Section: Ophthalmology

Original Research Article

A STUDY ON THE EFFICACY OF BOTULINUM TOXIN AND ITS IMPACT ON OCULAR SURFACE PARAMETERS IN BLEPHAROSPASM PATIENTS

A. Yogeswari[1], R. Sujatha[2], G. S. Nivedetha[3]

[1]Professor, Department of Orbit and Oculoplasty, Regional institute of ophthalmology, Chennai, Tamil Nadu, India.
[2]Associate Professor, Department of Ophthalmology, Government pudukottai medical college, Tamil Nadu, India.
[3]Junior Resident, Regional Institute of Ophthalmology, Chennai, Tamil Nadu, India.

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Corresponding Author:
Dr. Nivedetha. G. S,
Email: nivedetha1997@gmail.com

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Abstract

Background: Benign essential blepharospasm (BEB) is a bilateral focal dystonia characterized by involuntary closure of eyelids, causing significant disability. It usually affects both orbicularis oculi. Botulinum toxin injections provide a symptomatic relief. This study evaluates the efficacy of botulinum toxin injection type A in reducing the blepharospasm symptoms and their impact on ocular surface health in benign essential blepharospasm patients. **Materials and Methods:** This is a prospective interventional case series involving five patients diagnosed with benign essential blepharospasm. Patients diagnosed with benign essential blepharospasm were included in this study. Blepharospam associated with other systemic disorders were excluded from this study. All five patients received periocular injections of reconstituted Botulinum toxin type A (BTA) 0.1ml in each site subcutaneously in both eyes. Patients were evaluated for symptomatic response, and ocular surface parameters like tear film break-up time (TBUT), Schirmer test, and ocular surface diease questionnaire index (OSDI) scores at regular intervals. The patients were followed at 2- ,4- ,6- and 24 weeks. **Result:** Patients showed symptomatic reduction in eyelid spasm and improvement in ocular surface health parameters like tear film break-up time (TBUT), schirmer test and OSDI questionnaire scores. **Conclusion:** Botulinum toxin injection is found to be an effective, but temporary treatment for reducing eyelid spasm and improving the ocular surface health in patients diagnosed with benign essential blepharospasm. Repeated injections may be needed, as this treatment is temporary.

INTRODUCTION

Benign essential blepharospasm (BEB) is a neurological disorder characterized by involuntary spasm of the orbicularis oculi muscles and upper facial muscles, resulting in increased blinking and twitching of facial muscles. It is a bilateral presentation. Most of the cases are idiopathic with cases presenting around 6th decade. This disorder is seen most commonly among women. Severe cases of blepharospasm may temporarily lead to functional blindness. The precipitating factors are stress and bright light. The symptoms are relieved by talking and relaxation. Blepharospasm does not occur during sleep. Associated syndromes are Meige syndrome or Brueghel syndrome. Blepharospasm can cause dry eye and dry eye can lead to blepharospasm. Due to increased blinking, there is thickening of lipid layer and reduced evaporation of aqueous layer with each blink causing tear film instability.[1-5]

Botulinum toxin type A (BTA) is useful for the treatment of blepharospasm. Botulinum toxin acts by blocking the neuromuscular transmission by inhibiting the release of acetylcholine at the neuromuscular junction. It causes temporary paralysis of the injected muscles; hence repeated injections may be needed once the half-life of botulinum toxin reduces. By reducing the blink rate, the patients show improvement in dry eye symptoms in addition to symptomatic relief.[6,7]

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Figure 1: Botulinum toxin injection

MATERIALS AND METHODS

Study Design: This study is a hospital-based prospective interventional case series. The study is conducted between July 2023 and December 2023. Five patients diagnosed with benign essential blepharospasm both clinically and radiologically were included in this study. The patients were followed up for 24 weeks.

Inclusion and Exclusion Criteria

Inclusion Criteria were patients diagnosed with benign essential blepharospasm. Exclusion Criteria were patients with blepharospasm associated with systemic diseases such as Parkinson's disease, progressive supranuclear palsy, multiple system atrophy, and brain injury.

Treatment Protocol: 50 units of botulinum toxin injection is reconstituted in 2ml of 0.9% of normal saline under sterile conditions, thereby creating a dilution concentration of 2.5 units in 0.1ml.


Figure 2: showing dilution of botulinum toxin injection under sterile condition

After obtaining informed consent, five patients received 0.1ml of reconstituted botulinum toxin injection subcutaneously at seven periocular sites in each eye under strict aseptic conditions, targeting pretarsal orbicularis muscle of upper and lower eyelid and 1cm above the eyebrow. The dosage of injection might be increased depending upon the severity of the disease.

