Personal and Familial Cancer Histories in Patients with Malignant Peripheral Nerve Sheath Tumors

Megan C. Kaszuba, Ross C. Puffer, Robert J. Spinner
Department of Neurologic Surgery, Mayo Clinic, Rochester, MN

Background

Malignant peripheral nerve sheath tumors (MPNSTs) are found at increased incidence in individuals affected by neurofibromatosis type 1 (NF1) and prior radiation therapy.[1,3,4] Association of MPNSTs with additional cancers and genetic syndromes is not broadly described.[6]

Methods

A retrospective search involving MPNST cases at our institution after 1994 was performed. The electronic medical record was reviewed by examining the clinical problem list and standard patient and family history form for cancer diagnoses and genetic diagnoses. We reviewed available documentation from Radiation Oncology, Medical Genetics, and Medical Oncology for adult patients or Hematology Oncology for pediatric patients.

Results

A total of 188 patients were included (Table 1). Of these, 66 patients (35%) had a personal history of additional malignancy, 148 (79%) had family history of malignancy, 73 (39%) had a genetic syndrome which was most commonly NF1, and 22 (12%) had history of local radiation. In patients without radiation exposure or known genetic disorder, melanoma was the most frequently reported with 7.4% incidence (Table 2).

References
1. Evans DG et al. Malignant peripheral nerve sheath tumours in neurofibromatosis 1. Journal of medical genetics 2002;39:311-4.
2. Gutmann DH. Eliminating barriers to personalized medicine: learning from neurofibromatosis type 1. Neurology 2014;83:463-71.
3. Gutmann DH et al. . Neurofibromatosis type 1. Nat Rev Dis Primers 2017;3:17004.
4. Jouhilahti EM et al. The pathoetiology of neurofibromatosis 1. Am J Pathol 2011;178:1932-9.
5. Cancer Facts & Figures 2017. American Cancer Society, 2017.
6. Voutsinas S et al.. The infrequency of malignant disease in diaphyseal aclasis and neurofibromatosis. Journal of medical genetics 1983;20:345-9.

Total patients	**188**	
	n	%
Personal history of cancer	**66**	**35%**
Personal and family history of cancer	56	85%
Personal history of cancer without genetic diagnosis	48	73%
Family history of cancer	**148**	**79%**
Genetic diagnosis	**73**	**39%**
Genetic diagnosis and personal history of malignancy	16	22%
Genetic diagnosis and family history of malignancy	68	93%
Neurofibromatosis-1 diagnosis	70	96%
Personal and familial NF-1 diagnosis	32	44%
Prior radiation exposure at MPNST site	**22**	**12%**
Personal history of cancer	21	95%
Family history of cancer	17	77%
Personal history of NF1	3	14%
Spontaneous MPNST	**95**	**51%**
Personal history of cancer	28	29%
Family history of cancer	73	77%

Table 1: Patient and family characteristics

Cancer reported	**n**
Melanoma	7
Prostate	5
Colon	4
Lung	3
Breast	2
Neuroendocrine	2
Non-melanoma skin, basal cell, or squamous cell (each)	2
Bladder, chemodectoma, histiocytoma, tongue, thymus, pancreas, pituitary, renal cell (each)	1

Table 2: Number of cancer incidences in patients with spontaneous MPNSTs and a personal history of cancer

Discussion

Though melanoma was the most common prior diagnosis in patients with spontaneous MPNST, melanoma and skin cancers are the fifth most common cancer in the United States, with an estimated incidence of 5.2%.[5] Breast, lung, prostate, and colorectal cancers comprise the first- through fourth-most common,[5] which is a trend similar to that in our study population (Table 3).

Cancer reported	**n**
Breast	27
Other/Unknown type	26
Prostate	22
Lung	19
Colon	17
Melanoma	9
Leukemia	5
Ovarian	4
Stomach/gastric	4
Bladder, Gastrointestinal, Mesothelioma, Non-melanoma skin, Pancreatic, Renal (each)	2
Brain, cholangiocarcinoma, esophagus, liver, myeloma, nasopharyngeal, throat, thyroid, uterus (each)	1

Table 3: Number of cancer incidences in family members of patients with spontaneous MPNSTs

Conclusions

Targeted treatments are in development for NF1-affected patients, which may offer additional treatments for MPNSTs.[2] Future research on associated malignancies and genetic syndromes may prompt changes in cancer screening recommendations after MPNST diagnosis and may broaden targeted treatment options. A possible association with increased risk of melanoma warrants further research.