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CASE REPORT
Reconstructive

Severe Acute Radiodermatitis in a Keloid Patient with Takayasu's Arteritis

Yasuhiro Katayama, MD*
Satoko Yamawaki, MD*
Michio Yoshimura, MD, PhD†
Rino Aya, MD*
Tatsuki Enoshiri, MD*
Katsuhiro Yoshikawa, MD, PhD*
Motoko Naitoh, MD, PhD*
Shigehiko Suzuki, MD, PhD*

Summary: Although combination therapy for keloid including postoperative radiation therapy (RT) is common, the radiation toxicity of RT in a patient with a history of collagen vascular disease has not been fully recognized. We experienced a case of an acute radiodermatitis in a patient with keloid. This patient had a chest keloid because of the bypass surgery for Takayasu's arteritis. After we performed an excision and postoperative RT, severe radiodermatitis occurred. We speculate that the higher single dose and the use of electron beams may be related to the onset of severe acute radiodermatitis in this case. It should be kept in mind that there is a risk of exacerbation of radiation toxicity in patients with collagen vascular disease. *(Plast Reconstr Surg Glob Open 2014;2:e270; doi: 10.1097/GOX.0000000000000235; Published online 16 December 2014.)*

Keloids are refractory to treatment; therefore, combination therapy is common in keloids.[1,2] In our institution, we have treated keloid scars with surgical excision and postoperative irradiation for 20 years. We experienced a case of severe acute radiodermatitis in a patient with a history of Takayasu's arteritis. We herein report this case of acute radiation toxicity caused by radiation therapy (RT) in a patient who developed a chest keloid after undergoing bypass surgery for Takayasu's arteritis.

CASE REPORT

The patient was a 67-year-old Japanese woman with a chest keloid. At 35 years, she had been diagnosed with Takayasu's arteritis (aortitis syndrome) and underwent internal carotid artery bypass surgery, followed by oral corticosteroid (prednisolone) therapy, at a dose of 15 mg/d for 3 months. The dose of steroids was subsequently tapered to 5 mg/d and continued for 5 years with anticoagulation therapy (warfarin). Several years later, the chest surgical scar turned into a keloid with a wide area of contracture, and the patient frequently suffered from purulent infections.

Upon her visit to our hospital, the patient had been free of both Takayasu's disease and treatment for 27 years. She presented with a 36×35 mm keloid on the medial end that extended beyond the initial scar. In addition, a keloid contracture had resulted in the formation of a pocket measuring 24×23 mm in size that opened inferiorly. A small inclusion cyst was present on the top of the pocket (Fig. 1).

SURGICAL PROCEDURE

We resected the keloid completely, preserving the pocket. The pocket was cut at the left end and hinged to the right, and the lid of the pocket was used as an advancement flap to cover the raw surface. Interrupted subcutaneous sutures and dermal sutures were used for closure (Fig. 2).

*From the *Department of Plastic and Reconstructive Surgery, Kyoto University Graduate School of Medicine, Kyoto, Japan; and †Department of Radiation Oncology and Image-Applied Therapy, Kyoto University Graduate School of Medicine, Kyoto, Japan.*
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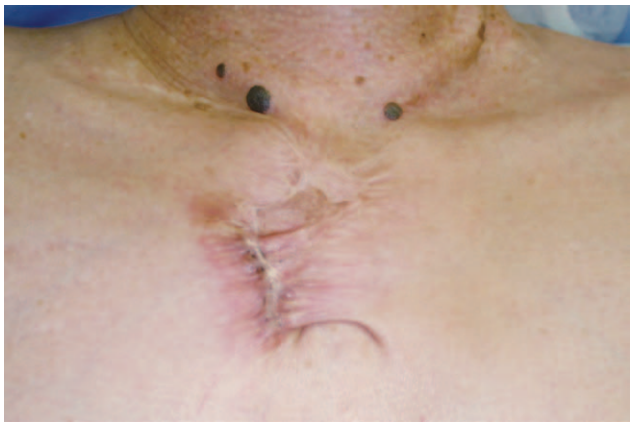

Fig. 1. A keloid on the medial side of the bypass surgery scar. The pocket was opened inferiorly.

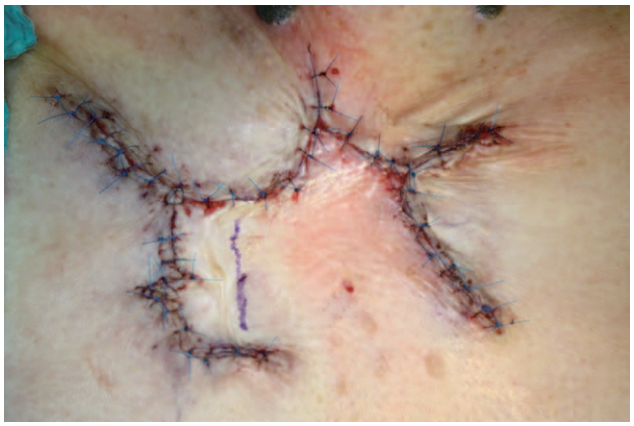

Fig. 2. The keloid was resected completely and covered with local flap.