Injection sites: In the medial aspect of upper eyelid, just above the puncture and laterally above the lateral canthus.

In the lower eyelid, avoiding the medial aspect, the injection is given at the junction of medial 2/3rd and lateral 1/3rd. Laterally above the lateral canthus. Another injection 1cm lateral to the lateral canthus.

Two injections 1cm above the medial aspect of eyebrow.

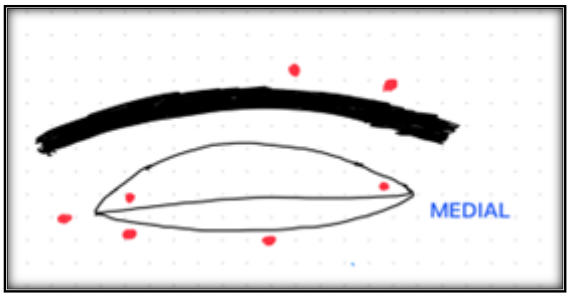

Figure 3: Seven periocular injection sites


Figure 4: injection of botulinum toxin subcutaneously

Symptomatic improvement, tear film break-up time (TBUT), schirmer test and OSDI questionnaire scores were assessed before and after injection.

Follow-Up: Patients were followed up at 2-, 4-, 6- and 24- weeks. The primary outcome is to look for the reduction in frequency of eyelid spasms. The secondary outcomes were to look for the changes in tear film break-up time (TBUT), Schirmer test values, and OSDI questionnaire scores.

Review of Literature

Yabumoto et al. (2023) identified significant improvement in ocular surface parameters among Benign essential blepharospasm (BEB) patients following treatment with botulinum toxin injection. This study observed that the ocular surface parameters stabilized after treatment with botulinum toxin injection.

Romero-Caballero et al. (2023) also conducted a prospective study based on the effects of Botulinum toxin type A (BTA) in improving the ocular surface stability and anterior chamber in patients with hemifacial spasm and blepharospam.

Kocabeyoglu et al. (2014), evaluated the efficacy of botulinum toxin injection in altering the ocular surface parameters in patients diagnosed with benign essential blepharospam. There was significant improvement in ocular surface parameters but with temporary effect.

Osaki et al. (2023) used optical coherence tomography to measure the tear meniscus area in addition to tear film break up time and OSDI questionnaire. The reduction in frequency of eye lid movements was observed after the treatment. There

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were also significant changes in the tear meniscus area.

RESULTS

Patient Demographics: The study population included four males and one female, with an average age of 52 years.

Clinical outcomes: Symptomatic Improvement: All patients showed symptomatic improvement in frequency of blinking. Three patients showed complete symptom relief within two weeks, while two patients showed complete resolution after three weeks.

Tear Film Break-Up Time (TBUT): All patients showed improvement in tear film break up time compared to the baseline value and then returned to baseline value by 24 weeks.

Schirmer Test: Significant improvement in schirmer test was seen by two weeks, with values gradually returning to baseline by 24-weeks.

OSDI Scores: The patient symptoms were assessed using OSDI questionnaire. All five patients showed gradual improvement in symptoms during follow-up at 2, 4, 6, and 24 weeks.

