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Intramedullary and Retroperitoneal Melanocytic Tumor Associated With Congenital Blue Nevus and Nevus Flammeus: An Uncommon Combination of Neurocutaneous Melanosis and Phacomatosis Pigmentovascularis—Case Report

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Abstract

Neurocutaneous melanosis (NCM) is a rare condition characterized by central nervous system melanocytic tumors associated with congenital melanocytic nevi. Phacomatosis pigmentovascularis (PPV) is an association of vascular nevus with pigmentary nevus. Aberrant maturation of neural crest-derived cells is considered to be related to pathogenesis in both conditions. However, association of NCM and PPV has not been reported to the best of our knowledge. Melanocytoma, which usually involves the leptomeninges or spinal cord, is extremely rare in the retroperitoneum. We present here a case of a patient with NCM, PPV, and melanocytic tumors in the spinal cord and retroperitoneum, which were treated surgically. A 40-year-old woman had a 2-year history of dysesthesia and weakness in the left leg. History included congenital giant blue nevus-like lesion in the trunk, a port-wine stain in the sacral area, and Caesarean section performed 8 years before, when diffuse pigmentation in the peritoneum was noted. Magnetic resonance (MR) imaging of the spine revealed an intramedullary tumor at T10 level with paramagnetic signal characteristics. The spinal cord tumor was totally removed, and the histological diagnosis was melanocytoma. Three months later, a left retroperitoneal mass with histological features of melanocytic tumor was removed. Neither tumors recurred and the patient stays ambulatory 4 years after the surgery. Multiple subtypes of melanocytic tumors with distinctive features of NCM and PPV can develop simultaneously, mimicking malignant melanoma. Gross total resection of each tumor, when indicated, is beneficial.

Key words: phacomatosis pigmentovascularis, neurocutaneous melanosis, intramedullary melanocytoma, retroperitoneal tumor

Introduction

Neurocutaneous melanosis (NCM) is a rare condition characterized by melanocytic tumors of the central nervous system coexisting with giant congenital melanocytic nevi.[5] Its prognosis is ominous due to high incidence of melanoma.[11] Phacomatosis pigmentovascularis (PPV), another rare condition, is an association of widespread vascular nevus with extensive pigmentary nevus.[9] Patients with PPV may have brain lesions similar to those of Sturge–Weber syndrome, such as meningeal angiomatous malformation and cortical atrophy and/or calcification, but not melanocytic tumor. To the best of our knowledge, association of NCM and PPV has not been described in the literature.

Melanocytoma is a benign tumor that usually arises in the spinal canal or posterior fossa leptomeninges[15,16,25] and rarely in the spinal cord.[6] Melanocytoma in the retroperitoneum is very rare and only one case has been reported.[18]

In this report, a case of a patient with concurrent development of NCM and PPV with melanocytic tumors in the spinal cord and retroperitoneum is presented.

Case Report

A 40-year-old woman presented with a 2-year history

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of tingling dysesthesia in the left lower extremity and 2-month history of mild foot drop on the left. She had a giant congenital nevus in the trunk which had been stable for years and left unexamined. She had undergone Caesarian section at the age of 32, and her obstetrician noted diffusely pigmented peritoneum. Family history was negative for traits of systemic pigmentous diseases.

On physical examination, there were large blue lesions on the trunk and a port-wine stain in the sacral area. Examinations of the cranial nerves and motor and sensory functions in the four extremities were intact except for positive Romberg sign and dysesthesia in the left L5 dermatome. Deep tendon reflexes were normal in the upper extremities and hyperactive in the lower extremities.

Magnetic resonance (MR) imaging of the thoracic spine showed a partially cystic intramedullary mass at T10 level, which was hyperintense on T_1- and hypointense on T_2-weighted images, denoting a paramagnetic character. It enhanced homogeneously with gadolinium diethylpentoic acid (Fig. 1). MR imaging of the brain, cervical, and lumbar spine was negative.

