EVALUATION OF SUSCEPTIBILITY TO GLAUCOMATOUS DAMAGE IN PATIENTS WITH HEMIFACIAL SPASM AND THE ROLE OF BOTULINUM TOXIN IN INTRAOCULAR PRESSURE

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EVALUATION OF SUSCEPTIBILITY TO GLAUCOMATOUS DAMAGE IN PATIENTS WITH HEMIFACIAL SPASM AND THE ROLE OF BOTULINUM TOXIN IN INTRAOCULAR PRESSURE

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INTRODUCTION

The impact of forcibly closing the eyes on the intraocular pressure (IOP) has been documented in existing literature [1]. Patients with Hemifacial Spasm (HFS) may experience a higher susceptibility to increased ipsilateral IOP due to their persistent anomalous eyelid movements. Consequently, this increased IOP could lead to lasting alterations in the ipsilateral retinal nerve fiber layer (RNFL) and increased risk of glaucoma. In alignment with this idea, mitigating the frequency of abnormal eyelid movements, through botulinum neurotoxin A (BoNT-A) applications, could influence the intraocular pressure dynamics and subsequent long-term ocular damage. The aim of this study was to assess the effect of BoNT-A on intraocular pressure and to assess possible differences in the RNFL between both eyes in HFS patients.

METHODS

In this prospective study, 16 patients with hemifacial spasm and 11 age-matched healthy subjects were recruited. IOP measurements (mean of 3 measurements) were taken using a Goldmann tonometer before and after 2 weeks of the BoNT-A application in patients with HFS, and single-occasion measurements (mean of 3 measurements) were taken in control patients, always by the same professional using the same tonometer and at the same period of the day (10-11am). The BoNT-A application sites and doses varied among patients depending on the degree of spasms. Measurements of the retinal nerve fiber layer (RNFL) with optical coherence tomography (Cirrus 4000 HD OCT, Zeiss, Dublin, CA) and ultrasonic pachymetry measurements (OcuScan RxP Ophthalmic Ultrasound System, Alcon Laboratories) of all patients were also performed. Patients with glaucoma, ocular hypertension and ocular surface conditions were excluded.

GraphPad Prism version 10.0.1 for Mac (GraphPad Software, San Diego, CA) was used in the statistical analysis. Kruskal-Wallis test with post-hoc Dunn's multiple comparisons test were used to compare IOP of the control group with the others, and Wilcoxon matched-pairs signed rank tests were used to compare eyes from the same subject as well as measurements before and after BoNT-A from the same eye. P-value less than 0.05 was considered significant.

RESULTS

The study included IOP measurements from 16 patients with hemifacial spasm (16 affected eyes and 16 non-affected eyes) and 11 controls (22 eyes). Regarding RNFL measurements, 9 HFS patients were included (18 eyes) and 7 controls (14 eyes); the others were excluded due to low quality imaging.

The mean pachymetry in the control group was 542±29, and in the group with HFS it was 533±28 (p=0.4312). Graphic 1 shows the IOP means of the control group (first column), of the affected eye of patients with HFS before and after the application of BoNT-A (second and third column) and non-affected eyes before and after the application (fourth and fifth columns).

Comparing the IOP of control patients with the IOP of the affected side of patients with HFS, there was a statistically significant difference (p<0.01). When we compared the IOP on the affected and unaffected side, a significant difference was also observed (p<0.01). Reduction of IOP on the affected side pre- and post-application of BoNT-A was also significant (p<0.01).

The analysis of the retinal nerve fiber layer (RNFL) in the eyes of the control group and the intervention group are shown in graphic 2. There was no statistical difference between one eye and the other in the control group (p=0.1719), but a significant difference was identified between the affected and unaffected eyes in individuals with HFS (p=0.0117).

DISCUSSION

Hemifacial spasm (HFS) can wield profound effects on both a patient's physical appearance and their social life [2]. It has been documented that seemingly innocuous physiological actions such as gauze movement, blinking or even just gently squeezing the eyelids, can provoke fluctuations in intraocular pressure (IOP) ranging from 2 to 90 mmHg [1,3,4]. With this knowledge in mind, we undertook this study, postulating that the chronic unilateral anomalous eyelid movements and forced closure characteristics of HFS might render these patients susceptibility to elevated IOP and subsequently give rise to posterior pole alterations on the affected side.

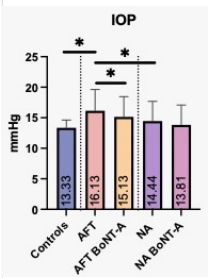
In the present study, there was a statistically significant difference between the IOP of the untreated affected eye and non-affected eye in patients with HFS (p<0.01), also between the affected eye pre and post application of BoNT-A (p<0.01), suggesting that the treatment with botulinum toxin might reduce the IOP. It is known that daily fluctuations may occur in IOP. In this study, IOP measurements were performed in the same period of the day to minimize IOP fluctuations. To the best of our knowledge, no previous studies compared IOPs pre and post application of BoNT-A and correlated with RFNL changes.

We found a significant thinning in the RNFL thickness of the affected eye when compared to the non-affected eye, that difference is not seen in the control group. The fact that morphological OCT parameters like RNFL thickness tend to precede functional changes such as those indicated by visual field tests [6], along with the discernible difference in the IOP, favor the notion of increased risk of glaucoma in the impacted eye. This suggests a plausible link between HFS and these alterations. Ozsaygily et al also documented changes in posterior ocular structures in patients with HFS, including RNFL thickness in the inferior quadrant and choroidal thickness when comparing the affected eye with the unaffected eye [5], but they did not assess the effect of BON-T on IOP.

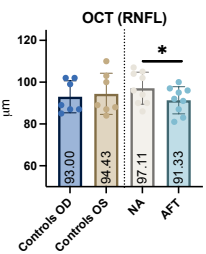
The present study did not take into consideration how long the patient had the HFS, nor the time between the diagnosis and the start of treatment with botulinum toxin. These can be fundamentally important factors, since the longer the exposure to higher IOPs, the greater the chance of damage to the retinal nerve fiber layer.

GRAPHICS

Graphic 1: Comparison between IOP in different groups



Graphic 2: Comparison between RNFL in different groups



* p<0.01

CONCLUSION

This study's results suggest that botulinum toxin injections to treat eyelid spasms on the affected side in HFS patients can lead to a reduction in the ipsilateral intraocular pressure. In addition, a significant thinning in RNFL was observed in the affected side of HFS patients.

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