Acta Medica Okayama

Volume 44, *Issue* 6 1990 *Article* 7

DECEMBER 1990

A case of bulbospinal muscular atrophy with chief complaint of sensory disorder in the lower extremities.

Shigetoshi Kuroda* Hiroshi Ujike†

Sachi Nakashima‡ Saburo Otsuki**

*Okayama University,

†Okayama University,

‡Okayama University,

**Okayama University,

A case of bulbospinal muscular atrophy with chief complaint of sensory disorder in the lower extremities.*

Shigetoshi Kuroda, Hiroshi Ujike, Sachi Nakashima, and Saburo Otsuki

Abstract

A 56-year-old man was admitted to our department with a chief complaint of lower extremity dysesthesia. He described a dull numbness below the ankle and a dull pain in the nates for the past two years. Although the numbness extended to the thigh, he did not notice any muscular weakness or atrophy. Neurological examination revealed weakness and atrophy in the face, tongue and the proximal portions of all four extremities. Deep tendon reflexes were decreased. A moderate loss of vibratory sensation was noted below the knees. Electromyography showed neurogenic changes. Muscle biopsy revealed both myogenic and neurogenic changes. Sural nerve biopsy revealed a mild reduction of myelinated fibers, particularly the large-diameter fibers. Based on these findings, a diagnosis of bulbospinal muscular atrophy (BSMA) was made. In recent years, there have been some case reports of BSMA with sensory disturbances, or merely with subclinical manifestations of a sensory disturbance. This case is included in the same category as those reports, but it is interesting to note that the sensory disturbance in the lower extremities occurred as the chief complaint of the disease.

KEYWORDS: bulbospinal muscular atrophy, sensory disturbance

---

*PMID: 1963731 [PubMed - indexed for MEDLINE]

Acta Med Okayama 44 (6) 325-328 (1990)

— Brief Note —

A Case of Bulbospinal Muscular Atrophy with Chief Complaint of Sensory Disorder in the Lower Extremities

Shigetoshi Kuroda*, Hiroshi Ujike, Sachi Nakashima and Saburo Otsuki

Department of Neuropsychiatry, Okayama University Medical School, Okayama 700, Japan

A 56-year-old man was admitted to our department with a chief complaint of lower extremity dysesthesia. He described a dull numbness below the ankle and a dull pain in the nates for the past two years. Although the numbness extended to the thigh, he did not notice any muscular weakness or atrophy. Neurological examination revealed weakness and atrophy in the face, tongue and the proximal portions of all four extremities. Deep tendon reflexes were decreased. A moderate loss of vibratory sensation was noted below the knees. Electromyography showed neurogenic changes. Muscle biopsy revealed both myogenic and neurogenic changes. Sural nerve biopsy revealed a mild reduction of myelinated fibers, particularly the large-diameter fibers. Based on these findings, a diagnosis of bulbospinal muscular atrophy (BSMA) was made. In recent years, there have been some case reports of BSMA with sensory disturbances, or merely with subclinical manifestations of a sensory disturbance. This case is included in the same category as those reports, but it is interesting to note that the sensory disturbance in the lower extremities occurred as the chief complaint of the disease.

Key words : **bulbospinal muscular atrophy, sensory disturbance**

Bulbospinal muscular atrophy (BSMA) (1-3), an X-linked, recessive hereditary disease in adults, is characterized by gradual progression of muscular weakness, atrophy, and fasciculations in the face, tongue, and proximal muscles of the extremities. It is often complicated by gynecomastia, hyperlipidemia, diabetes mellitus, and other physical abnormalities. Recent papers have also reported an associated sensory disorder with BSMA (3-9). We experienced an interesting case of BSMA, with a chief complaint of a sensory disturbance, which never noticed subjective symptoms of muscular atrophy.

A 56-year-old man was admitted to our department with chief complaints of numbness (dysesthesia) in the lower extremities and dull pain in the nates. His hereditary/family history was non-contributory; nor did he have diabetes mellitus. At around 45 years of age, he noticed a fine hand tremor when tense. Two years ago, he developed a dull pain in the nates with dull numbness below the ankles while in a sitting position. The symptoms progressed slowly, and he was admitted to our department. Neurological examination revealed fasciculation and weakness of the facial muscles and tongue. Slight

* To whom correspondence should be addressed.

