Original Research Paper

EXAMINING BOTULINUM TOXIN'S EFFECTS ACUTE ACQUIRED COMITANT ESOTROPIA (AACE) PATIENTS RECEIVING AN INJECTION

Dr. Vaghela Mayurkumar Dilipsinh

Assistant Professor, Department of Ophthalmology, Great Eastern Medical School & Hospital, Shrikakulam, Andhra Pradesh

Email - mvaghela.76@gmail.com

==========

ABSTRACT

Background: Treatment options for AACE (acute acquired comitant esotropia) include the use of prisms, strabismus surgery, and/or injections of botulinum toxin, either alone or in combination.

Aim: The purpose of this study was to evaluate the effects of a botulinum toxin A injection in individuals suffering from acute acquired comitant esotropia (AACE).

Methods: The prepared study evaluated 54 participants who attended the Institute throughout the designated study period and had a verified diagnosis of botulinum toxin A injection in patients with AACE acute acquired concurrent esotropia. Every individual had a thorough eye examination, orthoptic evaluation, and neuroimaging. Age, the development of esotropia, screen time, injection modality, pre-injection deviation, and whether an injection was administered in one or both eyes were among the outcomes evaluated.

Results: The study included 40 males and 14 girls, with a mean age of ten years. For distant and near pre-injection, the median deviance was 35 and 40 prism diopters, respectively. The percentage of individuals who experienced complete symptom relief was 66.6% (n=36). Eight participants required prism, four need repeat injections, and two required surgery and divergence treatment. Twelve participants had ptosis, and there was no evidence that any risk factor had an impact on the results.

Conclusion: Injecting botulinum toxin into the medical rectus muscle is a safe and effective way to treat patients with AACE (acute acquired comitant esotropia), according to the current study's findings. Pre-injection counseling is essential when it comes to ptosis, surgery, reinjection, and recurrence that requires prism.

Keywords: acute acquired comitant esotropia, acquired, and AACE Esotropia, botulinum toxin, surgery

INTRODUCTION

The particular feature of AACE (acute acquired comitant esotropia), an acquired and non-accommodative esodeviation, is the worsening of previously well-controlled esophoria, which may manifest as acute-onset diplopia.[1]

Acute acquired concurrent esotropia is known to have five subtypes, each of which has been linked to a potential underlying cause. These subtypes of the disease vary greatly, ranging from fusion interruption that happens with patching to more serious causes like posterior fossa lesions.[2]

Acute acquired comitant esotropia (AACE) can be treated with a variety of methods, including as injections of botulinum toxin, strabismus surgery, and/or the use of prisms. In order to cure diplopia,

restore binocularity, and correct eye alignment, botulinum toxin is injected into the medial rectus muscle.[3] The purpose of this study was to evaluate the effects of a botulinum toxin A injection in individuals suffering from acute acquired comitant esotropia (AACE).

MATERIALS AND METHODS

The purpose of the current retrospective clinical investigation was to evaluate the results of botulinum toxin A injection in individuals suffering with acute acquired comitant esotropia (AACE). The research participants came from the Institute's Department of Ophthalmology. Before participating in the study, all participants and school officials gave their verbal and written informed consent. Every instance with an AACE diagnosis that was treated with a Botox injection was evaluated for the research.

Participants in the trial had to be willing to participate, have a verified diagnosis of AACE, be treated with Botox injections, and have at least three months of follow-up following injection. Subjects with alternative causes of acquired esotropia, those without a full minimum follow-up time, and those who choose prisms or surgery as their initial course of treatment were all excluded from the research.

All minor individuals were offered the choice between Botox, surgery, or prisms; those who consented to get Botox were given it and included to the research. The 2017 study by Issaho et al.4 was taken into consideration for determining the dosage of Botox. Every participant had a thorough ocular and orthoptic evaluation.

Atropine refraction was performed to rule out pseudomyopia. In order to evaluate any posterior fossa lesions that could exist, the subjects also had magnetic resonance imaging (MRI) of their brains and orbits. Depending on the surgeon's discretion, topical anesthetic was given to adults using the open sky method or transconjunctival approach, whereas Botox was given to youngsters under general anesthesia. Topical betadine and paracaine drops were applied for the transconjunctival procedure after the eye had been cleaned and draped. The inferonasal limbus was then laterally shifted while being grasped with Moody's fixation. With the needle bevel pointing up, a botulinum toxin injection was administered into the muscle as the conjunctiva was held over the medial rectus using toothed forceps. To stop Botox from leaking, a sterile cotton bud was applied to the injection site as soon as the needle was removed.

