Neurocutaneous Melanosis with Hydrocephalus: Report of One Case

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Abstract- Neurocutaneous melanosis (NCM) is a rare nonfamilial syndrome and characterized by large or numerous congenital melanocytic nevi and excessive proliferation of melanin-containing cells in the leptomeninges. It is believed to be an embryonic neuroectodermal dysplasia. Patients with NCM may develop severe hydrocephalus and other neurological symptoms with extremely poor prognosis. We report an infant with multiple large congenital melanocytic nevi and hydrocephalus. He was admitted to our hospital due to intermittent projectile vomiting and irritable crying for one week. CSF cytology and brain magnetic resonance imaging revealed central nervous system involvement. His condition was much improved after ventriculoperitoneal shunting. Even though patients with NCM and hydrocephalus may have normal growth and development after shunt insertion, close follow-up for these patients is still warranted.

Key Words: Neurocutaneous melanosis, Hydrocephalus, Developmental disorder

Acta Neurol Taiwan 2004;13:29-33

INTRODUCTION

Neurocutaneous melanosis (NCM) is a rare form of congenital, nonfamilial neuroectodermal dysplasia in children. Rokitansky first described the case in 1861 and Van Bongaert first named it in 1948[(1)]. NCM is characterized by large or numerous congenital melanocytic nevi and excessive proliferation of melanin-containing cells in the leptomeninges. There have been around 100 cases of NCM reported in the literature.

Criteria for the diagnosis of NCM was first proposed by Fox in 1972[(2)] and was revised by Kadonaga and Frieden in 1991[(3)] as following: 1. Large (is, or is estimated to become equal to, or greater than 20 cm in diameter in an adult / 6-9 cm in neonates and infants) or multiple (greater than or equal to three lesions) congenital nevi in association with meningeal melanosis or melanoma. 2. No evidence of cutaneous melanoma, except in patients in whom the examined areas of meningeal lesions are histologically benign. 3. No evidence of meningeal melanoma, except in patients in whom the examined areas of the cutaneous lesions are histologically benign.

Hydrocephalus is the most common complication of NCM and shunt insertion is always necessary as a palliative treatment. We report a 46-day-old infant, present-

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Received May 12, 2003. Revised June 20, 2003.
Accepted November 28, 2003.

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ing with multiple large congenital melanocytic nevi and hydrocephalus.

CASE REPORT

This 46-day-old male infant was born at term to a gravid 1, para 1 healthy mother via cesarean section because of prolonged labor. Birth weight was 3500 gm. His head circumference at birth was 35 cm. The prenatal course was uneventful. At birth, massive hairy dark nevi covering most of the abdomen and back were noticed, in addition to multiple smaller lesions scattered over the head, lower legs and hands (Fig. 1). He had been admitted to another hospital for evaluation, where neuroimaging study was normal. On the day before admission, he was brought to a local medical doctor for vaccination and a large head girth of 46 cm (> 97th percentile) was noted. He also suffered from intermittent projectile vomiting and irritable crying for one week.

On admission, the infant appeared to be irritable and lethargic. Sunset eyes with prominent cephalic veins were noted. His deep tendon reflexes and muscle power were normal. Initial brain sonography and computed tomography (CT) scan showed dilated lateral, third and fourth ventricles. Brain sonography also found tiny hyperechoic floating substance in the lateral ventricles. An emergent externoventricular drainage was performed. Laboratory data revealed a white blood cell count of 7,990 cells/mm^3 with 16% neutrophils, 64% lymphocytes, 5% eosinophils and 12% monocytes. Hemoglobin was 12.3 g/dL and hemotocrit was 35.4%. The platelet count was 559,000 /mm^3. CSF was yellowish and had a white blood cell count of 65 cells/mm^3. The ratio of polymorphonuclear cells to mononuclear cells was 40 to 25. CSF glucose was 54 mg/dL and protein 420 mg/dL. Blood and CSF cultures were negative. CSF acid-fast stain and tuberculous culture were negative. After admission, phenobartibtal and phenytoin were prescribed due to seizures during hospitalization. The infant's head circumference decreased gradually after externoventricular drainage and a follow-up brain CT revealed an improvement of hydrocephalus.

During hospitalization, a skin biopsy revealed giant congenital melanocytic nevus, but no melanoma. CSF cytology showed melanin-containing cells compatible with neurocutaneous melanosis (Fig. 2).