POSTOPERATIVE COURSE

We performed RT using an electron beam, applying 20 Gy in 5 fractions, from the third to the 10th day after the operation. There were no side effects during RT, and the patient's postoperative course was uneventful. All stitches were removed on postoperative day 7. Thirty-seven days after the operation, redness, blisters, and ulceration developed within the radiation field, and the patient complained of itching and pain (Fig. 3). We diagnosed her as having third-degree radiodermatitis and applied steroid ointment (difluprednate) twice a day. The ulceration was cured in 5 days, and the redness in the radiation field diminished after 14 days (Fig. 4). No recurrence has been detected as of 6 months after the operation, without any additional treatment.

DISCUSSION

We herein experienced a case of severe acute radiodermatitis caused by postoperative irradiation for a keloid in a patient with Takayasu's arteritis. Takayasu's arteritis is a collagen vascular disease (CVD) characterized by stenosis of large blood vessels, such as the aorta and its main branches, as a consequence of inflammation of large blood vessels.[3] Corticosteroids and bypass surgery are often used to manage Takayasu's arteritis.

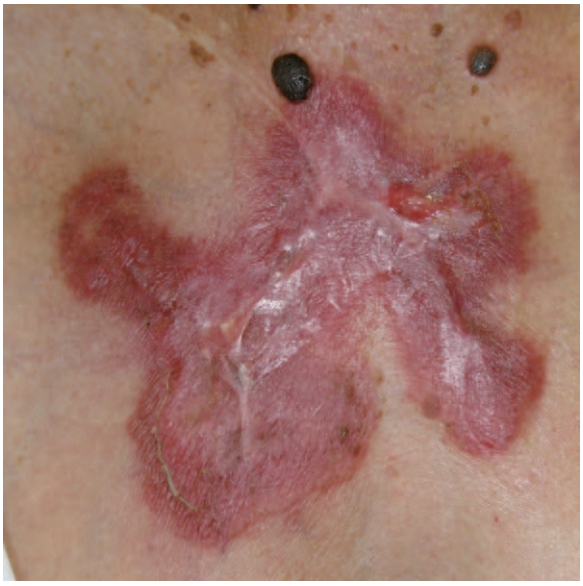

Fig. 3. Thirty-seven days after the operation, redness, blisters, and ulceration were noted in the radiation field.

It has previously been suggested that patients with CVD exhibit reduced tolerance to RT due to injury to microvessels exacerbated by RT.[4,5] There are many reports regarding acute and late toxicities of RT in patients with CVD with cancer[5–17]; however, there are currently no guidelines for administering RT in such cases, including the total dose, dose per fraction, age of the patient, site, and so on. Assessments of the indication for RT and a total dose should be performed in each patient with CVD.[4,10,12,18] In the present case, the dose of radiation applied to the keloid was much lower than that used for the cancer. Moreover, the patient had been free of medication for 27 years and had no active collagen disease. We therefore considered postoperative irradiation to be safe and appropriate in this case.

There has been only one report of the use of RT in a patient with Takayasu's arteritis who developed oropharyngeal cancer.[17] The dose was 46–64 Gy administered to the neck, including vessels affected by Takayasu's arteritis, successfully without deterioration. The author reported no acute toxicities and described the positive role of RT for the prevention of Takayasu's arteritis. According to that report, the use of RT in patients with Takayasu's arteritis may not be contraindicated.

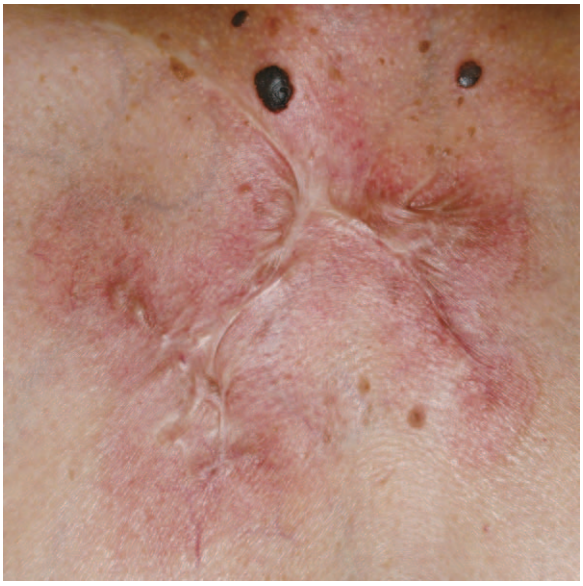

Fig. 4. The ulceration was cured, and the redness in the radiation field diminished within 14 days after the patient began treatment with a topical steroid ointment.

Combination treatment with surgical excision and radiation is widely considered to be the most effective treatment strategy for preventing keloid recurrence.[19,20] In our institution, we have treated keloids using surgical excision and postoperative irradiation for over 20 years; this technique involves a total dose of 20 Gy delivered in 5 fractions administered every other day and has achieved a cure rate of 89.0%.[21] The total dose of RT for keloids is much lower than that for cancer; however, the single dose is higher. Moreover, we apply electron beams in patients with keloid. The electron beam is used to deliver a high dose to the skin.[11,13] We speculate that the higher single dose and use of electron beams may be related to the onset of severe acute radiodermatitis in this case.

