Clinical images of radiation-induced heart disease

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A 61-year-old woman presented to our hospital with chest pain and dyspnoea. At the age of 44 years, she had undergone a modified radical mastectomy for left breast cancer and received postoperative parasternal irradiation (90 Gy).

Echocardiography revealed right ventricular outflow tract (RVOT) obstruction (peak pressure gradient, 79 mmHg). Computed tomography revealed thickening of the pericardium (Panel A) and aortic wall, osteosclerosis of the sternum (Panel B), and stenosis of the left main trunk (LMT) without plaque formation. Some findings were observed in the radiation field, which indicated radiation-induced heart disease. Magnetic resonance imaging with late gadolinium enhancement revealed thickening of the right ventricular anterior wall and the basal anteroseptum, which suggested myocardial fibrosis (Panel C). A cardiac catheter examination revealed stenosis of the LMT (Panel D) and RVOT obstruction (Panel E).

During the surgery, the areas that received the radiation showed fibrous atrophy (Panel F). The saphenous vein was grafted to the left anterior descending artery. The RVOT reconstruction was performed with a polytetrafluoroethylene pericardial sheet (Panel G).

Histopathological analysis of the resected infundibular myocardium of the basal anteroseptum (area labelled with an arrow in Panel C) revealed marked thickening of the endocardium, replacement fibrosis (Panel H, Masson’s trichrome staining), thickening of the small muscular arterial wall, and vacuolar degeneration with the disarrangement of myocytes of the subendocardial myocardium (Panel I, haematoxylin and eosin staining).

This is the first reported case of radiation-induced heart disease with compared image views, operative findings, and pathological findings.