Radiation-induced malignant peripheral nerve sheath tumors – a report of 2 cases.

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**Case n°1:**

A sixty-year-old woman was seen for a 2-year history of right cervical and arm neuropathic pain, associated with an arm weakness. She mentioned a loss of 5 kilograms over the past year. The neurological examination depicted a severe weakness, atrophy and loss of sensation in the right C4 to C7 radicular territories, predominating in C5-6 with decrease of all deep tendon reflexes in the right arm without signs of central nervous system involvement. A subclavicular hardened and enlarged lymph node was noted. Her past medical history was notable for a Hodgkin’s disease (HD) at the age of 17 treated with heavy radiation therapy (>40 Gy) and a left breast cancer at the age of 31 years old, treated by mastectomy and chemotherapy. Electromyography (EMG) revealed an acute radiculopathy in the right C5 and C6 territories. A first MRI of the right brachial plexus and of the cervical spine performed 7 months earlier was reputed normal but a second MRI revealed a tumor mass arising from the brachial plexus, with an extraforaminal extension along the C5 and C6 roots (Fig 1A, arrow). Positron Emission Tomography (PET) of the whole body with fluorodeoxyglucose (FDG) showed an increased FDG uptake at the level of the lesion, with no sign of secondary localization. Surgical biopsy of the subclavicular mass was performed and histology revealed a poorly differentiated malignant tumour. Its pattern was plexiform and characterized by multiple nodules separated by a connective tissue sheath (Fig 1B, HE, 25x) and containing malignant tumour cells admixed with residual axons (Fig 1C, HE, 400x), well demonstrated by their immunopositivity for the neurofilaments (Fig 1D). In immunohistochemistry, 10-20% of the tumour cells were positive for the S-100 protein (Fig 1E), 30% were positive for the CD56 (Fig 1F, 100x) and 10-20% positive for the epithelial membrane antigen (EMA). The proliferative index was very high with strong immunopositivity for the Ki-67 (Fig 1G). A diagnosis of Malignant Peripheral Nerve Sheath Tumour (MPNST) of the brachial plexus was proposed. The patient is currently treated by chemotherapy and her surgical management is under discussion.

**Conclusion and discussion:**

MPNSTs are rare tumors accounting for 3 to 10% of all tissues sarcomas\(^1\). Half of the cases described are sporadic, while the other half tend to appear in patients suffering from tumor prone conditions, such as neurofibromatosis type 1\(^2\). Although secondary neoplasms are known complications of radiotherapy, descriptions of peripheral nerve sheath tumors (PNST) are scarce in this context\(^3-6\). The exact pathophysiology of radiation-induced PNSTs remains unclear but vascular alterations, direct damages to axon or Schwann cell and nerve compression by soft tissue fibrosis are thought to play a role\(^7\). Although surgical removal sometimes followed by chemotherapy is the mainstay for the management of MPNSTs, they usually carry a poor prognosis\(^8\). Our 2 cases emphasize that the possibility of radiation-induced MPNST has to be kept in mind when investigating a localized neuropathy in a previously irradiated area.

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**Figure 1**

A. [Image of a tumor mass arising from the brachial plexus.]
B. [Image of histological section showing plexiform pattern and malignant cells admixed with residual axons.]
C. [Image of immunohistochemistry showing positive staining for S-100 protein.]
D. [Image of immunohistochemistry showing positive staining for neurofilaments.]
E. [Image of histological section showing positive staining for CD56.]
F. [Image of histological section showing positive staining for epithelial membrane antigen (EMA).]
G. [Image of immunohistochemistry showing high proliferative index with strong immunopositivity for Ki-67.]

**Figure 2**

A. [Image of a tumor mass with an extraforaminal extension along the C5 and C6 roots.]
B. [Image of histological section showing a nodular mass at the level of the sciatic nerve.]

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The authors have nothing to disclose.