Case study: delayed diagnosis of Duchenne muscular dystrophy (DMD) in an 8-year-old boy presenting with speech and language delay

Patient case based on Essex C & Roper H. 2001[1]

INITIAL PRESENTATION

T was brought to his GP by his mother because he was **not able to speak or even babble at 16 months old**. His mother also reported that T often walked on his toes when he began to walk at 13 months.

FIRST REFERRAL: SPEECH AND LANGUAGE THERAPY

At 2 years old, T underwent a multidisciplinary assessment at a child development centre and was diagnosed with **language delay** and **learning difficulties**. He was later provided special education and support services at primary school. At 5 years, T's teacher reported **concerns about his motor skills**.

SECOND REFERRAL: PAEDIATRIC NEUROLOGIST

At 5 years and 4 months, T was referred to a paediatric neurologist for further assessment.

Physical examination revealed **calf hypertrophy**, a **waddling gait** and use of **Gowers' manoeuvre** to get up from the floor.

LABORATORY AND GENETIC TESTS

Laboratory tests revealed **elevated creatine kinase (CK) levels**:

Creatine kinase	*>10,000 U/L*
Normal level	*≤250 U/L*[4]*

Genetic testing identified a **deletion mutation in the dystrophin gene** that included exons 3–8, **confirming a diagnosis of DMD**.

OUTCOME

T was diagnosed with DMD around **4 years** after he first presented with symptoms. At the age of 8 years 7 months, he could walk only a few metres indoors.

Patient's initial and photo are for illustrative purposes only.

DMD EARLY SIGNS AND SYMPTOMS INCLUDE:[2,3]

- Delayed motor milestones
- Speech delay and language impairment
- Abnormal gait (e.g. toe walking)
- Gowers' manoeuvre
- Calf hypertrophy
- Learning difficulties

WHAT IS A CK TEST?

- *A simple and rapid blood test that screens for elevated CK levels – which reflect muscle damage[4,5]*
- *Normal level is generally up to 250 U/L*[4]*
- *Refer to neuromuscular specialist if CK is elevated[2,4]*

GENETIC TESTING TO CONFIRM DMD

- *Patients with elevated CK levels and clinical signs of DMD should undergo genetic testing to confirm the condition[2]*
- *Only genetic testing can identify the DMD mutation type; this is important for genetic counselling, prenatal diagnosis, considering mutation-specific therapies and potential to enrol into clinical trials[2,6]*
- *Delayed diagnosis of DMD results in lost opportunities to initiate specialist care and access to genetic counselling[2,5,6]*

Think CK Test

Developmental delay?
Order a CK test today

PTC THERAPEUTICS

This material has been developed and funded by PTC Therapeutics.
It is intended for healthcare professionals only.

DMD: WHAT YOU NEED TO KNOW

- DMD is a rare, progressive, disabling childhood neuromuscular disorder that is often associated with a delayed diagnosis[2,3,5]
- Early diagnosis and intervention are critical to help delay disease progression and improve outcomes because once muscle loss occurs, it cannot be restored[2,5,7,8]
- As a first point of contact for parents' concerns, [GPs or PCPs] can be a driving force behind a successful diagnostic journey[9]
- Early diagnosis means early access to treatments and specialist care, better informed family planning and potential entry into appropriate clinical trials[2,5]

HOW TO RECOGNISE EARLY SIGNS AND SYMPTOMS OF DMD

Consider DMD in boys with:

Delayed motor milestones[3,13]

- *Difficulty rising to stand or not walking well by 18 months[2,4,10-12]*

Speech delay and language impairment[2,3,13]

- *Speech delay and articulation difficulties as early as 18 months old[2,3]*

Signs of muscle weakness[3,13]

- *Abnormal gait (e.g. toe walking or a waddling walk)[2,3,12]*
- *Gowers' manoeuvre[2,12,13]*
- *Frequent falls[2,3,12,13]*
- *Trouble with stairs[2,13]*

Calf hypertrophy[2,3,13]

Learning difficulties[2]

Behavioural problems[2,3]

Unexplained increases in transaminases[2]

WHAT TO DO IF YOU SUSPECT DMD[2,4,13]

Does your patient have signs and symptoms of DMD?

YES → Test for elevated serum CK (>250 U/L)*

IF CK IS ELEVATED:

\+ ***Refer to a neuromuscular specialist promptly for genetic testing***

IF CK IS NOT ELEVATED:

– ***Refer to a paediatric neurologist or neuromuscular specialist for further evaluation***

Normal CK levels do not rule out neuromuscular disease

*The normal CK range is generally up to 250 U/L. Absolute values may differ between laboratories.[4]

CK, creatine kinase; GP, general practitioner; PCP, primary care practitioner.

References: 1. Essex C & Roper H. *BMJ.* 2001;323:37–38. **2.** Birnkrant DJ, *et al. Lancet Neurol.* 2018;17:251–267. **3.** Ciafaloni E, *et al. J Pediatr.* 2009;155:380–385. **4.** National Task Force for Early Identification of Childhood Neuromuscular Disorders. Guide for primary care providers. Available at: https://childmuscleweakness.org/wp-content/uploads/2019/05/PrimaryCareProviderPacket.pdf [Accessed June 2020]. **5.** van Ruiten HJ, *et al. Arch Dis Child.* 2014;99:1074–1077. **6.** Aartsma-Rus A, *et al. J Med Genet.* 2016;53:145–151. **7.** Blake DJ, *et al. Physiol Rev.* 2002;82:291–329. **8.** Laing NG, *et al. Clin Biochem Rev.* 2011;32:129–134. **9.** Birnkrant DJ, *et al. Lancet Neurol.* 2018;17:445–455. **10.** Noritz GH, *et al. Pediatrics.* 2013;131:e2016–e2027. **11.** Centers for Disease Control and Prevention. Developmental milestones. Available at: https://www.cdc.gov/ncbddd/actearly/pdf/checklists/all_checklists.pdf [Accessed June 2020]. **12.** Lurio JG, *et al. Am Fam Physician.* 2015;91:38–44 **13.** Aartsma-Rus A, *et al. J Pediatr.* 2019;204:305–313.

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