How I do?

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Botulinum toxin in the treatment of sequelae of facial palsy: dermatologist's practice

Toxina botulínica no tratamento de sequelas da paralisia facial: área de atuação do dermatologista

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ABSTRACT

The application of botulinum toxin to patients with sequelae of Bell's palsy is a beneficial adjuvant therapy for the reduction of synkinesia and facial asymmetries. Bell's palsy is the most common cause of facial nerve paralysis. After the paralysis phase of the facial muscles, the condition may evolve with facial asymmetry and synkinesia. In the treatment of synkinesia, punctual injections into the orbicularis and platysma muscles relieve the spasms. Selective application to the unaffected hemiface aims to reduce facial asymmetry and its negative social impact, with improved quality of life.

Keywords: Facial paralysis; Bell palsy; Botulinum toxins, type A; Rehabilitation; Quality of life

RESUMO

A aplicação de toxina botulínica nos pacientes com sequela de paralisia de Bell é uma terapia auxiliar de extrema valia para a redução da sincinesia e de assimetrias faciais. A paralisia de Bell é a causa mais comum de paralisia do neurônio motor facial. Após a fase de paralisia dos músculos da face, o quadro pode evoluir com assimetria facial e sincinesia. No tratamento da sincinesia, as injeções pontuais no músculo orbicular e platisma aliviam os espasmos. A aplicação seletiva na hemiface não acometida objetiva reduzir a assimetria facial e seu impacto social negativo, com melhora da qualidade de vida.

Palavras-chave: *Paralisia facial; Paralisia de Bell; Toxinas botulínicas tipo A; Terapêutica; Qualidade de vida; Reabilitação*

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INTRODUCTION

Bell's palsy has a sudden onset and is unilateral, with facial paralysis associated with retroauricular pain, dysgeusia, paraesthesia, and hyperacusis. The maximum symptomatology occurs within the first 48-72 hours.[1] The severity of paralysis correlates with the duration of facial distension, the extent of facial recovery, and the impairment of quality of life.[1]

Some patients have incomplete recovery and develop hypertonia, synkinesis, or hyperkinesis. Physical therapy associated with botulinum toxin is an option in the treatment of synkinesis.

METHODS

In this study, we report the case of a patient with an excellent therapeutic response to the use of botulinum toxin to correct facial asymmetry. The review of the specialized literature, conducted between May and July 2018, used selected scientific articles by searching the Pubmed database. The keywords employed were Bell's palsy, facial palsy, and botulinum toxin.

The inclusion criteria for the studies found were the therapeutic approach of the use of botulinum toxin in the treatment of synkinesis and facial asymmetry after facial paralysis, with emphasis on cases of Bell's palsy. We excluded studies that reported the use of botulinum toxin in other facial asymmetry etiologies.

Soon after, we sought to study and compare the number of patients involved in each study (n), the botulinum toxin used, the average dose used, the application interval, the duration of the effect, and the follow-up time.

CASE REPORT

A 54-year-old woman reported that, during the summer of 1999, when moving from one refrigerated area to another with room temperature, she presented paralysis and paresthesia in the left hemiface. Bell's palsy was diagnosed, and she started the treatment with systemic corticosteroid therapy and physiotherapy (cryo and electrostimulation). She had a history of herpes episodes in the same area affected by the paralysis, the last one occurring four months ago. The patient maintained sequelae of left hemifacial paralysis and oro-ocular synkinesis, closing her left eye when smiling (Figure 1). When recruiting the facial muscles of the unaffected side (to contract (Figure 2) or raise the right forehead (Figure 3), as well as to close or move the oral cavity (Figure 4) laterally), the left eye also closes. There is ipsilateral platysma band contracture, causing pain in the region (Figure 5). She is having annual applications of botulinum toxin (she has performed approximately 16 sessions), reducing asym-

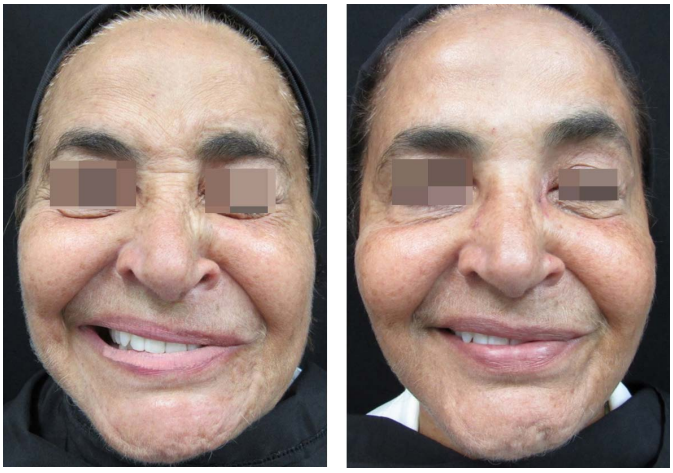

Figure 1: Oral ocular synkinesis, with left eye closing when the patient smiles, before and after botulinum toxin application