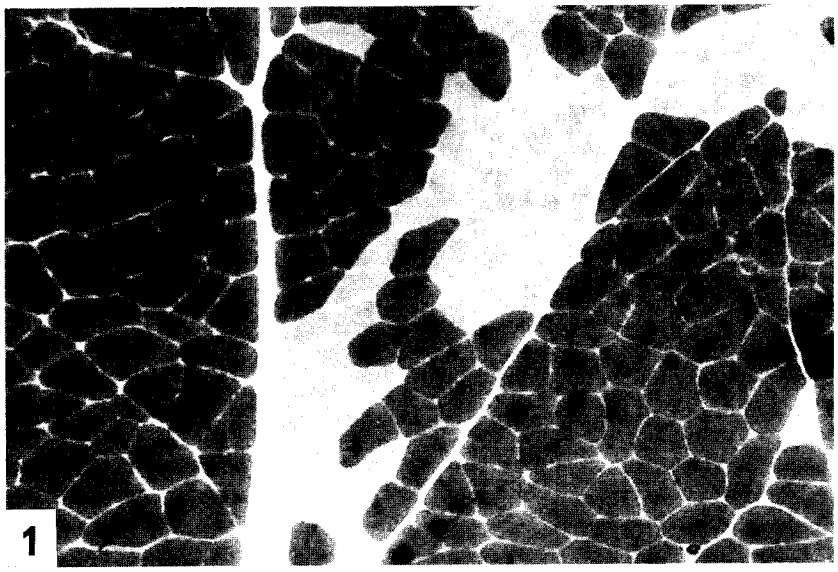

Fig. 1 ATPase reaction at pH 9.5 shows type II fiber grouping. Dark-staining fibers indicate type II fibers. ATPase × 70

dysphagia was also noted. Wasting and fasciculation was recognized in the muscles of the shoulder girdle, biceps, triceps and quadriceps. In general, the upper extremities were more wasted than the lower extremities. There was a finger tremor that was aggravated when the patient was tense. Deep tendon reflexes were reduced. There was a subjective symptom of severe pain and numbness throughout the lower extremities, but sensory testing only showed moderate loss of vibratory sensation below the knees. There were no abnormalities of superficial sensation. Creatine kinase level was 230 IU/l (normal range 10–139) and estrone (E_1) value was elevated at 78 pg/ml (normal range 5–40), but estradiol (E_2) and estriol (E_3) were both normal. Testosterone level was normal at 10.9 ng/ml (normal range 4–14). Electromyography revealed neurogenic changes. Motor nerve conduction velocities were within normal limits in all four extremities. Sensory nerve conduction velocity was 46.7 m/s in the sural nerve. Muscle biopsy revealed variation of fiber size and slight centronuclear migration with scattered angulated fibers and pyknotic nuclear clumps. ATPase staining at pH 9.5 revealed type II fiber grouping (Fig. 1). Sural nerve biopsy revealed a mild reduction in large diameter myelinated fibers (Fig. 2). Density of myelinated fibers per mm^2 was 4934/mm^2. Diameter frequency histogram of myelinated fibers in the sural nerve showed a unimodal pattern due to the loss of large myelinated fibers (Fig. 3).

Based on these findings, we diagnosed the patient with BSMA, though there was no evidence of a hereditary history. The chief complaint, lower extremity numbness, disappeared in response to administration of amitriptyline (25 mg/day), with improvement of the dull pain in the nates.