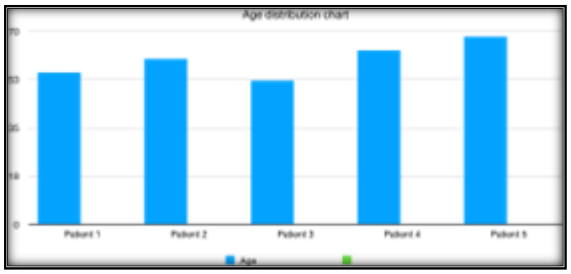

Figure 5: Age distribution chart

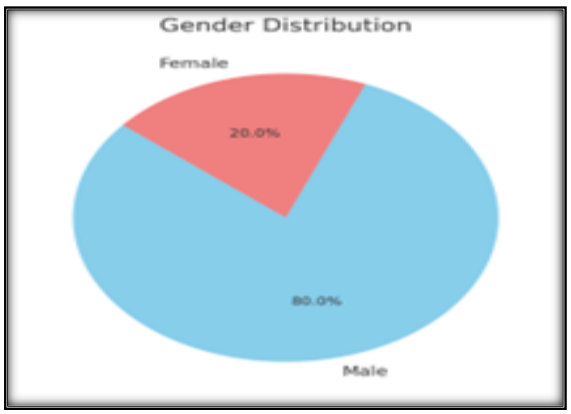

Figure 6: Gender distribution chart

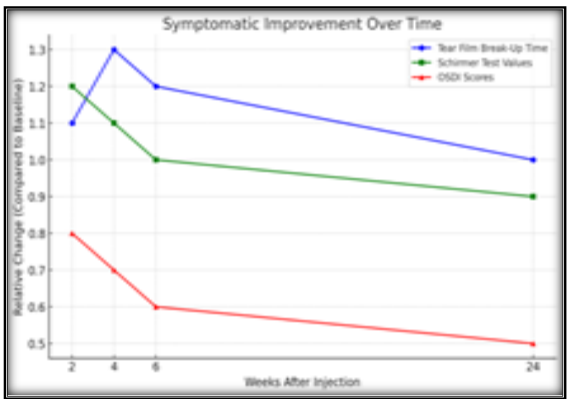

Figure 7: Improvements in ocular surface parameters over time

DISCUSSION

This study indicate that botulinum toxin type A (BTA) injection significantly improve both blepharospasm symptoms and associated dry eye parameters over time. In addition to symptomatic relief, significant improvement in tear film break-up time, schirmer test and OSDI questionnaire is also observed indicating that botulinum toxin improves ocular surface health.

The improvement in TBUT from 6.4 seconds pre-operatively to 8.5 seconds at 4 weeks, followed by stabilization at 6.0 seconds at 24 weeks. Reduced blink rate allows for good tear film stability thereby alleviating dry eye symptoms.

Similarly, the Schirmer test showed an initial increase in tear production, with a peak improvement from 11.3 mm pre-operatively to 13.5 mm at 4 weeks, followed by a slight reduction to 11.0 mm by 24 weeks. The OSDI scores, which improved from pre-operative levels to post-treatment, also corroborate these findings, indicating that patients experienced relief from dry eye symptoms alongside improvement in blepharospasm.

The results proves that Botulinum toxin type A (BTA) has positive impact on dry eye symptoms in blepharospasm patients by stabilizing the tear film thereby improving the ocular comfort. This occurs because of reduced blinking and decreased tear evaporation and stabilization of tear film.

The limitations of this study include decreased sample size and shorter follow-up period.

The only disadvantage of giving botulinum toxin injection is because of its temporary effect and the need for repeated injections.

Before Injection

After Injection

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Figure 8: Before and after injection of patient 1

Before Injection

After Injection

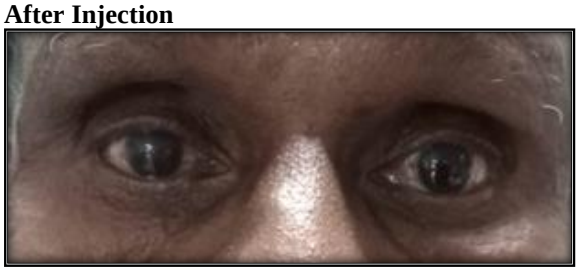
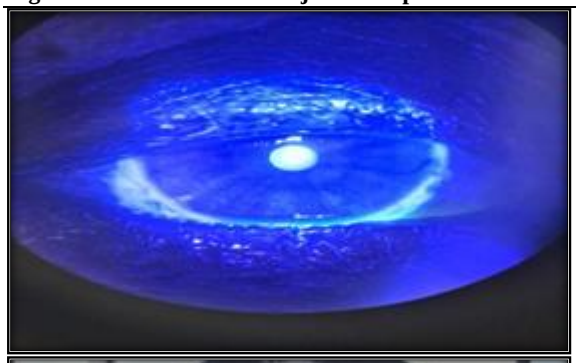


Figure 9: Before and after injection of patient 2



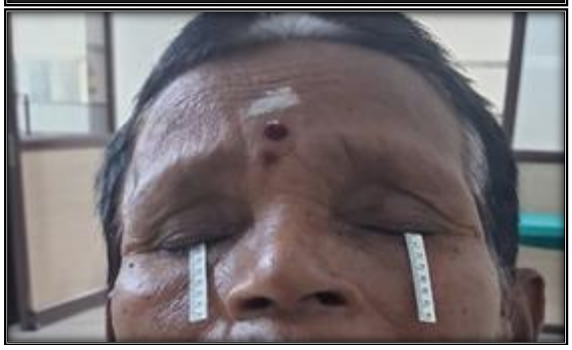


Figure 10: Tear film stability (10a) and improvement in schirmer test (10b) post injection

CONCLUSION

To conclude, Botulinum toxin type A (BTA)injections have proven to be a highly effective therapeutic treatment for treating the patients diagnosed with benign essential blepharospasm (BEB). Botulinum toxin injection not only reduces the symptoms resulting from involuntary muscle spasm but also improves the ocular surface health leading to improved ocular comfort, thereby improving the quality of life of affected patients.
Given the temporary nature of the treatment, botulinum toxin injections have to be repeated every six months to optimize symptom control and sustainability in ocular surface health.

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