MD, PhD
Department of Dermatovenerology
University Hospital Center Zagreb
10000 Zagreb Croatia
mirna.bradamante@gmail.com

SUMMARY Fluoroscopy-induced radiodermatitis, whether acute or chronic, is a complication of fluoroscopy-guided cardiac diagnostic and interventional procedures. Repeated cardiac catheterization and coronary angioplasty procedures, prolonged exposure time and, radiation doses greater than 10-12 Gy are the culprits in the development of skin inflammation. Acute radiodermatitis usually develops within two weeks after the procedure and is easily recognized clinically, whereas the chronic form can have a long latent period of almost ten years. Clinical symptoms of chronic disease caused by excessive irradiation include atrophy, sclerosis, telangiectasia, pigmentary changes, ulceration, and even the development of malignant neoplasms. We describe a patient with a history of psoriasis in whom chronic radiodermatitis developed after six fluoroscopic cardiac procedures, and the diagnosis established approximately four years after the last catheterization.

KEY WORDS: radiodermatitis, coronary angiography, skin ulcer, psoriasis

INTRODUCTION

Numerous cardiac and vascular diagnostic and interventional procedures are performed fluoroscopically, using X-rays to visualize the endovascular catheter, exposing the patient to harmful ionizing radiation (1). Fluoroscopically guided cardiac procedures comprise coronary angiography, percutaneous coronary intervention (PCI), including percutaneous transluminal coronary angioplasty (PTCA) with or without ballooning and stenting, aortocoronary bypass grafting, radiofrequency ablation, valve replacement, and closure of atrial or ventricular septal defects (1,2). Although it is a known complication of radiotherapy, with an incidence of up to 90%, radiation dermatitis occurring after cardiac procedures has been receiving increasing attention (3). It is likely the result of repeated, complex, and prolonged procedures with a radiation threshold dose of ten to twelve Greys (4). Since lifelong cumulative radiation doses become much higher due to multiple procedures, it is not surprising that radiation dermatitis following invasive cardiac procedures is no longer rare. The location of radiodermatitis correlates with the site of radiation beam entry and thus differs among different procedures. Chronic skin damage, which is not always preceded by acute damage, can develop as much as ten years after the procedure (2). In this report, we present a patient with psoriasis who developed chronic radiodermatitis after a total of six fluoroscopically guided cardiac procedures.

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CASE REPORT

A 67-year-old male patient presented with an ulcerated subaxillary plaque on the right side of the chest that had been present for three years. His past medical history included plaque psoriasis treated with methotrexate, hypertension, hyperlipidemia, unstable ventricular tachycardia, and coronary heart disease. The patient did not report any history of radiation therapy. He underwent six coronarographies, the first of which was performed approximately thirteen years prior to the development of the ulcerated skin plaque. During one of those procedures, a PCI of the occluded right circumflex artery (RCA) was attempted for a total of 80 minutes, with a fluoroscopic time of 33 minutes. Due to the length of the diascopy, the procedure was stopped and re-attempted several times afterwards, ultimately finalized with the successful implantation of a drug-eluting stent. Shortly after the last catheterization, the patient noticed an ulcerated plaque just below the right axilla, but did not request medical assistance. Four years later, a 7×4 cm well-demarcated, hard, centrally ulcerated and peripherally hyperpigmented plaque with teleangiectasia was noted below the right axilla (Figure 1). In addition to the ulcerated plaque, the patient also had several psoriatic plaques on the trunk. Histopathologic examination of the ulcerated plaque demonstrated irregularly acanthotic epidermis with hyperpigmented basal layer, dilated superficial vessels in papillary dermis, stellate fibroblasts, pigmentophages, and prominent sclerosis (Figure 2). The findings were consistent with chronic radiodermatitis. The patient's history of multiple catheterizations, prolonged fluoroscopic exposure, the location of the lesion, and typical histology were highly suggestive of fluoroscopy-induced radiation dermatitis. The initial treatment consisted of locally applied silver dressings, antiseptics, and antibiotics, but did not result in any clinical improvement. The patient was not attending regular check-up appointments and he was lastly seen several years after the diagnosis has been done. At that point he still had several yellowish crusts and ulceration. Unfortunatelly the patient patientt refused any additional surgical treatment.

DISCUSSION

While radiation dermatitis is common and well-documented, fluoroscopy-induced radiation dermatitis is fairly infrequent because radiation doses delivered during fluoroscopic procedures are usually low and do not reach the threshold needed for skin injury. If it occurs, it usually manifests only after multiple procedures with a longer exposure time. A large dose of irradiation can cause inflammation of the skin, adnexal structures, and subcutaneous fat. During cardiac procedures, the skin of the upper back receives the highest radiation levels. Whether acute or chronic, radiation dermatitis from coronary procedures usually occurs on the mid back, the scapular areas, the right anterolateral chest, and below the right axilla (3). Lesions on the affected skin have sharply defined edges and have a specific shape that depends on the collimator used during the procedure, being rhomboid or cube-shaped if a linear collimator was used or oval if a round (iris) collimator was used (4).