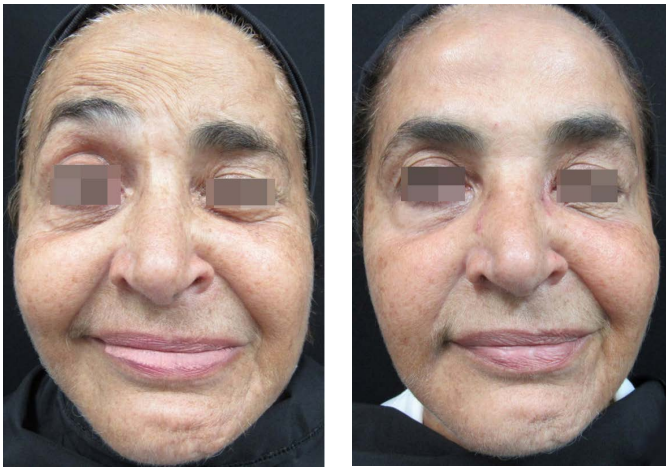

Figure 3: Closing of the left eye when the patient recruits the facial muscle of the unaffected side to elevate the forehead, before and after botulinum toxin application

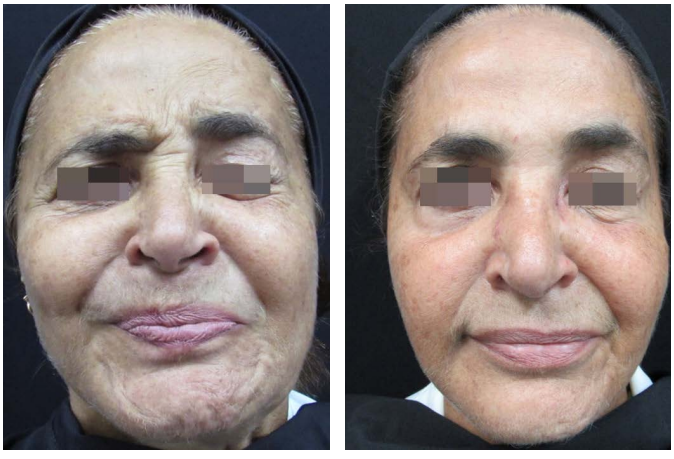

Figure 2: Closing of the left eye when the patient recruits the facial mimic muscles of the unaffected side to contract the forehead, before and after botulinum toxin application

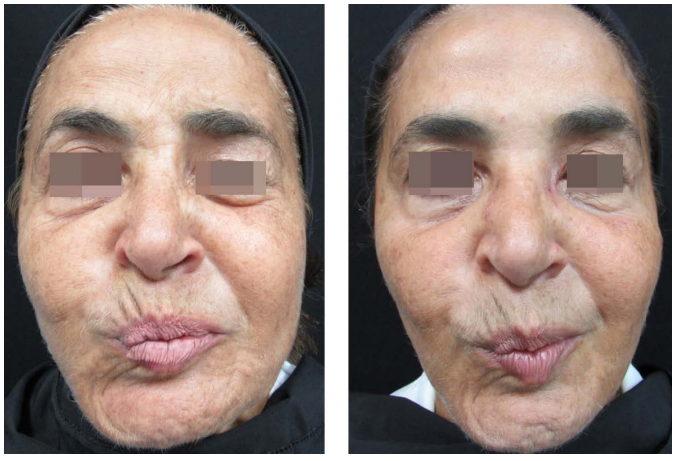

Figure 4: Closing of the left eye when the patient recruited the facial muscle of the unaffected side for the lateral movement of the oral cavity, before and after botulinum toxin application

