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ORIGINAL ARTICLE

Botulinum toxin for treatment of restrictive strabismus[☆]

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KEYWORDS

Acquired restrictive strabismus;
Botulinum toxin;
Graves ophthalmopathy;
Myopic acquired strabismus;
Strabismus secondary to cataract surgery

Abstract

Purpose: To study the types of acquired restrictive strabismus treated in a tertiary hospital and the outcome of treatment with botulinum toxin.

Methods: We performed a 10-year retrospective study of patients with restrictive strabismus aged ≥ 18 years who were treated with botulinum toxin. Treatment was considered successful if the final vertical deviation was ≤ 5 PD, horizontal deviation ≤ 10 PD, with no head turn or diplopia.

Results: We included 27 cases (mean age, 61.9 years). Horizontal strabismus was diagnosed in 11.1%, vertical in 51.9%, and mixed in 37%. Strabismus was secondary to cataract surgery in 6 cases, high myopia in 6, orbital fractures in 5, retinal surgery in 5, Graves ophthalmopathy in 4, and repair of conjunctival injury in 1 case. Diplopia was diagnosed in all patients, head turn in 33.3%. The initial deviation was 14 PD (range, 2–40), the mean number of injections per patient was 1.6 (range, 1–3), and the mean dose was 9.5 IU (range, 2.5–22.5). At the end of follow-up, diplopia was recorded in 59.3%, head turn in 18.5%, surgical treatment in 51.9%, and need for prism glasses in 14.8%. Outcome was successful in 37% of patients (4 high myopia, 3 orbital fractures, 2 post-surgical retinal detachment, and 1 post-cataract surgery). Mean follow-up was 3 ± 1.8 years.

Conclusion: Vertical deviation was observed in half of the sample. The most frequent deviation was secondary to cataract surgery and high myopia. Treatment with botulinum toxin was successful in one-third of the patients at the end of follow-up.

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[☆] This study was presented as an oral communication at the 24th Spanish Strabismus and Pediatric Ophthalmology Meeting in Cordoba, Spain, April 2016.

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PALABRAS CLAVE

Estrabismo restrictivo adquirido;
Toxina botulínica;
Oftalmopatía de Graves;
Estrabismo miópico adquirido;
Estrabismo secundario a cirugía de cataratas

Botox y estrabismo restrictivo

Resumen

Objetivo: Estudiar los tipos de estrabismo restrictivo adquirido tratados en un hospital terciario, y los resultados del tratamiento utilizando toxina botulínica.

Métodos: Realizamos un estudio retrospectivo de diez años en pacientes con estrabismo restrictivo y edades ≥ 18 años, a quienes se trató con toxina botulínica. El tratamiento se consideró exitoso cuando la desviación vertical final fue ≤ 5 PD, la desviación horizontal ≤ 10 PD, y no se produjo torsión ni diplopía.

Resultados: Incluimos 27 casos (edad media, 61,9 años). Se diagnosticó estrabismo horizontal en el 11,1% de los casos, vertical en el 51,9%, y mixto en el 37%. El estrabismo fue secundario a: cirugía de cataratas en 6 casos, miopía magna en 6, fracturas orbitales 5, cirugía de la retina en 5, oftalmopatía de Graves en 4, y reparación de lesiones conjuntivales en 1 caso. Se diagnosticó diplopía en todos los pacientes, y tortícolis en el 33,3%. La desviación inicial fue de 14 PD (rango, 2–40), el número medio de inyecciones por paciente fue de 1,6 (rango, 1-3), y la dosis media de 9,5 IU (rango, 2,5-22,5). Al final del seguimiento, se registró diplopía en el 59,3% de los casos, tortícolis en el 18,5%, tratamiento quirúrgico en el 51,9%, y necesidad de gafas prismadas en el 14,8%. El resultado fue exitoso en el 37% de los pacientes (4 miopes magnos, 3 fracturas orbitaria, 2 post-cirugía de desprendimiento de retina, y 1 post-cirugía de cataratas). El seguimiento medio fue de $3 \pm 1,8$ años.

Conclusión: Se observó desviación vertical en la mitad de la muestra. La desviación más frecuente fue secundaria a la cirugía de cataratas y a miopía magna. El tratamiento con toxina botulínica fue exitoso en una tercera parte de los pacientes al finalizar el seguimiento.

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Introduction

Botulinum toxin was first reported as an alternative to strabismus surgery in 1980 by Scott.¹ It can be used to treat acquired restrictive strabismus and proved to be successful or at least acceptable for treatment of thyroid strabismus.²

Most data in the literature are from isolated case reports or small samples describing the effect of treatment with botulinum toxin on acquired restrictive strabismus.^{3,4} The effect of botulinum toxin has been reported to be diminished in this type of strabismus,² with a 2-month duration of effect and the need for repeat injections to achieve results similar to those achieved in comitant strabismus and oculomotor palsy.³ Most patients need surgery after administration of botulinum toxin.² Results for thyroid strabismus have been good, with a 75% decrease in the initial deviation and a favorable outcome in 45.45% of cases.^{3,5} Botulinum toxin relaxes the inflammatory spasm that is characteristic of the acute phase of the condition, although its effect on the muscular fibrosis and contracture that appear during the clinical course is minimal.⁵ Restrictive strabismus secondary to orbital disorders seems to respond well to botulinum toxin, especially in inflammatory conditions or myositis, although treatment has little effect in orbital fractures. The effect of botulinum toxin is independent of the initial deviation.⁶ Other types of restrictive strabismus secondary to retinal detachment surgery, cataract surgery, and strabismus surgery have been treated with botulinum toxin, with variable results.⁷⁻¹⁰

The benefit of botulinum toxin in restrictive strabismus is open to debate. Therapeutic response is associated with

the type of deviation (vertical or horizontal), the extent of deviation, early treatment, age, and type of restrictive strabismus. The objectives of this study were to describe the types of acquired restrictive strabismus treated with botulinum toxin in a general tertiary hospital over a 10-year period and analyze the outcome of treatment.

Subject, material and methods

We performed a retrospective study of patients aged ≥ 18 years and diagnosed with acquired restrictive strabismus treated with botulinum toxin (Botox®, Allergan Inc., Irvine, CA, USA) between January 2002 and December 2012 in the Ocular Motility Section of our hospital. The study was performed in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Hospital General Universitario Gregorio Marañón.

The inclusion criterion was acquired restrictive strabismus. For the purposes of the present study, restrictive strabismus was defined as any incomitant deviation secondary to Graves ophthalmopathy, high myopia, orbital conditions, and post-surgical complications (secondary to retinal detachment surgery, cataract surgery, and any other ocular surgery), with a positive forced duction test result and botulinum toxin as the initial treatment. Subsequent injections were not applied if an increasing deviation or patient objection were observed.

The exclusion criteria were congenital restrictive strabismus or fibrosis (e.g., Duane syndrome), infantile strabismus,

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