Moody's fixation forceps was used to shift the eye laterally for the open sky method, and sterilizing procedures akin to the transconjunctival approach were followed. A fornix incision was made with Westcott's conjunctival scissors, and a muscle hook was utilized to separate the muscle. An injection of botulinum toxin was administered to the muscular belly following conjunctiva retraction. Strabismus was measured prior to injection, one day after injection, and at the final follow-up. At the final follow-up, success was defined as the participants' reduction of diplopia and being within 8 prism diopters of either orthotropic or esotropia following injection. Partial resolution was defined as subjects who need a prism to alleviate their diplopia and whose principal deviation had lessened.

ANOVA, the chi-square test, the student's t-test, Fisher's exact test, the Mann Whitney U test, and SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk, NY, USA) were used to statistically analyze the collected data. A p-value of less than 0.05 was regarded as the significance level.

RESULTS

The purpose of the current retrospective clinical investigation was to evaluate the results of botulinum toxin A injection in individuals suffering with acute acquired comitant esotropia (AACE). 54

participants who visited the Institute within the designated study period and had a verified diagnosis of botulinum toxin A injection in persons with AACE acute acquired concurrent esotropia were evaluated in the predefined study. Participants in the research received botox injections and were followed up with for at least three months.

Pre-injection deviation from D was 33 prism diopters with a range of 14-53, pre-injection deviation from N was 38 prism diopters with a range of 12-53, the time from esotropia onset was 12 months with a range of 1-70 months, and the mean screen time was 5.3 hours with a range of 2-14 hours (Table 1).

One eye was injected in 23 study participants, and both eyes were injected in 28 study participants, respectively, to observe changes in deviation before injection and dosage administered. The trial participants received an average injection dosage of 5 IU, with a range of 2–10 IU. Forty people underwent open eye administration, whereas fourteen research participants underwent transconjunctival administration. On day one, the mean prism diameter was 6 diopters, with a range of 0-53 diopters. At the most recent follow-up, the mean prism diopter deviation was 5 diopters, falling between 0 to 28 prism diopters (Table 2).

According to the study's findings, when the individuals' reactions to botulinum toxin were evaluated, 12 of them had ptosis, 2 experienced recurrence, 14 experienced partial resolution, and 66.6% (n=36) experienced complete resolution (Table 3).

In terms of evaluating the variables influencing study participants' performance, the transconjunctival mode had a p-value of 0.62 and an Odd's ratio of 1.4 (0.221, 11.496), indicating statistical non-significance. Both eye injections, OET (onset of esotropia), diplopia, age, Ndpreop (near deviation preoperatively), and Dpreop (distance deviation preoperatively) all had non-significant p-values of p=0.14, 0.92, 0.51, 0.18, 0.43, and 0.15 (Table 4).

DISCUSSION

54 participants who visited the Institute within the designated study period and had a verified diagnosis of botulinum toxin A injection in persons with AACE acute acquired concurrent esotropia were evaluated in the predefined study. Participants in the research received botox injections and were followed up with for at least three months.

Pre-injection deviation from D was 33 prism diopters with a range of 14-53, pre-injection deviation from N was 38 prism diopters with a range of 12-53, the mean screen time was 5.3 hours with a range of 2-14 hours, and the time from esotropia onset was 12 months with a range of 1-70 months. These findings were similar to those of earlier research by Topcu Yilmaz et al.5 and Kim DH et al.6, when the authors evaluated participants with AACE and used risk variables and demographic information equivalent to the current study.

One eye was injected in 23 research participants, and both eyes were treated in 28 study participants, according to the study's findings on changes in deviation before injection and dose administered to study participants. The trial participants received an average injection dosage of 5 IU, with a range of 2–10 IU. Forty people underwent open eye administration, whereas fourteen research participants underwent transconjunctival administration. On day one, the mean prism diameter was 6 diopters, with a range of 0-53 diopters. At the most recent follow-up, the mean prism diopter deviation was 5 diopters, falling between 0 to 28 prism diopters.

These findings were in line with those of de Alba Campomanes AG et al. (2010) and McNeer KW et al. (1997), whose studies reported similar results for the parameters for changes in deviation pre-

injection and dose injected in AACE study subjects. When evaluating the research participants' reaction to botulinum toxin, it was observed that 12 of them had ptosis, 2 experienced recurrence, 14 experienced partial resolution, and 66.6% (n=36) experienced complete resolution.

These results were consistent with those of Suwannaraj S et al. research and Wan MJ et al.'s study, in which the authors similarly observed a comparable reaction to botulinum toxin in AACE study participants.

The findings of the study also demonstrated that the transconjunctival mode had a p-value of 0.62, indicating statistical non-significance, and an Odd's ratio of 1.4 (0.221, 11.496) with regard to the evaluation of elements influencing study subjects' success. Ndpreop (near deviation preoperatively), Dpreop (distance deviation preoperatively), OET (onset of esotropia), age, diplopia, and both eye injections showed similar non-significant p-values (p=0.14, 0.92, 0.51, 0.18, 0.43, and 0.15).

