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Two cases of inverse Bell's phenomenon following levator resection: a contemplation of the mechanism

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PURPOSE. *The authors observed the unusual complication of inverse Bell's phenomenon of two cases following repeated and extensive levator resection surgery for a blepharoptosis and suggest the possible mechanism of the phenomenon.*

METHODS. *Case report.*

RESULTS. *The first case was a 22-year-old woman who was diagnosed with a congenital ptosis with good levator function and she underwent levator resection and several reoperations because of asymmetry of lid height. Inverse Bell's phenomenon and resultant exposure keratitis were found in both eyes following the final surgery and they resolved in 1 month. The second case was a 19-year-old man with a right residual congenital ptosis. After a maximal levator resection was performed, he had a satisfactory lid height. Inverse Bell's phenomenon of right eye developed and reverted to normal after 2 weeks. The injury of oculomotor nerves in superior rectus during the repeated and excessive operation would alter a trigemino-oculomotor projection but it is unlikely because the phenomenon resolved without any treatment. Severe edema and hyperemia of the superior fornix following the operation may aggravate the relationship between eyelid and superior rectus movements.*

CONCLUSIONS. *The simultaneous resolution of eyelid edema and inverse Bell's phenomenon supports our hypothesis that the latter may be determined by the edema of the soft tissue secondary to the surgical manipulations rather than the aberrant connections of the nervous system. When the inverse Bell's phenomenon develops postoperatively, copious use of lubricant and close follow-up of corneal complication is required until it resolves. (Eur J Ophthalmol 2009; 19: 285-7)*

KEY WORDS. *Inverse Bell's phenomenon, Levator resection, Ptosis*

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INTRODUCTION

Inverse Bell's phenomenon, where the eye moves downward instead of upward, can be found in the normal population as well as in patients with Bell's palsy or conjunctival scarring (1). It has occasionally been reported following levator surgery for congenital blepharoptosis (2). Its exact mechanism is unknown.

We have observed the unusual complications of inverse Bell's phenomenon of two cases following repeated and extensive levator resection surgery for blepharoptosis and suggest a possible mechanism of the phenomenon.

Case reports

The first case was a 22-year-old woman complaining of bilateral eyelid drooping for several years (Fig. 1). The margin reflex distance of the upper lid from the corneal light reflex (MRD1) was 0 mm in the right eye (RE) and 1.0 mm in the left eye (LE). The levator function determined

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Fig. 1 - (Top left and right) *Postoperative pictures showing an inverse Bell's phenomenon after levator resection in a 22-year-old woman (first patient) and a 19-year-old man (second patient). The first patient shows an inverse Bell's phenomenon on attempted eye closure following the third levator resection of the right eye and the second of the left eye and the second patient shows an inverse Bell's phenomenon after the excessive levator resection of the right eye.* **(Middle left and right)** *Primary gaze preoperative and postoperative images of the first patient with bilateral congenital ptosis. Note that the symmetric lid height was achieved following the repetitive levator resection in both eyes.* **(Bottom left and right)** *Preoperative and postoperative primary gaze photographs of the second patient with unilateral residual congenital ptosis. Note that the symmetric lid height was achieved following the excessive levator resection of the right eye.*

by measuring the excursion of the upper lid from extreme downgaze to extreme upgaze was 12 mm in both eyes. She was diagnosed with a congenital ptosis with good levator function and we planned to perform a levator resection of both lids. In 4 months, two additional levator resections of the right eye and one more in the left eye were performed due to undercorrection and asymmetry of both eyelids. Inverse Bell's phenomenon and resultant exposure keratitis developed in both eyes following the final surgery (Fig. 1). Both the inverse Bell's phenomenon and corneal complication resolved in 1 month after the copious artificial tears instillation (Fig. 1).

The second case was a 19-year-old man with a right residual congenital ptosis (Fig. 1). He had a surgical history of a frontalis sling with fascia lata of the right eyelid 1 year before in another institution. The MRD1 was –1.0 mm in RE and 2.0 mm in LE, and the levator function was 8 mm in RE and 14 mm in LE. After maximal levator resection was performed, he had a satisfactory lid height. Inverse Bell's phenomenon of the right eye developed and reverted to normal after 2 weeks (Fig. 1).

DISCUSSION

The usual finding of Bell's phenomenon is that eyes roll upward on attempted bilateral voluntary eyelid closure but the exact mechanism is unknown. Previous studies suggest that reciprocal activity of orbicularis oculi, superior rectus, and levator palpebrae may play a role by the connection of a trigemino-oculomotor nucleus (3). Paradoxical patterns of extraocular muscle and eyelid movements may develop as a result of the redirection of the regenerating sprouts following injury between division of the oculomotor and trigeminal nerves, and the situation typically remains unchanged for several years (4).

The injury of oculomotor nerves in superior rectus during the operation would alter a trigemino-oculomotor projection and the misdirection of the trigeminal nucleus may alter the direction of eyeball movement. However, unlike in previous reports, in our two cases it resolved with time regardless of any treatment.

Severe edema and hyperemia of the superior fornix following the operation may aggravate the relationship be-

tween eyelid movements, superior rectus movements, and the normal Bell's phenomenon. Anatomically, the posterior lamella is comprised of levator superioris, Müller's muscle, tarsal plate, and conjunctiva, and the structure adjacent to superior rectus may be injured by manipulation of levator complex during repeated or excessive levator resection. The period of resolving postoperative eyelid edema and inverse Bell's phenomenon correspond with each other and it supports that the inverse Bell's phenomenon may be affected by the edema of the soft tissue rather than the aberrant connections of the nervous system.

In conclusion, great care should be taken to examine the movement of eyeball accompanied by a forceful closure of eyelid before and after the operation in a blepharoptosis patient. When inverse Bell's phenomenon develops following levator resection, copious use of lubricant and close follow-up of corneal complication is required until it spontaneously resolves.

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