A Case of Neurofibromatosis-2 Associated With Multiple Spinal Tumors

Çoklu Omurilik Tümörüyle Birlikte Seyreden Nörofibromatosis-2 Olgusu

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Abstract: Neurofibromatosis -2 is rare in all neurocutaneos disorders.We report a case in a 20-year-old girl in whom magnetic resonance imaging revealed multiple supratentorial and infratentorial tumors associated with cervical extradural and thoracic intramedullary spinal schwannomas. This combination is rarely seen. We conclude that there is a clinical entity of multiple spinal cord tumors associated with neurofibromatosis-2.

Key Words: Neurofibromatosis, magnetic resonance imaging, schwannoma

Özet: Nörofibromatosis-2 az görülen bir nörokütanöz hastalıktır. Manyetik rezonans görüntülemede servikal ekstradural ve torakal omurilik içi schwannomlarla birlikte seyreden çok sayıda supratentoriyel ve intratentoriyel tümörü saptanan 20 yaşında bir kadın hasta sunuldu. Bu tümörlerin birlikte görülmesi nadirdir. Nörofibromatosis-2 ile birlikte olan çoklu omurilik tümörünün ayrı bir klinik durumu olduğu sonucuna vardık.

Anahtar Sözcükler: Manyetik rezonans görüntüleme, nörofibromatosis, schwannoma

INTRODUCTION

Neurofibromatosis 2 is an autosomal dominant disease predisposing to multiple tumors of the central and peripheral nervous system. The NF2 case reported in 1882 by Wishart was probably the first that had ever been reported on the very subject (8). Bilateral vestibuler schwannomas are hallmarks of the disease. To define the clinical spectrum, we performed magnetic resonance imaging of the brain and spine. Bilateral vestibular schwannomas are pathognomonic for NF2 and occur in 90% of adult patients (1). Patients with NF2 virtually frequently have spinal nerve tumors, which are usually schwanomas, and also have an increased incidence of intracranial meningiomas and intramedullary spinal cord tumors (ependymoma, astrocytoma, schwanoma)(2). The most frequent ocular abnormalities are early onset cataracts, hamartomas, meningiomas and epiretinal membranes (3,4). The gene for neurofibromatosis 2 is located near the center of the long arm of chromosome 22 (9,10).

The criteria for NF-2 are determined as follows: 1. Bilateral eighth nerve masses seen with appropriate imaging techniques (CT and MRI) or, 2. A first-degree relative with NF-2 and either unilateral eighth nerve mass or two of the following: neurofibroma, meningioma, glioma ,schwannoma or juvenile posterior subcapsular lenticular opacity. Spinal tumors are a major cause of NF-2 morbidity and mortality (5).

CASE REPORT

A 20-year-old girl who suffered from bilateral hearing loss and strabismus 10 years ago. She had strabismus operation due to her strabismus

disease at the age of 10, and she also had an operation due to carpal tunnel syndromas, which led to left hand weakness (incorrect diagnosis) when she were 19 of age; she now has complaints of headache, vertigo, left 3. and 7. cranial nerve palsy. Cranial and spinal MRI of her head, which were taken at times showed bilateral, 26x25x25 mm acoustic schwannoma, 40x19x38 mm right juguler foramen schwannoma, 12x18x11mm.left parasellar meningioma, left upper cervical cord schwannoma, thorasic 10-11 intramedullary schwannomas, bilateral cerebellar cortical and left frontal cortical calcifications and occipital subcutan eous lipoma, which, suggested NF2 (Figures 1,2,3,4). She had no family history of NF. Systemic and ocular disease were not found.

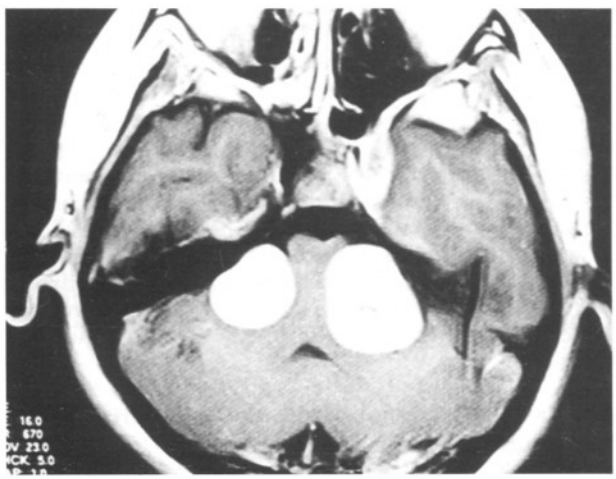

Figure 1: Contrast enhanced T1-weighted MRI of the posterior fossa showing bilateral acoustic schwannomas.

