Scoliosis After Treatment for Neuroblastoma

〈**Case Report**〉

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CASE REPORT

The subject of this case is a girl who at the sixth months of age was picked up by a mass-screening program. She was diagnosed as having a neuroblastoma based on the results of further detailed examination. She showed slight motor weakness in her left psoas muscle due to direct invasion of the tumor into muscle or nerves. Surgical resection of the tumor was performed at 8 months of age. The tumor, which weighed 20 grams, was located in the lumbar sympathetic ganglion and was located dorsally to the left kidney. Other treatment such as radiation and chemotherapy was not performed. At the age of 2 years, her lumbar spine showed deformity with a Cobb angle of 17 degrees. She has been followed up in another hospital every year since the age of 2 years and her lumbar scoliosis progressed gradually. Radiographic images of the lumbar spine showed right convex curving with Cobb angles of 31, 37 and 40 degrees at the ages of 4, 7 and 8 years, respectively. Conservative treatment with a corrective brace was not done during the progression of lumbar scoliosis.

When she visited our hospital, she presented with a physiologically lower right shoulder and pelvic tilting to the right without thoracic cage deformity. The results of neurological examination showed a decrease in motor function of the bilateral iliopsoas muscles and decreases in bilateral patella and ankle tendon reflexes, but no pathological reflex. She had normal sensation. Radiographs of the lumbar spine showed scoliosis with Cobb angles of 39 degrees in the supine position and 42 degrees in the standing position (Fig. 1). Surgical treatment for the lumbar scoliosis was performed through the left anterior approach under spinal code monitoring. The L1-L4 region of the spine was corrected using spinal instrumentation, and anterior lumbar interbody fusion was performed using an autollogous iliac bone graft. Postoperative evaluation demonstrated the lumbar scoliosis with Cobb angles of 6 degrees, and a corrective rate of 86% (Fig. 2).

DISCUSSION

Neuroblastoma is one of the most common types of malignant tumor in childhood, accounting for about 10% of the total. It occurs at a rate of one in about 10,000 live births and develops at a younger age, and 90% are found by the age of 5 years old.[1] The tumor can originate in any part of the body where sympathetic ganglia exist. About half of the tumors originate in the ad-

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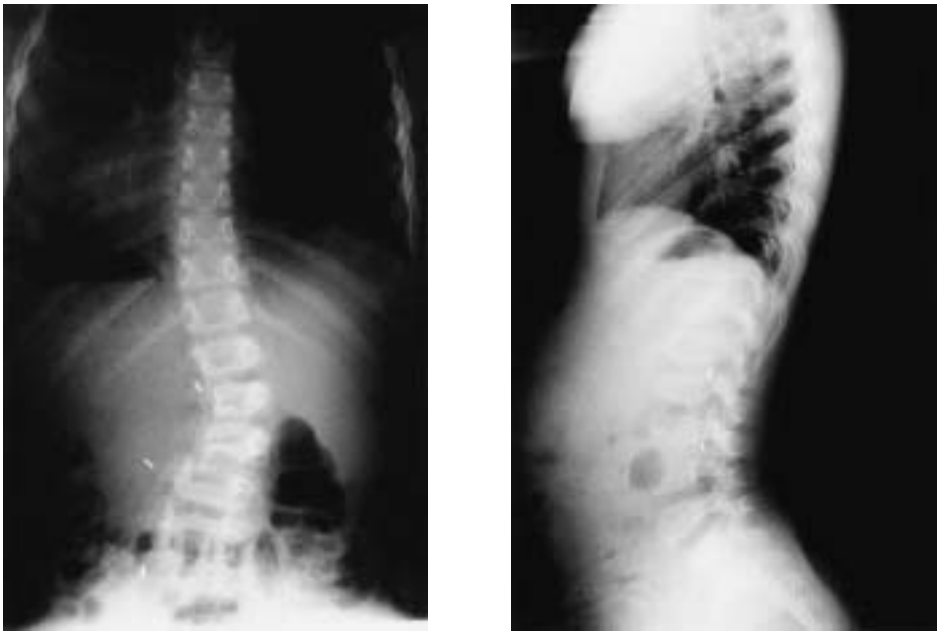

Fig. 1 Preoperative radiograph of left convex lumbar scoliosis. Cobb angle was 42° at 10 years.