Amount of CSF drainage from externoventricular shunt decreased gradually and the infant became seizure-free after anticonvulsant treatment. Externoventricular shunt was removed 4 weeks later and a ventriculoperitoneal shunt was inserted. Patient did not develop seizure after ventriculoperitoneal shunt insertion. Magnetic resonance imaging (MRI) before discharge showed gadolinium enhancement on T1-weighted images over the cerebellum, bilateral medial temporal lobes and ventral pons, compatible with melanosis (Fig. 3). Besides, strong enhancement around foramina

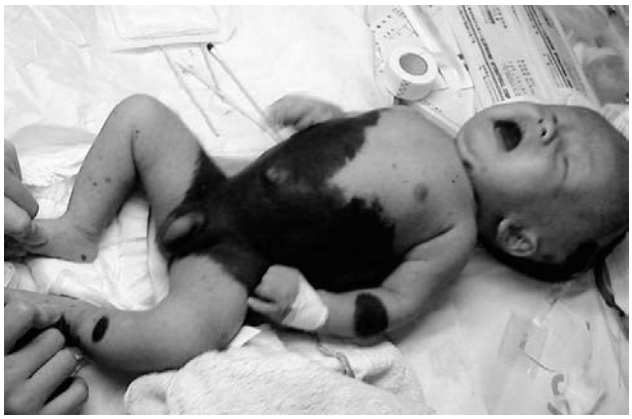

Figure 1. The infant had giant hairy dark nevi covering most of the abdomen and back as well as multiple smaller lesions scattered over the head, lower legs and hands.

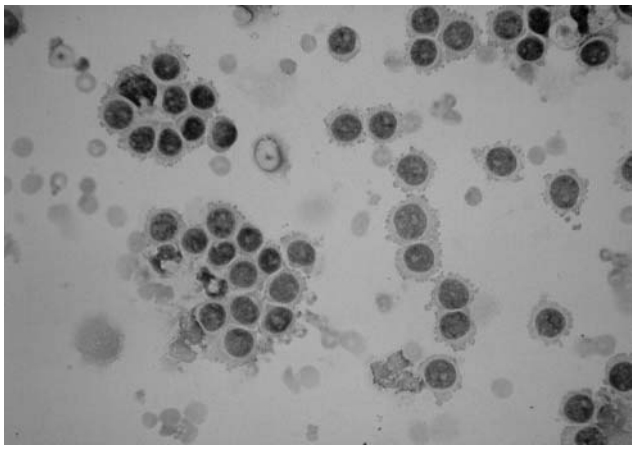

Figure 2. CSF revealed fairly uniform round mononuclear cells with pseudopod-like periphery. These cells stained positive for HMB45, consistent with melanocytic nature.

Luschka and Magendie was also noted, indicating noncommunicating hydrocephalus. The patient infant was discharged under stable condition 40 days after admission. He is now 9 months old and has a mild delay in motor development.

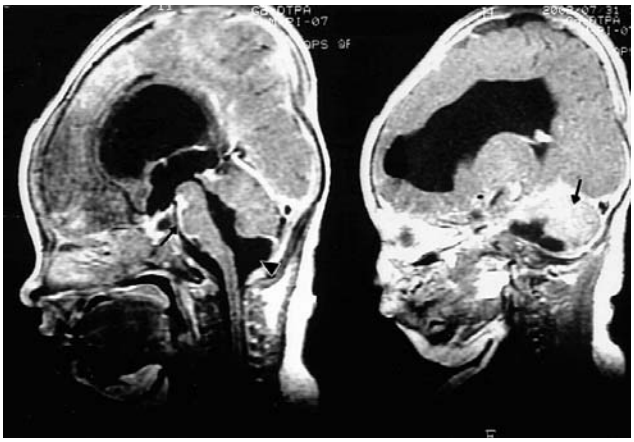

Figure 3. Contrast-enhanced T1-weighted MRI showed an enhancement at the medial temporal lobes, cerebellum and ventral pons (arrows). An enlarged cistern in the midline of the posterior cranial fossa communicated with the 4th ventricle (arrowhead).

DISCUSSION

NCM is classified as one of the neurocutaneous syndromes which involve both integument and central nervous system (CNS). Clinical diagnosis is based on skin manifestation, pathology studies of skin biopsy and CSF.