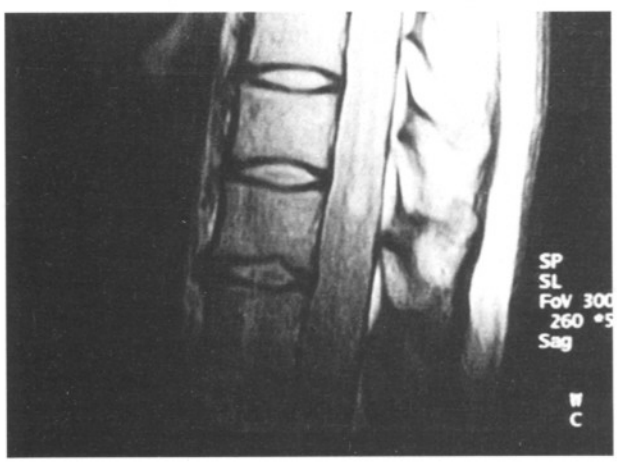

Figure 3: Unenhanced T2 weighted magnetic resonance imaging of thr thoracic spine showing the intramedullary thoracic schwannoma.

She underwent a suboccipital craniectomi. Furthermore, bilateral acoustic schwannomas have been extracted; histological diagnosis was acoustic neuroma. A gross total resection has been achieved of spine tumors by cervical 1-4 and thoracic 9-12 laminectomi. Pathological diagnosis was cervical extadural schwannoma and thorasic intradural schwannoma. A second operation was performed fifteen days after the first because of parasellar mass. The second postoperatif period was also uneventful. However, she died in the second postoperatif week as a result of pulmoner insufficiency.

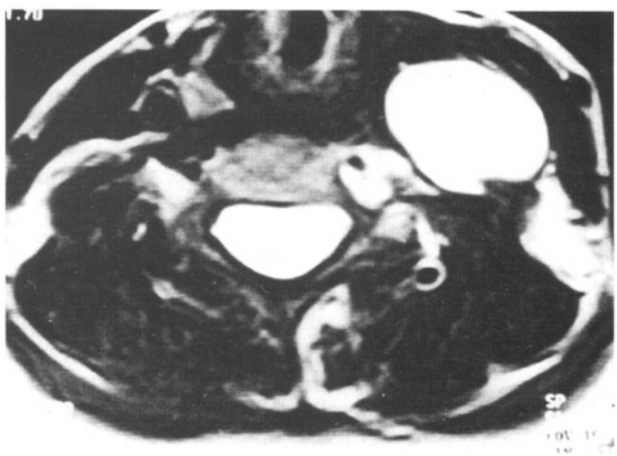

Figure 2: Axial cervical MRI showing left jugular foramen schwannoma in upper cervical region.

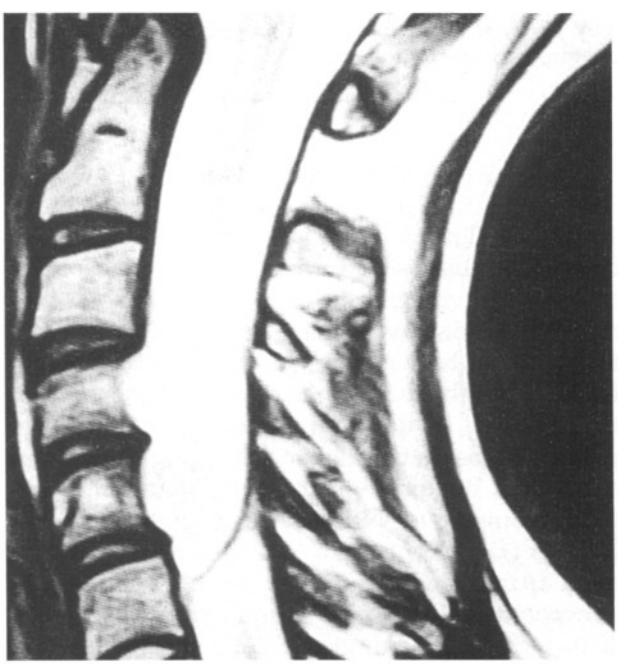

Figure 4: Unenhanced T2 weighted MRI of the spine showing a histologically confirmed extradural schwannoma extending from C1 to C3.