In surgery, myoarchitectonic spinolaminoplasty[13] from T9 through T11 was done. The skin over the lesion was normal, but the laminae and dura had multiple pigmentations. The black-colored tumor was observed on the dorsal surface of the cord, with a soft pial part that was easily peeled off and a elastic hard intramedullary part that was adherent to the pia and richly vascularized (Fig. 2). The tumor was totally removed through a midline myelotomy. Postoperatively, the patient had dysesthesia in the abdomen and lower extremities. Joint position sense was diminished in the lower extremities, more prominently on the left. Pain and temperature sensation was temporarily disturbed in the right lower extremity. The muscle strength was unaffected. The patient became ambulatory in 2 weeks.

Three months later, the patient had computed tomography of the abdomen for a complaint of persistent abdominal dysesthesia. A low-dense, nonenhancing 4-cm mass was found in the left retroperitoneum displacing the pancreas. The lesion was hyperintense on T_2-weighted MR images (Fig. 3) and manifested a high uptake of 2-[(18) F]-fluoro-2-deoxy-D-glucose (FDG) on positron emission tomography (PET). The pigmented tumor in the retroperitoneal adipose tissue was totally removed through a conventional laparotomy without adverse consequences.

Presently, 4 years after the operations, the patient ambulates freely with residual dysesthesia in the lower abdomen and lower extremities. Thoracic spine MR imaging and whole-body FDG-PET scan reveal no tumor recurrence (Fig. 4).

Histology of the spinal cord tumor showed dense proliferation of polyhedral cells with round to ovoid nucleus and faintly eosinophilic cytoplasm containing melanin, without necrosis. Mitosis was not evident. Soft part consisted of monotonous proliferation of cells, and firm portion had a background feature of fibrous tissue, resembling dermal nevus. The tumor cells infiltrated into the perivascular space and spinal cord parenchyma (Fig. 5). The cells reacted positive for HMB-45. Index ratio of Ki-67/MIB-1-positive cells was less than 5%. The diagnosis was melanocytoma.

Histology of the skin biopsy specimen from the back revealed deposition of melanin, fibrosis, and proliferation of melanophages and melanocytes in the middle to lower dermis and subcutaneous tissue. The finding was consistent with a diagnosis of blue nevus.

The retroperitoneal tumor consisted of diffuse proliferation of ovoid and spindle cells containing melanin. There was no necrosis and rarely mitosis. Immunohistochemical

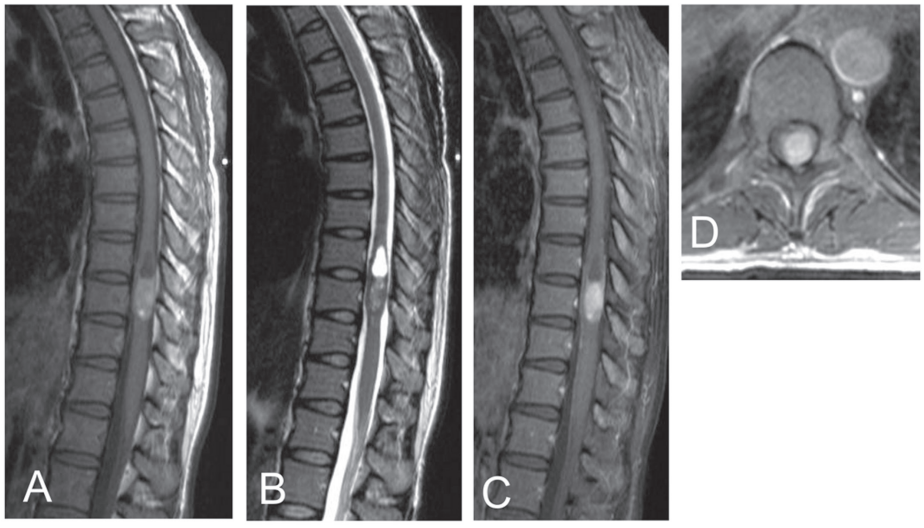

Fig. 1 Magnetic resonance (MR) imaging of the thoracic spine showing a partially cystic intramedullary mass, which is hyperintense on T_1-weighted image (A), hypointense on T_2-weighted image (B), and enhances homogenously with gadolinium diethylpentoic acid (C). Contrast-enhanced T_1-weighted axial image shows displacement of the normal parenchyma of the cord ventrally (D).

