



# Botulinum toxin A in electrical injury – induced cervical myoclonus

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## ABSTRACT

**OBJECTIVE:** To report a case of cervical myoclonus immediately following an electrical injury which has been successfully treated with botulinum toxin A injections. **BACKGROUND:** Neurological sequelae of lightning or other electrical current can cause both peripheral and central nervous system injuries. Involuntary movements following electrical injuries are rare. Some reports include lingual dystonia and lingual tremor, cervical dystonia, limb dystonia, segmental dystonia, athetosis, limb segmental – myoclonus and parkinsonism. **METHODS:** This 41 – year - old, right-handed man suffered a sustained electrical injury while taking a shower. He sustained no loss of consciousness but was amnesic of the event. Within a few minutes, he noticed persistent head jerking to the right. Our examination six months after the event revealed patterned, sudden brief rotational jerks of his head to the right with an intermittent semi - rhythmic frequency of about 0.5 hertz. Mental status examination found mild cognitive impairment with no mood disorders or psychiatric disturbances. The general and neurological examination including cranial nerves, motor, sensory, coordination, reflexes and gait showed no deficits. There was no parkinsonism. He had a normal brain computed tomography (CT). Serological evaluations for connective tissue diseases, syphilis, sedimentation rate (ESR), vitamin B12, folate, homocysteine and thyroid-stimulating hormone (TSH) were normal. EEG (Electroencephalogram) was normal during the movements. **RESULTS:** Needle EMG recordings were obtained but only the left SCM showed activities during the movements, in contrast to what is seen in volitional movement. The EMG activity was brief (<0.5 seconds) and did not persist throughout the apparent observed rotation. This is most consistent with segmental myoclonus. The patient was injected with a total of two hundred and fifty units of botulinum toxin type A (Botox): 200 into his left SCM, and 50 into the right splenius capitis, semispinalis capitis, and trapezius. The patient reported essentially complete resolution 2 days after injections. **CONCLUSION:** Botulinum toxin type A injections improved cervical myoclonus induced by electrical injury.

## BACKGROUND

Neurological sequelae of lightning or other electrical current can cause both peripheral and central nervous system injuries. Involuntary movements following electrical injuries are rare. There are some reports including lingual dystonia and lingual tremor, cervical dystonia, limb dystonia, athetosis, limb segmental – myoclonus and parkinsonism.

## CASE REPORT

This is a 41 – year old, right-handed man with dyslipidemia.

- A power line fell and contacted water outside his home. It was a short circuit. The patient was screaming and his mother found him in the shower holding a metallic showerhead with his right hand.
- Within a few minutes, his mother noticed his head jerking to the right persistently.
- The patient was amnesic to the event. He denied pain, an urge to move or other sensory component.
- There were no histories of previous movement disorders or drug exposure especially dopamine blocking drugs.

*Physical examination:*

- The general examination was normal. Mental status examination was showed mild cognitive impairment, which has been present from birth.
- The neurological examination including cranial nerves, motor, sensory, coordination, reflexes and gait showed no deficits.
- Movement: Patterned, sudden brief rotational jerks of his head to the right with a frequency of about 0.5 hertz. These were neither position specific nor stimulus induced. There was no distractibility, variability, entrainment or inducement by vibration.

### VIDEO ILLUSTRATION

*Investigation:*

- Blood tests including serological evaluations for connective tissue diseases, syphilis, sedimentation rate (ESR), vitamin B12, folate, homocysteine and thyroid-stimulating hormone (TSH) were normal.
- Electroencephalogram – no abnormal electrical activities
- CT brain – unremarkable

## CASE REPORT

*Needle EMG* were obtained before botulinum toxin injection from the following muscles: left sternocleidomastoid (SCM), right splenius capitis, semispinalis capitis, obliquus capitis inferior, trapezius, and scalene. Only the left SCM showed activities during the movements. The EMG activity was brief (<0.5 seconds) and did not persist throughout the entire apparent observed rotation.

*Treatment:*

Two - hundred and fifty units of Botulinum toxin type A were injected in the following pattern; 200 into his left SCM, and 50 into the right splenius capitis, semispinalis capitis, and trapezius

## RESULTS

The patient reported essentially complete resolution 2 days after injections. After 3 months, his head jerking gradually recurred and he was successfully injected again.

## DISCUSSION

There are a few case reports of segmental myoclonus following electrical injuries affecting the brachial plexus and extremities. Electricity takes the shortest pathway through the body to a ground. It is possible that the electrical current may have traveled from his hand to his cervical spine, body, leg and then to the ground. The mechanism of electrical injuries has not been fully elucidated. Both thermal (secondary to body resistance) and non-thermal mechanism of tissue injuries from electrical breakdown of cell membrane electroporation are possible. Perforations of cell membrane from marked electrochemical imbalance between intracellular and extracellular compartments might lead to cellular metabolic disorders and cell death. The patient's specific phenotype may result from a genetic predisposition or some prior neural damage.

## CONCLUSIONS

We report a first case of cervical segmental myoclonus immediately following an electrical injury.

## REFERENCES

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