PS-16

Spinal Muscular Atrophy Type 3B Previously Misdiagnosed as Poliomyelitis Until Adulthood

Tae Kwon Lee[1*], Christopher Chung[2*], Shin Ki Hoon[1], Su Min Lee[1], Sung-Rae Cho[1,3,4,5,6 †]

[1]Department and Research Institute of Rehabilitation Medicine, Yonsei University College of Medicine, Seoul, Republic of Korea
[2]Tonbridge School, Tonbridge, Kent, England
[3]Graduate School of Medical Science, Brain Korea 21 Project, Yonsei University College of Medicine, Seoul, Republic of Korea
[4]Department of Biohealth Engineering, Graduate school of Transdisciplinary Health Sciences, Yonsei University, Seoul, Republic of Korea
[5]Brain Research Institute, Yonsei University College of Medicine, Seoul, Republic of Korea
[6]Metabolism-Dementia Research Institute, Yonsei University College of Medicine, Seoul, Republic of Korea

Introduction

Why Misdiagnosis Occurs

Poliomyelitis	OVERLAP	SMA type 3B
• Viral (enterovirus) • Lower motor neuron • Febrile illness preceding weakness • Asymmetric • Stable after acute phase	LMN signs Weakness Atrophy Areflexia	• SMN1 gene deletion • Lower motor neuron • Childhood onset • Symmetric proximal • Progressive course

In Pre-genetic era

The genetic basis of this disorder was first identified in **1995,** revealing that **SMA** is primarily caused by **a mutation or deletion in the SMN1 gene located at 5q13.**

Shared lower motor neuron features made poliomyelitis reasonable before genetic testing without molecular confirmation, distinction was clinically impossible.

Case presentation

A Korean woman in early 50s presented with progressive motor deficits beginning in early childhood.

Age 2 : High fever
Age 3 : Limping gait, recurrent falls, Febrile convulsion
CDH : Surgical correction for congenital hip dislocation
→ **Diagnosed with poliomyelitis at that time.**
Age 18 : Additional orthopedic surgery on hip joints
Age 22 : MMT - U/Ex proximal P/P distal F/F, L/Ex P/P
Age 29 : Wheelchair dependent ambulation
Age 47 : Visited OPD for hip pain d/t aggravated muscle atrophy
MMT – Shoulder P+/P+, Elbow, Wrist, Hand F/F
Hip P/P, Knee, ankle, foot P+/P+
→ **Electrodiagnostic : Motor neuron disease**
Age 52 : Lt. breast cancer
s/p Total mastectomy & sentinel lymph node biopsy
s/p Tamoxifen
Age 53 : Neck swelling > Septic shock
Multifocal infarction, referred for rehabilitation
→ **Next Generation Sequencing (NGS) : SMA type 3B**

Diagnostic Timeline

Initial diagnosis	Disease progression	Work up	NGS	Final diagnosis
Age 3 **Poliomyelitis** Fever + limping gait after febrile illness Febrile convulsion Clinical diagnosis of poliomyelitis Before genetic testing	**Age ~47** **Progression Loss of ambulation** Ambulation maintained until age 20 After gradual decline. Wheelchair – dependent by age 29.	**Age 47** **Electrodiagnosis** 1. Normal SNAP 2. Decreased CMAP amplitude in Rt peroneal nerve (EDB, TA) 3. Abnormal spontaneous activity & long polyphasic motor unit (VM, GCM, EHL) Motor neuron disease, but non-specific.	**Age 53** **Next Generation Sequencing (NGS)** Homozygous deletion of SMN1 was identified. SMN2 copy number: 3~4	**Age 53** **Final Diagnosis: SMA Type 3B** 5q SMA Disease-modifying therapy not pursued due to advanced stage and long disease duration.

ELECTRODIAGNOSTIC RESULTS

Nerve conduction study (NCS)

Nerve type	Nerve Examined	Findings
Sensory	Median	normal
	Ulnar	normal
	Superficial peroneal	normal
	Sural	normal
Motor	Median (APB)	normal
	Ulnar (ADM)	normal
	Peroneal (EDB, TA)	**Reduced CMAP amplitude**
	Tibial (AH)	normal

Needle EMG — Right Lower Extremity

Muscle	Spontaneous	Motor unit potentials	Interference
Paraspinalis	-		
Tensor fascia latae	-	Normal	**Single - Partial**
Vastus medialis	**1+ PSW**	**Long duration polyphasic**	**Single - Partial**
Tibialis anterior	-	Normal	**Single - Partial**
Extensor hallucis longus	**1+ PSW**	**Long duration polyphasic**	**Single - Partial**
Gastrocnemius	**1+ PSW**	**Long duration polyphasic**	**Single - Partial**

APB = Abductor pollicis brevis, ADM = Abductor digiti minimi, EDB = Extensor digitorum brevis, TA = Tibialis anterior, AH = Abductor hallucis
CMAP = Compound Muscle Action Potential , PSW = positive sharp wave · Abnormal values highlighted · EMG limited to right LE (patient declined bilateral exam)

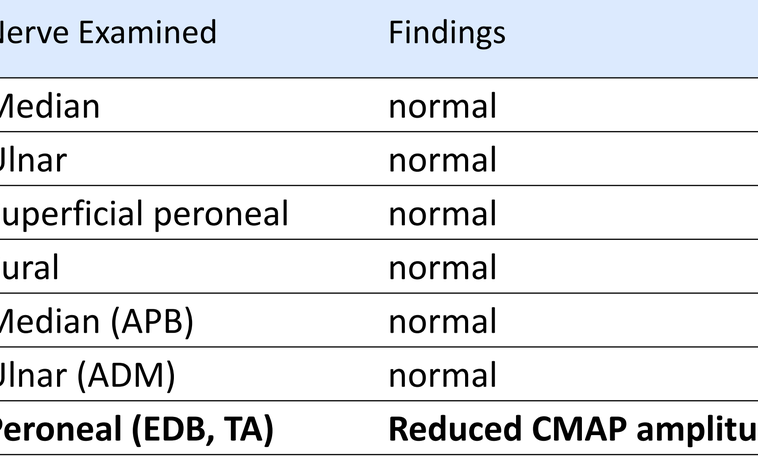
NGS Result – SMA type 3B

Variants of Interest

ACMG Classification	Gene	Accession	Nucleotide	Amino acid	Zygosity	dbSNP	Disorder (OMIM, HGMD)	Inheritance	Global (ExAC)	Korean (KRGDB)	Comments
Pathogenic	SMN1	NM_000344	Deletion		Homo		Spinal muscular atrophy-2, 253550 (3), Autosomal recessive; Spinal muscular atrophy-4, 271150 (3), Autosomal recessive; Spinal muscular atrophy-3, 253400 (3), Autosomal recessive; Spinal muscular atrophy-1, 253300 (3), Autosomal recessive	AR			MLPA confirmed

* dbSNP, The Single Nucleotide Polymorphism Database; OMIM, Online Mendelian Inheritance in Man; ExAC, population frequency from The Exome Aggregation Consortium; KRGDB, population frequency from the Korean Reference Genome DB; VOUS, Variants of unknown significance; AD, autosomal dominant; AR, autosomal recessive; XD, x-linked dominant; XR, x-linked recessive

Figures



Conclusion

This case illustrates that SMA may be misdiagnosed as poliomyelitis in individuals from the pre-genetic era.
A slowly progressive clinical course and non-specific electrodiagnostic findings may delay accurate diagnosis.

Re-assessment of longstanding diagnoses is crucial when disease progression is atypical, genetic testing is essential for establishing a definitive diagnosis.