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. 2001¹

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 condition²
- 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





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 journey⁹
- 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 difficulties²



Behavioural problems^{2,3}



Unexplained increases in transaminases²



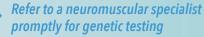
WHAT TO DO IF YOU SUSPECT DMD^{2,4,13}

Does your patient have signs and symptoms of DMD?



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





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.