The details of this case suggest that physicians must determine the indications for RT in patients with keloid with a history of CVD more strictly, even if the dose of irradiation is low and the patient is medication-free and nonsymptomatic.

CONCLUSIONS

We herein experienced a case of acute RT toxicity in a patient with Takayasu's arteritis that developed after the administration of low-dose postoperative RT. When attempting to perform RT in patients with a history of CVD, the risk of exacerbation of radiation toxicities should be kept in mind and careful follow-up should thus be provided.

Satoko Yamawaki, MD
Department of Plastic and Reconstructive Surgery
Kyoto University Graduate School of Medicine
54 Kawahara-cho
Shogoin, Sakyo-ku
Kyoto 606–8507
Japan
E-mail: satokoy@kuhp.kyoto-u.ac.jp

REFERENCES

1. Mustoe TA, Cooter RD, Gold MH, et al; International Advisory Panel on Scar Management. International clinical recommendations on scar management. *Plast Reconstr Surg.* 2002;110:560–571.
2. Monstrey S, Middelkoop E, Vranckx JJ, et al. Updated scar management practical guidelines: non-invasive and invasive measures. *J Plast Reconstr Aesthet Surg.* 2014;67:1017–1025.
3. Sekiguchi M, Suzuki J. An overview on Takayasu arteritis. *Heart Vessels Suppl.* 1992;7:6–10.
4. Morris MM, Powell SN. Irradiation in the setting of collagen vascular disease: acute and late complications. *J Clin Oncol.* 1997;15:2728–2735.
5. Chon BH, Loeffler JS. The effect of nonmalignant systemic disease on tolerance to radiation therapy. *Oncologist* 2002;7:136–143.
6. Fleck R, McNeese MD, Ellerbroek NA, et al. Consequences of breast irradiation in patients with preexisting collagen vascular diseases. *Int J Radiat Oncol Biol Phys.* 1989;17:829–833.
7. Teo P, Tai TH, Choy D. Nasopharyngeal carcinoma with dermatomyositis. *Int J Radiat Oncol Biol Phys.* 1989;16:471–474.
8. Robertson JM, Clarke DH, Pevzner MM, et al. Breast conservation therapy. Severe breast fibrosis after radiation therapy in patients with collagen vascular disease. *Cancer* 1991;68:502–508.
9. Trattner A, Figer A, David M, et al. Circumscribed scleroderma induced by postlumpectomy radiation therapy. *Cancer* 1991;68:2131–2133.
10. Rathmell AJ, Taylor RE. Enhanced normal tissue response to radiation in a patient with discoid lupus erythematosus. *Clin Oncol (R Coll Radiol).* 1992;4:331–332.
11. McCormick B. Selection criteria for breast conservation. The impact of young and old age and collagen vascular disease. *Cancer* 1994;74(1 Suppl):430–435.
12. Delanian S, Maulard-Durdux C, Lefaix JL, et al. Major interactions between radiation therapy and systemic sclerosis: is there an optimal treatment? *Eur J Cancer* 1996;32A:738–739.
13. Mayr NA, Riggs CE Jr, Saag KG, et al. Mixed connective tissue disease and radiation toxicity. A case report. *Cancer* 1997;79:612–618.
14. Chen AM, Obedian E, Haffty BG. Breast-conserving therapy in the setting of collagen vascular disease. *Cancer J.* 2001;7:480–491.
15. Gold DG, Miller RC, Pinn ME, et al. Chronic toxicity risk after radiotherapy for patients with systemic sclerosis (systemic scleroderma) or systemic lupus erythematosus: association with connective tissue disorder severity. *Radiother Oncol.* 2008;87:127–131.
16. Pinn ME, Gold DG, Petersen IA, et al. Systemic lupus erythematosus, radiotherapy, and the risk of acute and

chronic toxicity: the Mayo Clinic Experience. *Int J Radiat Oncol Biol Phys.* 2008;71:498–506.
17. Kavanagh BD, Brizel DM, Leopold KA, et al. Radiation therapy for head and neck cancer in a patient with Takayasu's arteritis. *Acta Oncol.* 1994;33:73–74.
18. Lee CE, Prabhu V, Slevin NJ. Collagen vascular diseases and enhanced radiotherapy-induced normal tissue effects—a case report and a review of published studies. *Clin Oncol (R Coll Radiol).* 2011;23:73–78.
19. Borok TL, Bray M, Sinclair I, et al. Role of ionizing irradiation for 393 keloids. *Int J Radiat Oncol Biol Phys.* 1988;15:865–870.
20. Kovalic JJ, Perez CA. Radiation therapy following keloidectomy: a 20-year experience. *Int J Radiat Oncol Biol Phys.* 1989;17:77–80.
21. Yamawaki S, Naitoh M, Ishiko T, et al. Keloids can be forced into remission with surgical excision and radiation, followed by adjuvant therapy. *Ann Plast Surg.* 2011;67:402–406.