CASE REPORT

Schwannoma with Focal Malignant Transformation (MPNST) - A Rare Case Report

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Abstract

MPNST is a malignant neoplasm commonly arising from a pre-existing nerve sheath tumor in neurofibromatosis type 1 (NF1) or in the setting of prior radiation therapy with an incidence of 0.001% in general population. This case is about a 55-year-old male who was diagnosed with schwannoma in left para-vertebral region extending into posterior mediastinum radiologically, showed a focal malignant transformation histopathologically. Malignant peripheral nerve sheath tumor (MPNST) arising from a schwannoma is an extremely rare entitiy, so it's essential for pathologists and surgeons to be aware of the possibility to make accurate diagnosis and choose best treatment options.

Keywords

MPNST, Schwannoma, Histopathology, Differential diagnosis

Introduction

Schwannomas are benign neoplasms arising from the nerve sheath. Paraspinal neurogenic tumors usually expand into the mediastinum and retroperitoneum, can reach a considerable size before they become symptomatic. Such large tumors are rare.[1] Cellular schwannomas, which were first identified by Woodruff et al in 1981, make up about 5% of benign tumors that develop in the peripheral nerve sheath.[2] Cellular schwannoma, on account of its cellularity, is often mistaken for malignant nerve sheath tumor and low-grade malignant smooth muscle tumors.[3] It mainly affects middle-aged individuals and manifests as a slow-growing tumour in the mediastinum and retroperitoneum in the paravertebral region. It is histopathologically distinguished by the presence of compact spindle cells arranged into fascicles, variable nuclear hyperchromasia , pleomorphism, lack of Verocay bodies, typical predominance of Antoni A areas, occasionally by bone erosion and neurological symptoms brought on by the compression of the nerve roots.

Case history

A 55-year old male presented with complaints of paraplegia for 3 weeks, for which MRI was done, revealed a well-defined lobulated heterogenous lesion seen from D7 to D10 left para-vertebral region extending into posterior mediastinum, with involvement of D9 vertebra and was reported as possible evidence of schwannoma with secondary evidence of aneurysmal bone cyst. Laminectomy and intraspinal decompression with biopsy from the paravertebral mass was done which was reported as malignant peripheral nerve sheath tumor histopathologically. 15th post operative day, posterior mediastinal part of the tumor was excised which grossly was smooth, capsulated, grey-white to grey-brown soft

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Manuscript Received: 09.03.2023; **Revision Accepted**: 13.05.2023;

Published Online First: 10 January, 2024.

Open Access at: https://journal.jkscience.org

Cite this article as: Selvaraju V, Yamini PM, Ganesh J. Schwannoma with focal malignant transformation (MPNST) - a rare case report. JK Science 2024;26(1):62-4.

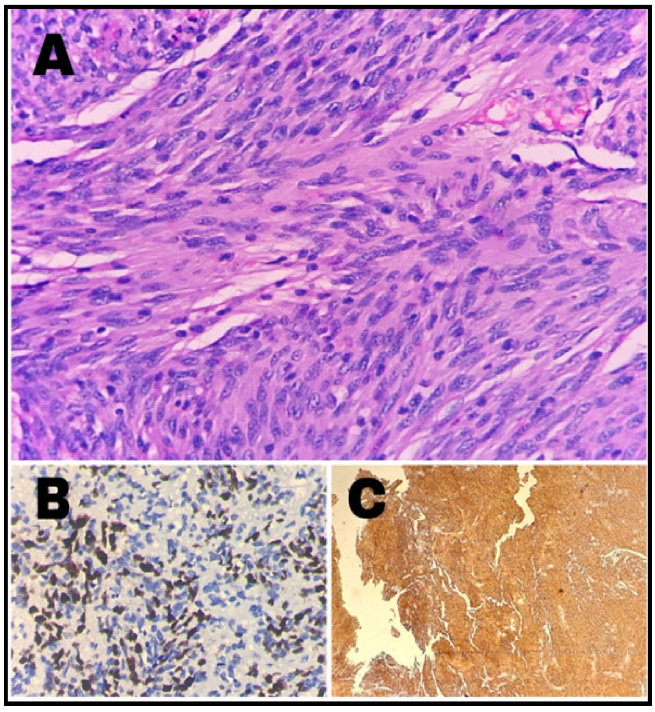

Fig 1: (A) Fascicles of pleomorphic spindle cells with dense cellularity alternate with less cellular areas. (B) Ki-67 proliferation index 35-45%. (C) S100 - Diffuse positivity in 90-95% of cells