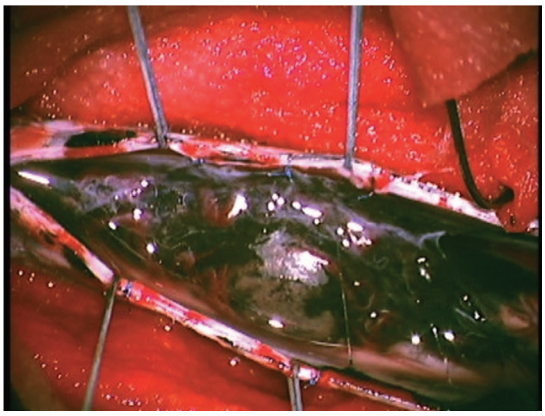

Fig. 2 Intraoperative photograph shows pigmentations in the dura and arachnoid. Black tumor is seen on the posterior surface of the cord.

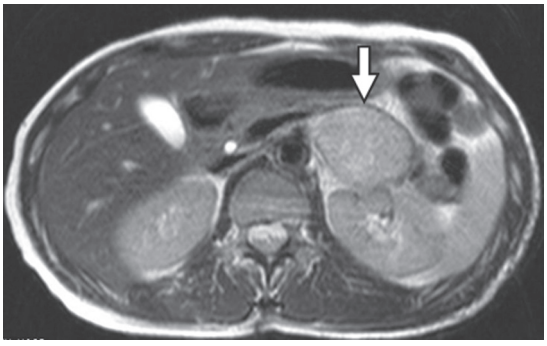

Fig. 3 The T_2-weighted magnetic resonance (MR) image of the abdomen shows a round mass (*arrow*) in the retroperitoneum.

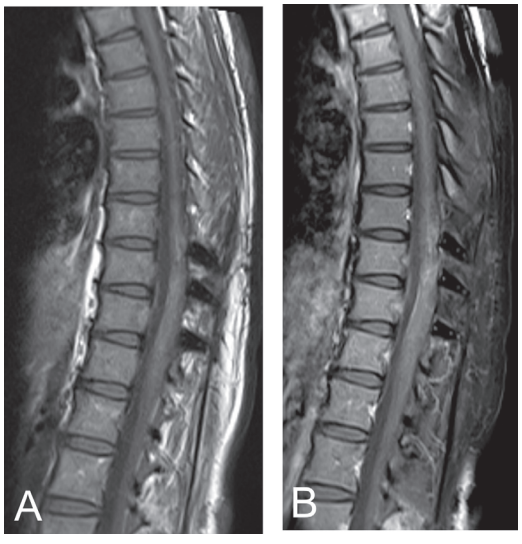

Fig. 4 Magnetic resonance (MR) imaging of the thoracic spine 4 years after surgery. T_1-weighted images without contrast (A) and with contrast (B) show no tumor recurrence.