These findings were consistent with those of Shi M et al. (2011) and Ai L et al. (12), where the authors' evaluation of the variables influencing the success of AACE individuals after receiving a botulinum toxin injection was comparable to the findings of the current investigation.

CONCLUSION

Considering its limitations, the present study concludes that botulinum toxin injection in medical rectus muscle is a viable and safe option for managing subjects with AACE (acute acquired comitant esotropia). Pre-injection counselling concerning ptosis, surgery, reinjection, and recurrence needing prism is vital in such subjects.

REFERENCES

1. Neena R, Remya S, Anantharaman G. Acute acquired comitant esotropia precipitated by excessive near work during the COVID-19-induced home confinement. Indian J Ophthalmol 2012;70:1359-64.
2. Kowal L, Wong E, Yahalom C. Botulinum toxin in the treatment of strabismus. A review of its use and effects. Disabil Rehabil 2007;29:1823-31.
3. Dawson EL, Marshman WE, Adams GG. The role of botulinum toxin A in acute-onset esotropia. Ophthalmology 1999;106:1727-30.
4. Issaho DC, de Souza Carvalho FR, Tabuse MK, Carrijo-Carvalho LC, de Freitas D. The use of botulinum toxin to treat infantile esotropia: Asystematic review with meta-analysis. Invest Ophthal Vis Sci 2011;58:5468-76.
5. Topcu Yilmaz, P, Ural Fatihoglu, O, and Sener, EC. Acquired comitant esotropia in children and young adults: clinical characteristics, surgical outcomes, and association with presumed intensive near work with digital displays. *J Pediatr Ophthalmol Strabismus*. 2010;57:251–6.
6. Kim DH, and Noh, HJ. Surgical outcomes of acute acquired comitant esotropia of adulthood. *BMC Ophthalmol*. 2013;21:45.
7. de Alba Campomanes AG, Binenbaum G, Eguiarte GC. Comparison of botulinum toxin with surgery as primary treatment for infantile esotropia. J AAPOS; 2010;14:111-6.
8. McNeer KW, Tucker MG, Spencer RF. Botulinum toxin management of essential infantile esotropia in children. Arch Ophthal 1997;115:1411-8.

9. Suwannaraj S, Rojanasaksothron C, Methapisittikul Y, Wongwai P, Yospaiboon Y. Botulinum toxin injection versus extraocular muscle surgery for acute acquired comitant esotropia. Clin Ophthalmol 2013;17:413-20.
10. Wan MJ, Mantagos IS, Shah AS, Kazlas M, Hunter DG. Comparison of botulinum toxin with surgery for the treatment of acute-onset comitant esotropia in children. Am J Ophthalmol 2012;176:33-9.
11. Shi M, Zhou Y, Qin A, Cheng J, Ren H. Treatment of acute acquired concomitant esotropia. BMC Ophthalmol 2012;21:9.
12. Ai L, Chen X, Guo R, Li J, Wang J, Feng Y, et al. Botulinum toxin treatment for bielschowsky acquired comitant esotropia in adults. BMC Ophthalmol 2012;22:395.

Variable	Average (median)
Time from esotropia onset (months)	12 (1-70)
Mean screen time (hours)	5.3 (2-14)
Pre-injection deviation from D (prism diopetrs)	33 (14-53)
Pre-injection deviation from N (prism diopetrs)	38 (12-53)

Table 1: Demographic and risk characteristics in study subjects

Injected dose and pre-injection deviation changes		
Injected eye	One eye (26)	Both eye (28)
Mean injection dose in IU	5 (2-10)	
Administration technique	Open sky (40)	Transconjunctival (14)
Mean prism diopter on day 1	6 (0-53)	
Median prism diopter deviation at last follow-up	5 (0-28)	

Table 2: Changes in deviation pre-injection and dose injected in study subjects

Response	Number (n)
Ptosis	12
Recurrence	2
Partial resolution	14
Complete resolution	36 (66.6%)

Table 3: Response to botulinum toxin in study subjects

Variable	Odd's ratio	p-value
Mode-TC	1.4 (0.221, 11.496)	0.62
Injection- both eyes	3.73 (0.56, 24.26)	0.14
Ndpreop >25	0.931 (0.12, 6.21)	0.92
Dpreop >25	1.73 (0.294, 10.32)	0.51
OET	0.95 (0.91, 1.00)	0.18
Diplopia	0.47 (0.06, 3.13)	0.43
Age	0.94 (0.79, 1.02)	0.15

Table 4: Factors affecting success in study subjects