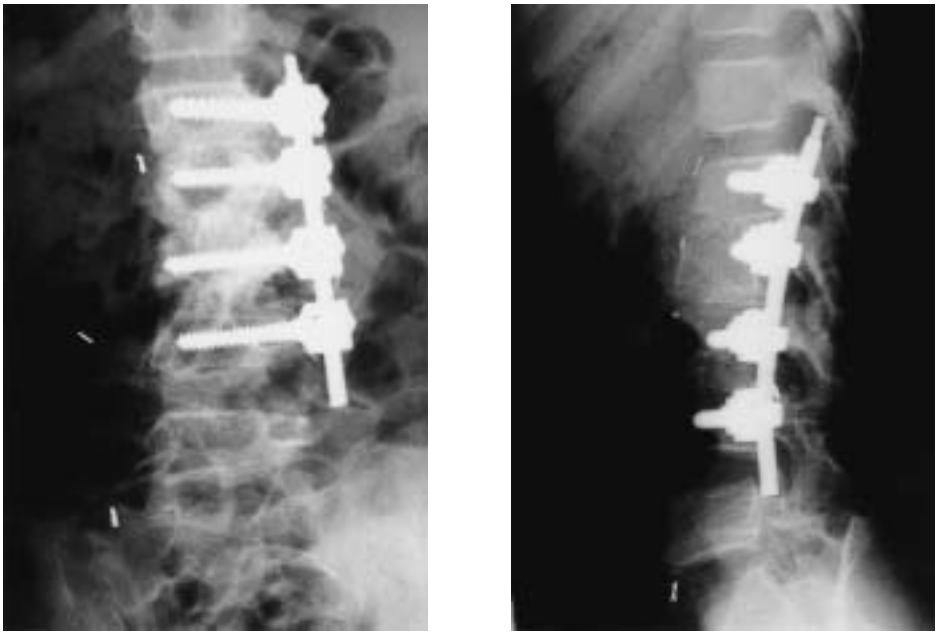

Fig. 2 Radiograph shows L1-L4 anterior spinal fusion. Lumbar scoliosis was corrected to 6°.

renal gland and the remainder originate in the retroperitoneal sympathetic ganglia. Early-stage tumors are surgically resected, while advanced- stage tumors are treated with a combination of irradiation and surgery. At the metastatic stage, chemotherapy may also be used. Spinal deformities such as scoliosis and kyphosis have been reported as complication of these treatments. Mayfield et al.[2] reported that 56 of 74 (76%) children with neuroblastoma developed spinal deformity, 28 (50%) developed coronal deformity (scoliosis) and 9 (16%) developed sagittal deformity (kyphosis) and that 4 (7%) of the children with deformities underwent corrective sur-

gery. It was also reported that 57% of the children with neuroblastoma treated by radiation developed radiation-induced spinal deformities.[2] Spinal deformity occurs in 50% of children undergoing laminectomies for spinal cord tumors, and the most frequently occurring deformity is kyphosis. [3]

The reason for the occurrence of spinal deformities is not clear. It may be caused directly by invasion of the tumor into a spinal component such as a vertebral body and subsequent asymmetric paravertebral muscular paralysis due to spinal cord compression. Meanwhile, asymmetrical irradiation of the spine and surgery such as laminectomy can lead to complications like fibrosis and contracture of the soft tissues, resulting in spinal deformity. In the present case, irradiation and laminectomy were not performed, and there was no tumor invasion in the spinal canal. Thus, the lumbar scoliosis in the present case seems to have been caused by asymmetrical distention of paravertebral muscle due to nerve damage during the surgery or to surgical resection of a spinal structure such as a transverse proccess, spinal ligament or paravertebral muscle.

In Japan, mass screening for neuroblstoma has been performed since 1973. Between 1976 and 1995, 1400 cases of neuroblastoma were detected in Japan, and surgical resection was performed in 93% of these cases.[4] However, there have been no reports on spinal deformity after treatment for neuroblastoma. A greater number of detailed investigations into spinal deformity after neuroblastoma treatment is necessary if we are to achieve a better outcome for the patients.

REFERNCES

1. Enzinger FM, Weiss SW. Tumor of the sympathetic nerves. In: Enzinger FM, Weiss SW. Soft tissue tumors. 2nd ed. St. Louis, Mosby, 1988, 816–835.
2. Mayfield JK, Rieseborough EJ, Jaffe N, Nehme AME. Spinal deformity in children treated for neuroblastoma. J Bone Joint Surg Am 1981, 63: 183–193.
3. Lonstein JE. Post-laminectomy kyphosis. Clin Orthop 1977, 128: 93–100.
4. Nishi M, Miyake H, Takeda T, Shimada M, Takasugi N, Sato Y, Hanai J. Effects of the mass screening of neuroblastoma in Sapporo City. Cancer 1987, 60: 433–436.

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