SHORT REPORT

Symptomatic Radiation-induced Upper Extremity Occlusive Arterial Disease

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Introduction. Radiation enteritis is an infrequent result of external beam radiation. However, its recognition is of increasing importance because of the growing use of radiotherapy in the management of neoplastic conditions. Upper extremity arterial occlusive disease is a rare complication of radiation therapy for breast cancer.

Report. We present the case of a 64-year-old woman who developed upper extremity ischaemia 28 years after mastectomy and radiation therapy. Arteriography identified a stenotic proximal brachial artery lesion within the previous radiation field.

Discussion. Different mechanisms leading to arterial occlusion have been proposed. The symptoms vary in type and severity, but are consistent with peripheral occlusive arterial disease. We review the pathophysiology and management options for this condition.

Keywords: Radiation-induced injury; Artery occlusion; Symptomatic; Treatment options.

Introduction

Although significant damage to large and medium sized arteries after radiotherapy is uncommon, it can cause debilitating symptoms to the patient and can be a considerable challenge to the vascular surgeon. Disturbance of the arterial circulation in the ipsilateral upper limb following mastectomy is a rare sequel attributed to adjuvant radiotherapy.

Report

We present the case of a 64-year-old woman who developed right upper extremity ischaemia 28 years after right mastectomy and radiation therapy. Symptoms developed with minimal exercise but no rest pain was experienced. She had no other atherosclerotic risk factors. In particular, she never smoked cigarettes. Clinically a weak radial, ulnar or brachial pulse was palpable in that limb. There was evidence of mild skin and soft tissue scarring related to the previous radiation. Arteriography identified a 2 cm occlusion in the proximal axillary artery lesion within the previous radiation field (Fig. 1). All treatment options were discussed and a conservative approach with medical management and an exercise programme was adopted and her symptoms improved significantly.

Discussion

Radiation-induced vasculitis is a well-documented complication in patients with a history of previous head and neck or mediastinal radiation. Cardiac valves and ostial location lesions of the epicardial coronary arteries are the more common sites of injury. However, areas distant to the heart have also been shown to undergo changes after radiation-induced therapy. These areas are not limited to but include the carotid, vertebral and less commonly, the subclavian arteries.

Radiation-induced arterial injury presents with appropriate ischaemic symptoms of the organs supplied by that artery. Therefore, occlusion of the brachial artery could present with upper limb...
ischaemia, or rest pain. Upper extremity arterial occlusive disease is a rare complication of radiation therapy for breast cancer. Different mechanisms of injury leading to arterial occlusion have been proposed. It is unclear whether radiation injury causes direct fibrosis or causes molecular and genetic changes that lead to the development of early atherosclerosis. Certain cytokines and growth factors, such as TGF-beta1 and IL-1 beta, may stimulate radiation-induced endothelial proliferation, fibroblast proliferation, collagen deposition and fibrosis leading to advanced lesions of atherosclerosis. The pattern of radiation-induced arterial injury correlates with the time period elapsed since irradiation. Early disease (less than 5 years since irradiation) is often caused by mural thrombus. Intermediate disease (approximately 10 years following irradiation) is due to fibrotic occlusion of the artery. Late presentation (mean interval 26 years after radiation), as was the case with our patient, occurs because of peri-arterial fibrosis and accelerated atherosclerosis. One study that evaluated revascularization procedures performed for radiation-induced supra-aortic trunk disease found that the mean interval between irradiation and arterial revascularization was 15 years. This is considerably shorter than our patient who presented with symptomatic vascular disease 28 years after her therapy.

Treatment of radiation-induced arteritis has included percutaneous intervention, surgical and medical therapy. To alleviate severe symptoms and prevent limb loss, reconstructive vascular surgery is advocated. Although the indications for operative management are similar to those for patients with peripheral vascular disease of atherosclerotic origin, percutaneous techniques including angioplasty tend to be somewhat less efficacious. Open intervention should be carefully planned as fibrosis due to prior surgery or irradiation can hinder dissection and if this deemed particularly hazardous, an extra-anatomical route for bypass grafting should be performed. An increased rate of late graft infection has been reported and use of autogenous graft is, therefore, recommended, all be it harvested from an area outside the irradiated field. These can be performed with excellent symptomatic relief although patients will need frequent graft surveillance, as restenosis rates are higher in such patients. The synergism of radiation exposure with other vascular risk factors advocates that patients undergoing radiotherapy treatments should have their cardiovascular risk factors scrutinised and aggressively targeted.

References


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