As for the sensory disorder associated with BSMA, Kennedy *et al.* (2), in their paper on 11 patients in two families, reported a slight decrease in peripheral nerve fibers in an autopsy case, as well as reduced sensory nerve conduction rates in three cases. Hardings *et al.* (4), in their report on ten cases of BSMA, stated that sensory action potentials were abnormal in six of the seven subjects, and preferred labeling the disease bulbospinal neuronopathy, rather than BSMA. Wilde *et al.* (6) also reported three cases of

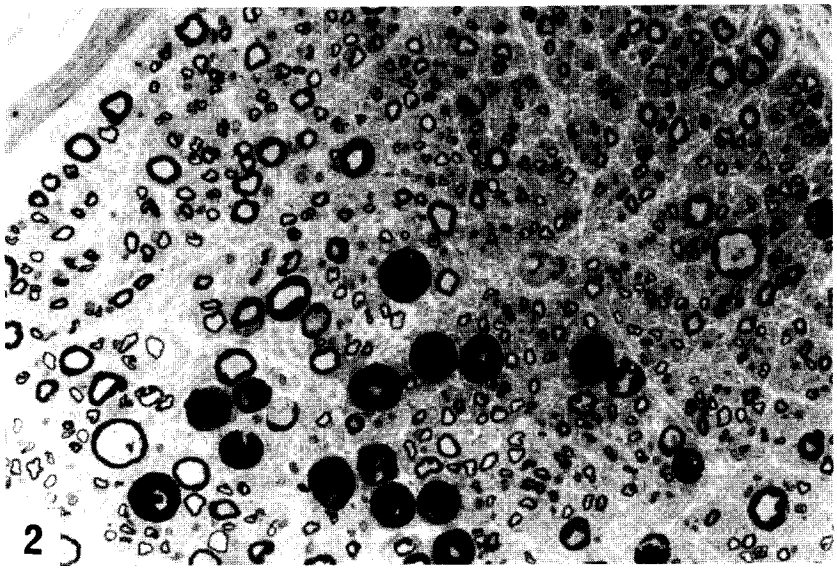

Fig. 2 Semi-thin, epon-embedded, transverse section of the sural nerve biopsy, showing depletion of large-sized myelinated fibers. Toluidine blue, × 350

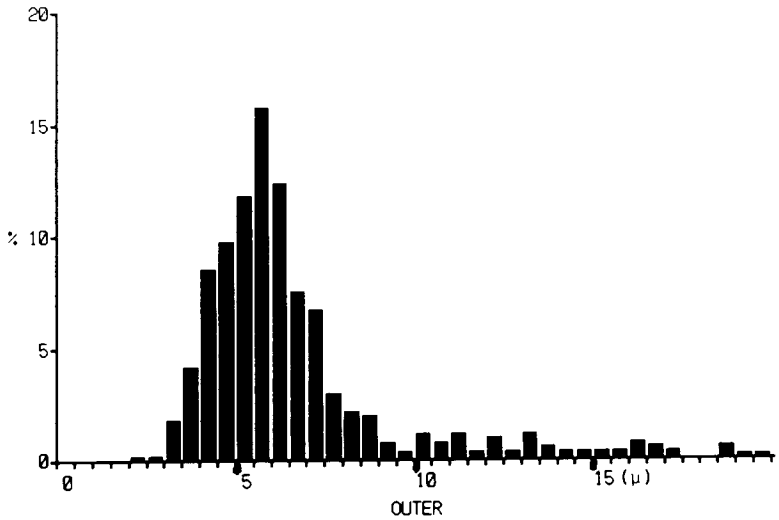

Fig. 3 Size frequency distribution for myelinated fibers of the sural nerve. The fiber size distribution is unimodal due to the loss of large myelinated fibers.

BSMA and noted axonal degeneration, segmental demyelination and marked interstitial tissue hypertrophy on sural nerve biopsy. They diagnosed neuronopathy of the dying-back type, characterized by primary damage to the anterior horn cells and dorsal root ganglia. Saito *et al.* (7) reported four cases of BSMA, in two of which sural nerve potentials were abnormal and nerve biopsy

