Botulinum Toxin Injections are Safe and Effective in Reducing Focal Spasticity in Pelizaeus-Merzbacher Disease: ***A Case Report***

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CASE DIAGNOSIS: A 35-year-old male with spastic quadriplegia due to Pelizaeus-Merzbacher disease.

BACKGROUND:

- Pelizaeus Merzbacher disease (PMD) is a rare, progressive, degenerative X-linked disorder that causes hypomyelination in the brain and spinal cord.[1]
- It is categorized as a "leukodystrophy" (disease process that affects development of white matter) via mutation of the PLP1 gene, which oversees the production of myelin (see Figure 1).[2]
- "Classical" PMD (most common) presents in first year of life and patients often live into the 50s and 60s, though with significant support.[3]
- Symptoms are variable but may present as hypotonia, nystagmus, and poor growth during infancy.
- With time, patients may develop significant psychomotor delay, ataxia, spasticity, and worsening upper or lower limb paresis.
- Treatment is symptomatic as there are no disease-modifying agents or cures.

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Patients with spasticity resulting from Pelizaeus–Merzbacher disease can be safely and effectively managed with botulinum toxin injections.

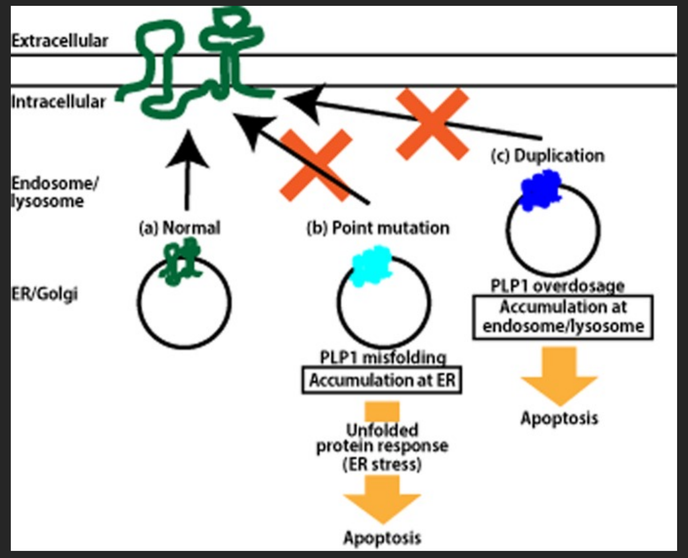

Figure 1. Pathophysiology of PMD[4]

Figure 2. Post-injection follow-up

Take a picture to **read more** about **PMD** on the National Organization for Rare Disorders (NORD) website.

THE CASE:

- The patient presented to clinic from group home complaining of his knees pressing against each other when sitting. He was found to have bilateral hip adductor hypertonia (Modified Ashworth 3) limiting his ability to perform activities of daily living (ADLs) such as bathing, dressing, and wheelchair positioning. We were only able to passively separate the knees approximately 5 cm with great effort.
- He was already taking oral baclofen and had previously received phenol neurolysis to the bilateral obturator nerves every 6 months for several years with waning efficacy.
- Given concern regarding the potential for fibrosis/contracture development with frequent phenol injections at a young age, chemodenervation with botulinum toxin was recommended to continue the above benefits of decreased muscle tone while limiting the risk for fibrosis.
- Unfortunately, the patient's insurance company denied prior authorization due to lack of literature supporting the safety and efficacy of botulinum for this pathology.
- The decision was made to continue with planned treatment as benefits outweighed risks.

DISCUSSION:

- The patient received 100 units of onabotulinumtoxinA to bilateral hip adductor muscles (200 units total) using electromyography for guidance and confirmation of overactivity.
- At one-month follow-up, the patient noted significantly improved ability to sit and position himself with hips more easily abducted (Modified Ashworth 3 decreased to 1) and ability to perform ADLs per his caregiver.
- The distance measured between the medial femoral condyles increased from 5 cm pre-injection to 12 cm at 1-month post-injection follow-up (see Figure 2).

TAKEAWAY:

- Spasticity and other phenomena due to muscle overactivity can result from a wide variety of upper motor neuron pathology including PMD.
- There is limited evidence regarding the safety and efficacy of chemodenervation for spasticity caused by these rare disorders.
- However, treatment should be individualized and modified accordingly with a benefit vs risk discussion.
- This case showed that botulinum toxin injections were indeed safe and very effective for treatment of issues related to muscle overactivity in PMD.
- We hope others who have treated issues related to muscle overactivity in PMD with botulinum toxin injections report their findings to help provide more evidence for safety/efficacy of this therapy in this rare disorder.

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2. Koeppen AH, Robitaille Y. Pelizaeus-Merzbacher disease. *Journal of Neuropathology & Experimental Neurology.* 2002;61(9):747–759.
3. Hobson GM. Pelizaeus-Merzbacher disease. *National Organization for Rare Disorders.* 2020. https://rarediseases.org/rare-diseases/pelizaeus-merzbacher-disease
4. Torii T, Miyamoto Y, Yamauchi J, Tanoue A. New insights into PMD mechanism. *Pediatr Int.* 2014;56: 659-666.