# Treatment of Acquired Nystagmus With Botulinum A Toxin

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We injected botulinum A toxin into the retrobulbar space of one eye each in two patients who had acquired nystagmus with oscillopsia and decreased vision. After injection of 25 units of botulinum A toxin, visual acuity improved from 20/80 to 20/30 in one patient, and both patients were able to read and watch television. Improved vision lasted from five to 13 weeks. No adverse side effects were observed after a total of five injections in each patient.

BOTULINUM A TOXIN is injected directly into the extraocular muscles for treatment of selected types of strabismus. 1,2 It is also injected into the orbicularis muscle and facial muscles for treatment of blepharospasm and Meige's disease. Both of these uses for botulinum A toxin offer an alternative to orthoptic, prismatic, surgical, or medical treatments. We injected botulinum A toxin into the retrobulbar space for the treatment of vertical, horizontal, and rotary pendular nystagmus after brainstem stroke producing oscillopsia, a rare but disabling condition that has no other apparent alternative treatment.

# Case Reports

### Case 1

A 53-year-old woman had bilateral vertical, horizontal, and rotary pendular nystagmus, which produced oscillopsia with decreased vision. She had had a brainstem infarction 18 months previously that had produced lower extremity weakness, restricting her to a wheelchair. Best-corrected visual acuity was R.E.:

20/120 and L.E.: 20/160. The patient sought relief from the oscillopsia so that she could read and watch television. As an initial trial, 3 units of botulinum A toxin were injected at the myoneural junction of the four recti muscles of the left eye under electromyographic control. The patient reported no subjective improvement in vision. One month later, she received a retrobulbar injection of 25 units of botulinum A toxin delivered through a 25-gauge, 38.1-mm needle inserted through the temporal aspect of the lower eyelid just inside the orbital rim and directed into the intraconal retrobulbar space. The patient reported by telephone that she had marked improvement in vision starting between three and four days posttreatment. She noted that she was able to read and watch television.

The nystagmus gradually returned between three and six weeks after the injection. During this time, the patient noted decreasing vision. On examination two months later, the severity of her nystagmus had returned to its preinjection level. Retrobulbar injection of 25 units of botulinum A toxin was repeated on this occasion and at two additional visits, for a total of four treatments. After each treatment, the patient reported significant improvement in her vision. Visual acuity was not confirmed by examination because of travel difficulties for the patient.

For additional treatment, the patient was referred to an ophthalmologist nearer her home. She subsequently received three additional injections of 25 units of botulinum A toxin in the retrobulbar space of the right eye. Preinjection visual acuity was 20/200 in both eyes. Postinjection visual acuity was R.E.: 20/60 and L.E.: 20/200; R.E.: 20/70 and L.E.: 20/200; and R.E.: 20/60 and L.E.: 20/200, respectively.

# Case 2

A 55-year-old woman had bilateral horizontal, vertical, and rotary nystagmus producing oscillopsia. She also had left sixth and seventh nerve palsy and corneal scarring of the left eye

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secondary to eyelid lag and decreased blinking, with resulting poor vision of the left eye. She had had a left brainstem infarction three years earlier (Figure).

Best-corrected visual acuity was R.E.: 20/80 and L.E.: 20/800. The patient was unable to read or watch television because of the oscillopsia. After obtaining informed consent, 25 units of botulinum A toxin were injected into the retrobulbar space of the right orbit. Within four days, a marked subjective improvement was noted by the patient. Using her +5.00diopter reading add spectacles, she was able to read the newspaper for the first time since the development of her nystagmus. Best-corrected visual acuity was R.E.: 20/40 one week after the injection; no change was noted in the left eye. The nystagmus of the right eye was minimal. She has since received three repeat injections, given five, 18, and 33 weeks after the initial injection. Three weeks after the third injection, visual acuity was R.E.: 20/30. No nystagmus was observed in the primary position, although it did develop on attempted version movements. Ductions of the right eye were moderately reduced. A minimum right upper eyelid blepharoptosis was noted during the first week after injection. The eyelid returned to normal in two weeks. Videotapes obtained before and after treatment confirmed dampening of the nystagmus. The periodicity of the nystagmus was approximately 2 Hz and remained unchanged after treatment. However, the nystagmus amplitude of approximately 20 to 25 degrees before treatment variably decreased to 6 to 10 degrees after treatment, with a corresponding decrease in duction move-



**Figure** (Helveston and Pogrebniak). Case 2. Note left facial palsy and corneal leukoma in the left eye which has had a tarsorrhaphy.

ments. Electro-oculography was not performed.