DISCUSSION

NF describes two major human genetic disorders that are distinct clinical entities. However, both demonstrate autosomal dominant inheritance and involve tumors of the nervous system (9,10).

NF-1 is more common (incidence 1 of every 3000 individual) and is characterized by a variable array of features, such as neurofibromas, café-au-lait spot, lish nodules of the iris, and other certain CNS tumors (10). Astrocytomas are the most common intracranial tumor in NF-1 (11). Other tumors, such as ependymomas, may occur with an excessive frequency (13).

NF-2 is even more rare and occurs in about 1 of every 50.000-100.000 individual (9,14). It is characterized by bilateral acoustic neuromas, which are schwannomas of the vestibular branch of the VIIIth cranial nerve. Tumors of the CNS are relatively common in NF-2. Schwannomas are most common, on the other hand, multiple tumors of meningeal and glial origin can also occur especially meningiomas can easily develop (6,11). Schwannomas, which are the most common extramedullary tumors, always originate from sensory nerve roots; they are frequently located in the cervicothoracic region and may grow into a dumbbell shape, which causes the neural foramen to expand. However, intramedullary tumors are usually ependymomas, and less likely low grade astrocytomas (11). CNS calcification and subcutan lipofibrom are extremely rare in NF-2 but our case inhered these lesions.

NF-2 is genetically distinct from NF-1. Linkage studies have shown the NF-2 gene to be on chromosome 22(6). An abnormal NF-2 gene revelation of such as in patients with NF-2, can lead to tumor formation in affected tissues. However, it must be stressed that sporadic tumors in the general population may or may not be associated with alterations in the NF genes.

Rodriguez and Berthrong (16) reported such a patient and included an extensive review of the literature in 1966. They found 16 reported cases of patients with NF and intramedullary spinal cord tumors. All of these patients had NF-2, as currently defined. They were eight ependymomas, three astrocytomas, and three gliomas. More recently, a report on NF-2 in the pediatric age group included three patients with intramedullary spinal cord tumors. However, only one was biopsied and it was diagnosed as ependymoma (11,12).

Multiple intradural spinal tumors are common in NF-2 (less common in NF-1)(3). Pathologically, ependymomas are common but astrocytoma, meningioma, and neurofibroma are less common (3). The histologies of NF-1 and NF-2 tumors are controversial. Halliday et al. (9) suggested that histologically, NF-1 spinal tumors were neurofibromas; whereas, NF-2 spinal tumors were schwannomas (13). In our patients, the histology of spinal tumors were typical of schwannomas in cervical and thorasic region. Cervical schwannomas were extradural, whereas, thoracic tumors were intradural, and no association of either form of NF withspinal cord tumors has been reported so far (10,15). The distinct histological features of these tumors may reflect different pathogenetic mechanisms even though they arise at identical sites in NF-1 and NF-2 (9,11). Cerebral and cerebellar calcifications are extremely rare in NF-2; our patient had bilateral frontal cortical and cerebellar cortical calcifications. Mark Lee et al. have also reported a patient with NF 2 and C5-T3 intramedullary schwannoma (10).

CONCLUSION

We conclude that intramedullary and extramedullary spinal cord tumors should be included in the typical spectrum of CNS tumors associated with NF-2. We think that this association has not previously been made explicit because of the rarity of intramedullary and extramedullary spinal cord tumors on those patients with NF-2. In contrast, most spinal nerve sheath tumors in neurofibromatosis type 2 or those that occur sporadically are schwannomas. Spinal tumor localization may be multiple in NF-2 and may require a different histopathological diagnosis .The point is to identify the very area or those areas requiring special attention while trying to pay special cere to the entire neuroaxis in the long term follow -up of these patients. Whether all NF-2 patients should undergo presymptomatic screening with MRI or visual evoked response testing is not certain, but this is recommended in most centers (11). Growth of these tumors may be quite variable and some may require no specific therapy. Progressive symptoms or tumor enlargement are handled surgically; yet, though less likely, radiation and chemotheraphy can also apply. Therefore, in such cases surgical operation may be recommended secondary to radiation and chemotheraphy.

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