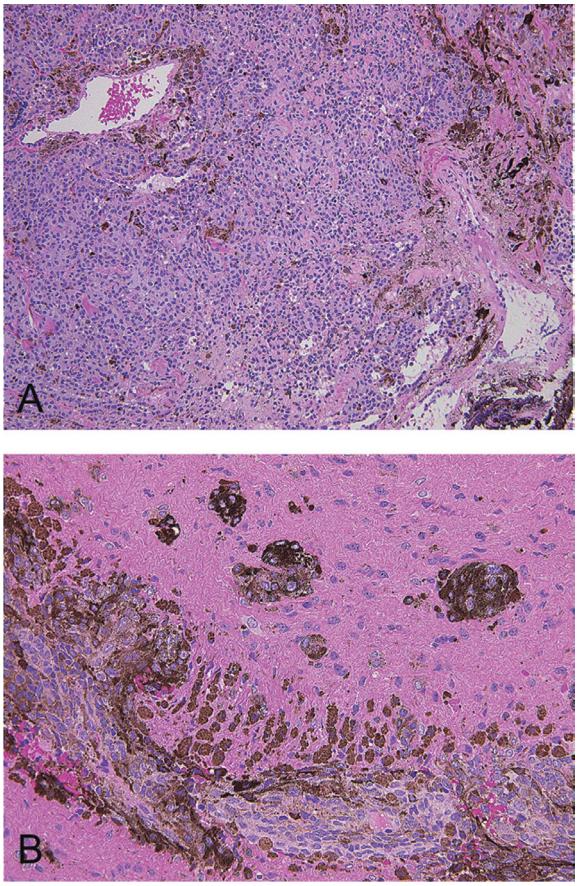

Fig. 5 Hematoxylin and eosin-stained section of the intramedullary tumor shows proliferation of cells with fibrous tissue background (A). The tumor infiltrates into the spinal cord parenchyme (B).

stain was positive for HMB-45, C-KIT, and S-100 and negative for smooth muscle actin, cytokeratin (AE1/3), CD56, TUJ-1, and CD99. Proliferative index by Ki-67/MIB-1 was 5%. The diagnosis was melanocytic tumor with questionable malignant property.

Discussion

This patient had congenital melanocytic nevus and intramedullary melanocytoma, meeting the diagnostic criteria for NCM.[5] Concurrently she had a vascular nevus, also compatible with a diagnosis of PPV.[8] The pathogenesis of NCM is postulated to be a congenital error in morphogenesis of the neuroectoderm and/or neural crest.[11] The pathogenesis of PPV is presumed to be an aberrant proliferation of angioblasts and melanoblasts, or vasomotor nerve cells derived from the neural crest.[9,21] The coexistence of NCM and PPV in this case suggests that they may have a common cause in the embryonal differentiations in the neural crest.

Patients with NCM typically present in the first decade of life, and the mortality is 54% within 3 years of onset due to development of melanoma or leptomeningeal melanosis.[5,11] These studies probably had selection bias because they were based on autopsy series. In a recent study, of 205 patients with large congenital melanocytic nevi taking MR imaging survey, 8 patients had asymptomatic and 9 had symptomatic NCM.[7] In a 5-year follow-up study concerning asymptomatic NCM patients, 1 out of 10 developed neurological symptom.[4] The presented case may exemplify a future status of patients with asymptomatic NCM.

MR imaging was critical for diagnosing the spinal cord melanocytoma, which exhibited high T_1- and low T_2 signal intensity. Such paramagnetic signal is characteristic to melanocytic tumors with high melanin contents, but not to those with low melanin contents.[17,24] The high T_2 signal exhibited by the retroperitoneal tumor may be caused by lower melanin concentration.

Histology of the spinal cord tumor revealed proliferation of melanocytes with immunoreactivity for HMB-45 and Ki-67/MIB-1 proliferation index no more than 5%.[2] Infiltration of the neural parenchyme is a common finding and does not indicate a malignancy.[6] Features of melanoma such as cellular atypia, mitosis, necrosis, hemorrhage, or host responses were absent in this case.[22]

Recurrence of intramedullary melanocytoma is rare after total excision.[3,6,12,23] Radiation therapy with dosage greater than 45 Gy is recommended when total resection is not achieved[20] because partial resection may result in recurrence and malignant transformation.[1,10,17,19,25]

Only one case of retroperitoneal melanocytic tumor is reported, of a 5-month-old boy with a posterior fossa meningeal melanocytoma and tumors in the surrenal glands and renal capsule, which remained stable for 10 months without treatment.[18] In our experience, total resection of the retroperitoneal melanocytic tumor resulted in good outcome, but further studies are needed to provide a recommendation of treatment.

When a patient with congenital nevus presents with tumors in the central nervous system and retroperitoneum, it may be mistaken for advanced melanoma with metastasis, for which surgery is not recommended. However, this case indicates that surgery is a reasonable option for multiple melanocytic tumors in a patient with NCM and PPV, analogous to tumors in neurofibromatosis, a neurocristopathy familiar to neurosurgeons.[14]

Conflicts of Interest Disclosure

The authors have no personal, financial or institutional interest in any of the drugs, materials, or devices in the article. All authors who are members of the Japan Neurosurgical Society (JNS) have registered online self-reported conflict of interest disclosure statement forms through the website for JNS members.

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