### **Discussion**

Both of our patients had intractable oscillopsia of sufficient duration to suggest that the condition would not resolve spontaneously. Treatment options for such patients in the past have been limited. Optical dampening of the oscillopsia with spectacles and contact lenses has been suggested.4 Surgical treatment of nystagmus has been mainly limited to congenital nystagmus, not acquired nystagmus.5 For congenital null-point nystagmus, a Kestenbaum-Anderson operation may be used to relieve head turn, and the esotropia of nystagmus compensation syndrome may be treated with bilateral medial rectus muscle recession or fadenoperation. We previously treated symptomatic horizontal nystagmus with oscillopsia by recessing all four horizontal recti muscles beyond the limits of usual recession with some success. This limited success was probably because the fundamental contractability of the muscles causing the nystagmus was not changed, and perhaps because the recessions were not large enough. Because of the vertical, horizontal, and rotary components of the nystagmus in these patients, it seemed necessary to dampen the effect of all of the recti muscles. We did not see a good effect from injection of botulinum A toxin directly into all four recti muscles, as reported by Crone, de Jong, and Notermans.6 We believe that the patients described here received a beneficial effect from retrobulbar botulinum A toxin because it produced paresis of all of the extraocular muscles, which in turn produced reduced ocular movement and subjective improvement in the oscil-

Both of our patients were offered repeat injections with the expectation of achieving improvement similar to the previous injection. In the first case, the subjective improvement in vision had been substantial enough in the patient's mind to warrant repeat injection. It is unlikely that the beneficial subjective response was solely a placebo effect. In the second patient we observed objective improvement in the nystagmus and recorded improvement in visual acuity.

The primary reason for resorting to the unconventional use of botulinum A toxin was that it allowed these patients who were unable to read or watch television before treatment to resume these activities in three to four days after treatment. In each case, because of general physical disability, sedentary activities were the principal avenues of diversion and enjoyment available. The dose of 25 units was selected because it has been administered repeatedly to patients with benign essential blepharospasm without adverse effect.

No complications occurred after any of the nine retrobulbar injections given to our two patients. Significant blepharoptosis was not produced, perhaps because the intraconal injection is more likely to spare the levator muscle than the intramuscular (extraconal) injection near the superior rectus muscle or upper eyelid. In contrast to retrobulbar anesthesia, which causes a transient blepharoptosis, botulinum toxin acts on the motor endplates and not on the nerve axons. Intravascular injections of botulinum toxin should not pose a systemic risk, as the dosage is well below the amount necessary to cause systemic toxicity and the molecule is too large to pass through the blood-brain barrier.5 The low toxicity of botulinum A toxin has been demonstrated by unchanged electroretinographic and visualevoked potential responses after intravitreal injection in the rabbit.<sup>7,8</sup>

A major disadvantage of retrobulbar botulinum toxin injection is the necessity for repeat injections. The visual improvement in our two patients lasted from four to 20 weeks before vision returned to near preinjection levels. The risk of retrobulbar hemorrhage with each injection must also be weighed against the therapeutic effects perceived by the patients. We believe that retrobulbar injection of botulinum A toxin did not differ significantly from injection at the myoneural junction; therefore, no additional permission for use of the drug was sought. Despite these drawbacks, retrobulbar botulinum A toxin injection represents a useful therapeutic approach to an acquired nystagmus that produces disabling reduction in vision. This type of treatment to one eye may be considered in a patient who demonstrates reduced vision from nystagmus, with vision improved by stabilizing one eye; understanding of the informed consent; no contraindication to receiving retrobulbar injection; and a health risk ruling out surgical intervention.

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