tissue, the cut surface of which showed glistening grey-white nodules with focal yellowish friable areas. The microscopic images are shown below which was reported as Schwannoma with focal malignant transformation (MPNST). (*Fig 1*)

Discussion

The MPNST developed in this case of schwannoma is exceptionally rare, that manifested as a sizable, deep-seated soft tissue tumor. Major nerve trunks such the brachial plexus, sacral plexus, or sciatic nerve as well as cells found in nerve sheaths like the Schwann cell, perineural cells, or fibroblasts are the sources of MPNST. It may manifest as a painful or painless mass, depending on its location and the degree of nerve involvement. The majority of MPNSTs seen in the trunk and extremities are high grade. A variety of genes appear to be involved in the multi-step process that leads to gain of function in a few and loss of function in others. NF1 is germline inactivated seen in NF1 patients. Further proof shows that both alleles are inactive in neurofibromas and MPNST, that Schwann cells produced from NF1-deleted (neurofibromin-deficient) animals exhibit higher angioinvasive and proliferative abilities.[4] Many genes that differ in expression between MPNSTs, neurofibromas, and regular schwann cells have been discovered using array-based techniques. The neural crest stem cell genes SOX9 and TWIST1 are consistently increased in comparison to normal schwann cells, whereas the genes for schwann cell differentiation (SOX10, CNP, PMP22, and NGFR) are continuously downregulated. But because these tumours have such a wide range in their development rates, there is a lot of variation in the expression of cell cycle regulators. Also, one should be aware of the tumor's propensity to migrate through the nerve sheath over great distances; there have even been instances where cancers have used this route to invade the spinal cord subarachnoid area. To evaluate the effectiveness of the excision, it is recommended to get a frozen slice of the nerve margins.

About 5% of these tumors have a predominance of epithelioid cells and 15% have heterologous glandular or sarcomatous components. Immunohistochemistry shows S-100 protein expression in scattered cells of 50-70 percent of cases [5] and Ki-67 index also plays a role in diagnosing MPNST.[6] It's critical to distinguish between MPNST and schwannoma since schwannoma often has a benign history with sporadic malignant deterioration. Even though cellular schwannomas undergo rapid mitosis, it can be recognized by characteristic features such as Antoni B regions, secondary degenerative change, and hyalinized thick-walled blood vessels. Typical MPNST exhibit widespread mitosis (often > 10/10HPF), anaplastic cells, and a geographic kind of necrosis [7]. To distinguish between different types of nerve sheaths, immunohistochemistry is used. PG P 9.5, leu - 7, myelin basic protein, and S-100 antigen are frequently positive in nerve sheath tumours.[8] The following diagnostic standards were put forth by Woodruff *et al.* [2] for the malignant transformation of schwannoma: (a)exhibiting characteristics of a histology and immunohistochemistry population of malignant cells in a classical or cellular schwannoma ; (b)the presence of cells that should have metastasized or that share the same histologic features as metastatic components of reported malignant peripheral nerve tumours; and (c) the absence of a primary tumour that may have metastasized to the schwannoma. All three of these requirements were satisfied in our case.

Conclusion

Malignant peripheral nerve sheath tumor (MPNST)

arising from a benign schwannoma is an extremely uncommon disease entity with rapid progression. The immunohistochemistry expression patterns and morphology of our case were distinct from those of the previously reported cases. MPNST may develop in benign schwannoma, so it's essential for pathologists and surgeons to be aware of this possibility. This knowledge will help with patient evaluation, help the pathologist make a more accurate diagnosis, and help the surgeon choose the best treatment options, including surgical methods.

Financial Support and Sponsorship

Nil.

Conflicts of Interest

There are no conflicts of interest.

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