Figure 1. Two psoriatic plaques and livid plaque with a small ulceration and hyperpigmented periphery in the axillary line.

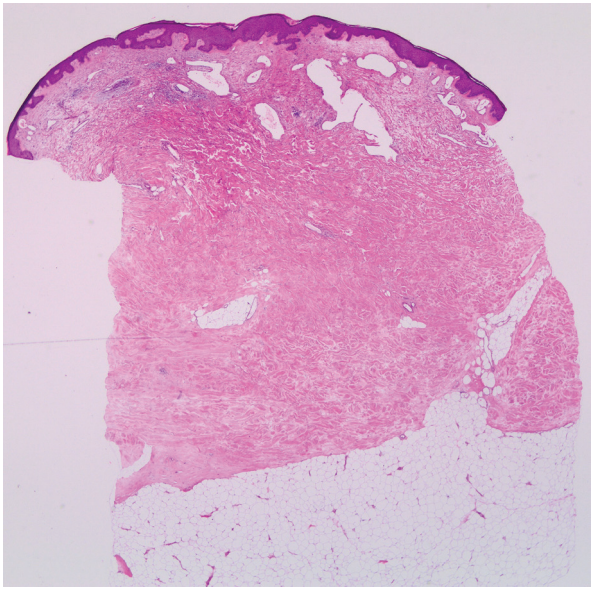

Figure 2. Dilated vessels in the papillary dermis with sparse mononuclear infiltrate, fibroblasts, and prominent sclerosis of the deep dermis and interlobular septa.

Signs of acute radiation dermatitis such as erythema, epilation, desquamation, and skin necrosis are usually present. Nevertheless, these are not prerequisites for developing the chronic form of the disease that is characterized by sclerosis, telangiectasia, ulceration, and necrosis. In addition to depending on the dose of radiation received, prior irradiations, and the duration of the procedure itself, the risk of the occurrence of chronic radiodermatitis is also patient-dependent. Obese patients, the once taking drugs such as doxorubicin, actinomycin D, bleomycin, 5-fluorouracil, or methotrexate, smokers, and patients with a history of connective tissue diseases are at increased risk (5). Our patient had a higher risk for chronic radiodermatitis due to obesity, methotrexate consumption, repeated irradiations, and one fluoroscopy-guided cardiac procedure with prolonged exposure time. Additionally, our patient was at higher risk because of chronic total occlusion (CTO) of RCA. In PCI RCA, the surface of the skin is closer to the X-ray tube because a mostly left oblique projection is used, so the patients usually receive a higher dose of radiation (compared with the right oblique projection) (7). Wei *et al.* reported nine patients with chronic radiodermatitis similar to ours: six of them were obese, all of them had occlusion of the RCA, and five of them had CTO (6). Although chronic radiodermatitis can be clinically mistaken for morphea or fixed drug reaction, in the right clinical setting a biopsy is usually not needed. The final diagnosis is easily established if the period between the procedure and the onset of skin symptoms is short, but cases with a long latent period can be misleading. Malignant transformation into squamous cell carcinoma in the area exposed to radiation is well-documented (3,6). Sporadic reports of basal cell carcinoma developing even 20-30 years after multiple diagnostic procedures and large cumulative doses of irradiation have also been described (3). Therefore, after cardiologic procedures, especially multiple ones, patients should be closely monitored during follow-up for any newly developed skin lesions in the area exposed to irradiation. Unfortunately, there are currently no standard treatment options for radiation dermatitis, and treatment consists mostly of symptom management and application of local corticosteroids. Laser therapy and surgical treatment with skin grafts could also be considered.

CONCLUSION

New and more complex cardiologic procedures and increasing numbers of such procedures performed throughout patients' lives inevitably lead to a higher cumulative radiation dose and possible cutaneous side-effects caused by X-rays. Chronic radiodermatitis is a severe and poorly treatable side-effect of ionizing radiation that can develop months to years after radiation exposure. Because of this extreme variability in time of onset the diagnosis can be easily missed without a thorough patient's history, with an emphasis on previous interventions. Patients undergoing multiple fluoroscopic procedures should be periodically examined to prevent potential complications of radiation exposure, such as chronic radiodermatitis or the development of malignant neoplasms. The appearance of a well-demarcated, sclerotic, ulcerated plaque with telangiectasias that is resistant to local treatment in a patient who underwent several fluoroscopy-guided cardiac procedures should raise the suspicion of chronic radiodermatitis. Due to increasing frequency of cardiac angiographic interventions, it is important we raise awareness of this complication, the incidence of which might rise in the future.

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