We report here the resection of a radiation-induced sarcoma (RIS) of the left clavicle developed in a 59-year-old woman 13 years after radiation for breast cancer. Surgery consisted of extirpation of the tumor with a combined resection of the total layer of the chest wall, the left brachiocephalic vein, and the left subclavian vein, reconstructed with a pediculated musculocutaneous graft using the right latissimus dorsi muscle. RIS of the clavicle is rare, and the prognosis might be poor. However, a complete removal of the tumor is feasible and can be performed safely. (Ann Thorac Cardiovasc Surg 2008; 14: 178–180)

Key words: radiation-induced sarcoma, clavicle, musculocutaneous graft, breast cancer
Radiation-Induced Sarcoma of the Clavicle


clavicle was cut, the left axillary artery and vein were taped. The left common carotid artery and left subclavian artery were successfully spared, though the tumor involved the left BCV, the left SV, and the left phrenic nerve, all of which were sacrificed during the tumor extirpation (Fig. 2, A and B). After a fixation of the bony thorax, using two layers of Marlex mesh, a pediculated right latissimus dorsi muscle and a skin graft were designed at the right trunk in the left lateral position (Fig. 2C). Operating time was 16 h (7 h for extirpation), and blood loss was 1,850 g. The patient tolerated the procedures well and was monitored in the intensive care unit on the day of surgery. Her postoperative course was uneventful, and she started receiving additional irradiation on the 41st postoperative day. She died of recurrence at the back and bilateral lung 5 months after the operation; however, the surgical margin was free from the disease at the time of death.

A microscopic examination revealed malignant fibrous histiocytoma (MFH), which showed diffuse proliferation of bizarre atypical cells with nuclear pleomorphism and hyperchromasia.

Discussion

The following diagnostic criteria for RIS have been proposed: (a) evidence of an initial nonmalignancy or malignant tumor of a different kind than the subsequent sarcoma, (b) development of the second malignant tumor in a previously irradiated field, and (c) histologic confirmation of sarcoma. This case meets the criteria, which were present 13 years after the resections of bilateral breast...
cancer. Pathological study revealed an MFH-like sarcoma of the left clavicle, with no sarcomatous lesion present at the margin of the resected specimen.

The risk of RIS for the remnant breast after irradiation has been reported to range from 0.1% to 0.2% at 10 years.\(^3,4\) According to a report of 34 RIS cases after partial mastectomy and irradiation for breast cancers, the mean latent interval from postoperative adjuvant radiotherapy was 152 months.\(^5\) Tumor size was prognostic in this disease.\(^5\) Here we successfully resected the tumor with no sarcoma at the margin. The reconstruction of the chest wall defect had to be performed in an unusual manner using the contralateral latissimus dorsi muscle and adjunct skin because of the following reasons: (i) the left SV was resected along with the tumor; (ii) the right axillary lymph nodes were dissected by the previous breast cancer surgery, and the right pectoralis major muscle could not be used for a graft.

**Conclusion**

The RIS of the clavicle has not been reported so far. A poor prognosis could be expected because an extended removal of the tumor is not easily accomplished. However, we herein reported that a complete removal of the tumor is feasible and can be performed safely.

**References**