revealed obvious depletion of myelinated fibers despite the absence of clinical signs of a sensory disorder. Hirayama *et al.* (8) obtained autopsy findings of dorsal funicular degeneration with dominance in the cervical cord and decreased numbers of nerve fibers, particularly large-diameter fibers, in the sural nerve. Nagashima *et al.* (9) reported a marked loss of myelinated fibers in the sural nerve in two autopsy cases. Mukai (3), in a review of 71 cases of BSMA, reported slight impairment of all sensory modalities in the distal region of the lower extremities in six cases and moderate impairment in five cases, with liability in vibratory and tactile sensation and a slight delay in sural nerve conduction. Sobue *et al.* (10) morphologically investigated the sural nerve in six subjects and noted depletion of up to 20 to 30 % of nerve fibers, particularly large-diameter fibers, in comparison with normal controls. Teased fiber preparations showed segmental demyelination changes. Also noted was dorsal funicular degeneration, primarily in the distal regions.

As suggested by these reports, BSMA should be thought of as a disease involving a sensory disorder, rather than categorized as "spinal muscular atrophy" (11). However, it is differentiated from hereditary motor and sensory neuropathy (HMSN) as proposed by Dyck (12), since the motor neuron disorder is more severe, the sensory disorder is less severe, and the sural nerve changes are less severe in comparison with those noted in HMSN. It remains to be determined through electrophysiological and morphological investigations, on a large number of subjects, whether the sensory disorder found in BSMA is among the cardinal symptoms, or is a secondary finding.

References

1. Magee KR: Familial progressive bulbar-spinal muscular atrophy. Neurology (1960) **10**, 295–305.
2. Kennedy WR, Alter M and Sung JH: Progressive proximal spinal and bulbar muscular atrophy of late onset. A sex-linked recessive trait. Neurology (1968) **18**, 671–680.
3. Mukai E: Clinical features of bulbo-spinal muscular atrophy. Neurol Med (1989) **30**, 1–7 (in Japanese).
4. Harding AE, Thomas PK, Baraitser M, Bradbury PG, Morgan-Hughes JA and Ponsford JR: X-linked recessive bulbospinal neuronopathy: a report of ten cases. J Neurol Neurosurg Psychiatry (1982) **45**, 1012–1019.
5. Ono S, Ukawa Y, Kurisaki H, Iwata M, Mannen T and Toyokura Y: A family of bulbar-spinal muscular atrophy including a female patient with muscle cramps, contraction fasciculations and neurogenic EMG. Neurol Med (1983) **18**, 41–47 (in Japanese).
6. Wilde J, Moss T, Thrush D: X-linked bulbo-spinal neuronopathy: A family study of three patients. J Neurol Neurosurg Psychiatry (1987) **50**, 279–284.
7. Saito T, Miyata K, Hosoda M, Torii J and Kowa H: Familial bulbo-spinal muscular atrophy with sensory involvement —Morphological studies of biopsied sural nerve in two patients—. Clin Neurol (1988) **28**, 695–704 (in Japanese).
8. Hirayama M, Hashizume Y, Takagi T, Higo H and Ito M: An autopsy case of X-linked recessive bulbar-spinal muscular atrophy. Clin Neurol (1988) **28**, 1131–1136 (in Japanese).
9. Nagashima T, Seko K, Hirose K, Mannen T, Yoshimura S, Arima R, Nagashima K and Morimatsu Y: Familial bulbospinal muscular atrophy associated with testicular atrophy and sensory neuropathy (Kennedy-Alter-Sung syndrome). Autopsy case report of two brothers. J Neurol Sci (1988) **87**, 141–152.
10. Sobue G, Hashizume Y, Mukai E, Hirayama M, Mitsuma T and Takahashi A: X-linked recessive bulbospinal neuronopathy. Brain (1989) **112**, 209–232.
11. Emery AEH: The nosology of the spinal muscular atrophies. J Med Genet (1971) **8**, 481–495.
12. Dyck PJ: Inherited neuronal degeneration and atrophy affecting peripheral motor, sensory, and autonomic neurons; in Peripheral Neuropathy, Dyck, Thomas, Lambert and Bunge eds, 2nd Ed, Vol 2, WB Saunders, Philadelphia (1984) pp 1600–1655.

Received August 3, 1990; accepted September 20, 1990