Presently MRI with contrast study is the best imaging diagnosis for CNS involvement. Byrd et al.[4] reviewed the literature and found that the patients whose leptomeningeal involvement had either marked enhancement (most commonly) and/or hyperintense nonenhancement on T1-weighted MR images[5-10]. They suggested that leptomeningeal enhancement is characteristic for this disorder, especially in severely symptomatic children. Leptomeningeal enhancement is more commonly seen at the base of the brain, such as basal cisterns, tentorium, brain stem, inferior vermis and folia of cerebellar hemispheres[8,10]. In our patient, leptomeningeal enhancement was seen at the medial temporal lobes, cerebellum and ventral pons. Strong enhancement around foramina Luschka and Magendie was also noted.

Patients with NCM usually present neurological manifestations within the first 2 years of life. Symptoms and signs of raised intracranial pressure, such as irritability, lethargy, headache, recurrent vomiting, generalized seizures, increased head circumference, bulging anterior fontanelle, photophobia, papilledema, and neck stiffness were commonly reported[3]. Occasionally, cranial nerve palsies (usually 6th and 7th cranial nerves), ataxic gait, lower extremity paresis or paralysis, bowel and bladder dysfunction, and developmental delay were reported[3].

Proliferation or accumulation of melanotc cells of the leptomeninges may lead to disturbance of CSF circulation, which may result in the wide range of complications in NCM. Malignant leptomeningeal melanoma occurs when there is brain and/or spinal cord invasion or the melanocytes demonstrating malignant (anaplastic) changes[11-14]. 40%-64% of patients with NCM will develop leptomeningeal melanoma[2,3,7,15].

As in our patient, hydrocephalus is the most common complication in NCM[3,4,16,17]. Kadonaga et al.[3] reported that hydrocephalus was present in 64% of patients with NCM with 64% the communicating type and 36% the noncommunicating type. Hydrocephalus is believed to be caused by obstruction of CSF circulation, either at the fourth ventricle outlets or within the basal subarachnoid cisterns. Communicating type is attributed to accumulation of melanotic cells in the basal subarachnoid cisterns, with subsequent obstruction of CSF flow and prevention of CSF reabsorption in the arachnoid villi, while aqueductal stenosis or obstruction of outflow foramina by melanotic cells, as in our patient, leads to the noncommunicating type[3]. Shunt placement to reduce intracranial pressure should be performed as the most important palliative treatment in children with NCM and hydrocephalus. However, shunting itself may lead to dissemination of melanoma throughout the peritoneal cavity with melanotic metastatic lesions not only in peritoneum, omentum, abdominal lymph nodes, but also in the liver and pleura[16,17]. A filter is recommended to be placed in the shunt to prevent this complication, but the filter may increase the risk of shunt obstruction.

NCM may associate with CNS malformations, especially Dandy-Walker malformation. 8-10% of patients with NCM had this malformation[10,19,20]. Other CNS malformations are midline vertebral column defects, intraspinal lipoma, arachnoid cysts and syringomyelia[21,22]. Our patient had no Dandy-Walker malformation but had an enlarged cistern in the midline of the posterior cranial fossa communicating with the 4th ventricle.

Patients with large congenital melanocytic nevi (LCMN) are at increased risk for developing cutaneous or extracutaneous melanoma and NCM[15,18]. The lifetime risk of patients with LCMN for developing melanoma ranges from 4.5% to 8.5%[18]. These patients also have a significantly increased risk for developing NCM. DeDavid et al.[15] reviewed 289 cases of LCMN and found that 33 (12%) had developed NCM. CNS melanomas occurred in 21 out of 33 patients (64%) with NCM. Furthermore, all 33 patients with NCM had their large nevi in axial locations (cephalic, posterior cervical, and paravertebral) as well as satellite nevi. It seems that patients at the greatest risk are those with LCMN in axial locations, and those with multiple satellite nevi[15,18]. MRI evaluation of newborn with LCMN is recommended in patients with axial location, and especially with multiple satellite nevi.

The prognosis of symptomatic NCM is extremely poor. In Kadonaga's review[3], 90% of the patients with NCM died secondary to benign and/or malignant CNS melanocytosis. The majority of the patients died within 3 years after onset of neurological symptoms and 70% died before the age of 10 years. In addition, DeDavid et al.[15] found that 21 of 33 patients with NCM also had CNS melanoma, and 90% of those patients died from their melanomas. Of the remaining 12, 58% died from the sequelae of CNS melanosis, even though they did not have CNS melanoma.

Chemotherapy has no significant effect on the rapid course of NCM with malignant leptomeningeal involvement[4,21]. The most important palliative treatment in children with NCM and hydrocephalus is insertion of a shunt. For our patient, the shunt operation had improved the hydrocephalus and seizures. However, because of the poor prognosis in patients with NCM, close followed-up for our patient is warranted.

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