CASE REPORT

Subcutaneous calcification in the pectoralis major flap: a late complication of radiotherapy

^{1,2}J PLZAK, MD, PhD, ^{1,3}P KALITOVA, MD, ^{1,4}M URBANOVA, MD and ¹J BETKA, MD, PhD

¹Department of Otorhinolaryngology and Head and Neck Surgery, 1st Faculty of Medicine, Charles University, Faculty Hospital Motol, Prague, Czech Republic, ²Institute of Anatomy, 1st Faculty of Medicine, Charles University, Prague, Czech Republic, ³Institute of Physiology, 1st Faculty of Medicine, Charles University, Prague, Czech Republic, and ⁴Department of Genomics and Bioinformatics, Institute of Molecular Genetics, Academy of Sciences of the Czech Republic, Prague, Czech Republic

ABSTRACT. Heterotopic calcification following radiotherapy is a very rare event. Here, we report a case of a patient who underwent surgical intervention including pectoralis major flap reconstruction for locally advanced pharyngolaryngeal squamous cell carcinoma with skin invasion. He was followed up post-operatively with adjuvant radiotherapy. 13 years after the treatment, suspect resistance in the myocutaneous flap region appeared and was diagnosed as a calcification. To date, the occurrence of subcutaneous calcification in the myocutaneous flap in the neck has not been described as a late complication of neck irradiation.

Received 14 November 2010
Revised 17 December 2010
Accepted 4 January 2011

DOI: 10.1259/bjr/29175509

© 2011 The British Institute of Radiology

More than half of laryngeal cancers are diagnosed in an advanced stage. Total laryngectomy, neck dissection and adjuvant radiotherapy are often used as treatment modalities. Well-known late tissue effects following therapeutic radiation include necrosis, ulceration and fibrosis. Calcification as a consequence of radiation therapy occurs infrequently [1, 2]. The occurrence of calcification as a manifestation of the late effects of radiotherapy has been described in patients with breast carcinoma, anal carcinoma, seminoma, cervical cancer, bladder cancer, sarcoma and endometrial carcinoma [2, 3]. However, to date calcification after radiotherapy in the head and neck area has not been described.

Case report

A 72-year-old Caucasian male who was formerly a heavy smoker underwent total laryngectomy, partial pharyngectomy, bilateral neck dissection and reconstruction with a myocutaneous flap from the great pectoral

muscle for locally advanced pharyngolaryngeal squamous cell carcinoma with skin invasion pT4pN2bM0 in March 1995. He was followed up post-operatively with adjuvant radiotherapy. The patient was treated using a Telecobalt unit and was prescribed a total dose of 60 Gy in 30 fractions over 40 days. Voice prosthesis was introduced 1 year after surgery and voice rehabilitation was very good. The patient remained well until May 2008, when he presented with a slow growing (2–3 months) stony firm mass (3 × 4 cm) in the myocutaneous flap in the midline of the anterior neck (Figure 1a). There was a redness of the overlying skin and small areas of skin destruction showing a white firm base with inflammatory secretion from the undermined margins. It was difficult to obtain any histopathological specimens owing to the hardness of the mass, but malignancy was excluded and calcified fibrous tissue was described. A CT scan showed calcification (38 × 14 × 22 mm) in the anterior region of the neck adjacent to the oesophagus (Figure 2a,b). The secondary finding was advanced atherosclerosis of all carotid arteries with complete obstruction of the right internal carotid artery and significant stenosis of the left internal carotid artery. The intracranial blood supply was realised mainly by the vertebral arteries. Other causes of heterotopic

Address correspondence to: Dr Jan Plzak, Department of Otorhinolaryngology and Head and Neck Surgery, 1st Faculty of Medicine, Charles University, Faculty Hospital Motol, V Úvalu 84, Prague 5, 158 00, Czech Republic. E-mail: jan.plzak@lf1.cuni.cz

(a)

(b)

Figure 1. (a) Calcification in the myocutaneous flap in the midline of the anterior neck. (b) Newly epithelialised wound.

calcification such as chronic renal failure, old local trauma or hyperparathyroidism were excluded.

Since any attempt of surgical resection could be complicated by a high risk of oesophagus damage and difficulties in the healing of the irradiated area with its very poor blood supply were anticipated, anti-inflammatory and local supportive conservative therapy was performed. Gradually during the following 6 months of surgery, necrosis of the skin cover was observed and all of the calcified mass (5×3 cm) was removed. Definite histopathological examination excluded malignancy and confirmed dystrophic calcification. After a further 6 months the wound spontaneously epithelialised (Figure 1b).

Discussion

Although the process imitated a tumour at the beginning of this study, recurrence was unlikely owing to the long time period that had elapsed from the primary surgical intervention. The lesion was classified as a dystrophic calcification within necrosis of the myocutaneous flap. To date, such a lesion as a late complication after radiotherapy of the soft tissues of the neck has not been described. Heterotopic tissue calcification as a consequence of radiation occurs infrequently [2]. Aetiological factors for heterotopic tissue calcification are hypercalcaemia, ischaemia, trauma, inflammatory metabolic

(a)

(b)

Figure 2. CT scan shows calcification (38×14×22 mm) in the anterior part of the neck. (a) Transverse section. (b) Sagittal section (arrows).

Figure 3. The dose distribution of radiation.

disorders, infection and hereditary factors [4]. In addition, heterotopic calcification seems to be the end-stage damage following high-dose radiotherapy [2]. Radiation leads to

vascular damage, thereby causing a thickening of the vessel walls and proliferation of intimal and subintimal cells. Circulatory efficiency is compromised later by fibrotic and sclerotic changes of the vessels [5]. The site of calcification was likely to have received a higher dose given the small separation (Figure 3).

In this case, the massive atherosclerosis of both carotid arteries, which resulted in poor blood supply followed by hypoxia of the irradiated area, seems to be the main contributing factor to the calcification.

Acknowledgments

This study was supported by the grants NPV II 2B06106 and 260510.

References

1. Zaka Z, Fodor J, Udvarhelyi N, Orosz Z, Kasler M. Subcutaneous calcification as a delayed complication of radiotherapy: a case report and review of the literature. *Pathol Oncol Res* 2008;14:485–8.
2. Carl UM, Hartmann KA. Heterotopic calcification as a late radiation effect: report of 15 cases. *Br J Radiol* 2002;75: 460–3.
3. Amin R, Hamilton-Wood C, Silver D. Subcutaneous calcification following chest wall and breast irradiation: a late complication. *Br J Radiol* 2002;75:279–82.
4. Seifert G. Heterotope (extraossare)Verkalkung (Kalznose). *Pathologie* 1997;18:430–8.
5. White BC, Wiegenstein JG, Winegar B. Brain ischemic anoxia. Mechanism of injury. *JAMA* 1984;251:1586–90.