metry, painful contractions, and synkinesis. Otolaryngologist, neurologist, dermatologist, and physiotherapist are following her multi-disciplinarily. It was decided to apply onabotulinum toxin A (totaling 85 U - Figure 6 and Table 1), using anesthetic cream before the procedure and syringe with a 30G needle in order to reduce the pain of the injection. In the left (affected) hemiface, injections of 1U of botulinum toxin were applied at three points in the orbicularis oculi muscle and of 2U at each of the four points in the platysma muscle to relieve the spasms. The corrugator supercilii muscle was also approached, and injections of 3Us were applied at one point in order to reduce hypertonia. The selective application to the right (unaffected) hemiface, forehead, glabella, orbicularis oculi, orbicularis oris, depressor anguli oris muscle, as well as to the masseter, mental, nasal and platysma muscles was guided in an attempt to improve facial asymmetry and correct some wrinkles, according to Table 1. The functional and aesthetic results were considered satisfactory by the patient in the review 20 days after the procedure.

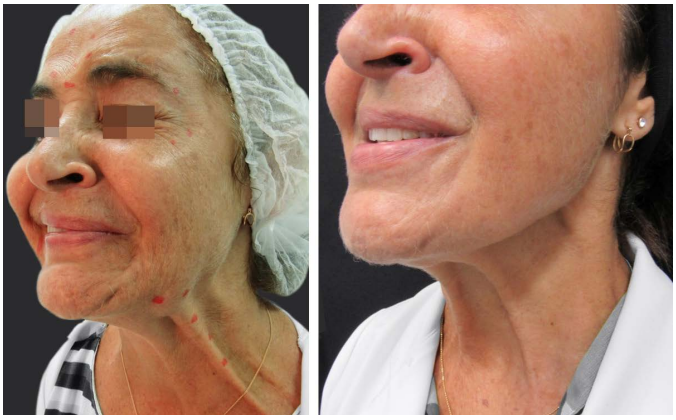

Figure 5: Botulinum toxin application points in platysma to relieve spasms

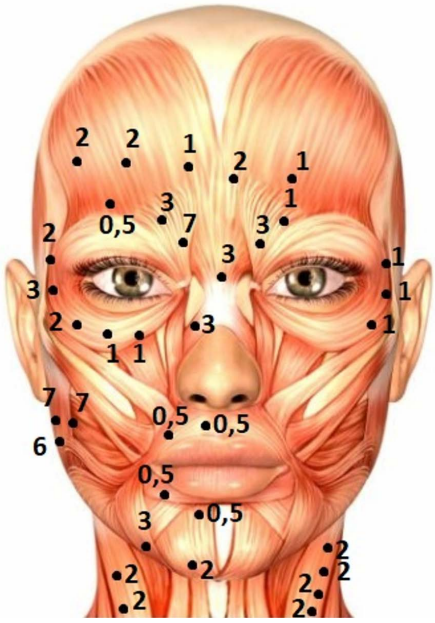

Figure 6: Scheme showing the botulinum toxin application points in the left (affected) hemiface, into the orbicularis oculi and platysma muscles, in order to relieve spasms and correct synkinesis. Selective application to the right hemiface (unaffected) in an attempt to improve facial asymmetry and correct some wrinkles

DISCUSSION

Bell's palsy is the most common cause of paralysis of facial motor neurons and affects motor, sensory, and parasympathetic fibers. It was first described in 1830 by Charles Bell and presents an incidence rate of 15 to 40 per 100,000 patients.[2] According to Eviston TJ et al[1], there is no preference for gender, but it tends to occur more frequently in older age groups.

The pathogenesis is still controversial and is related to herpesvirus type 1 infection, nerve compression (ischemic mechanisms) and autoimmunity. Herpesvirus HSV-1, HSV-2 EVZV subtypes are known to latently establish in multiple cranial ganglia, dorsal root and autonomic ganglion following mucocutaneous exposure.[3] Intra-axonal degradation and activation of apoptotic pathways in response to the virus, associated with a susceptible phenotype, are believed to contribute to the episode of facial paralysis.[1]

Combined treatment with acyclovir and corticosteroids for classical Bell's palsy in the acute phase remains controversial.[4] Some authors suggest the use of systemic corticosteroids only.

Botulinum toxin is a neurotoxin produced by the anaerobic bacteria *Clostridium botulinum*.[5] It acts on the presynaptic membrane of the neuromuscular junction, inhibiting acetylcholine release and causing a dose-dependent reduction in the muscle contraction.

After the paralysis phase of the facial muscles, there is a tendency for hypertonia. The toxin performs chemodenervation, weakening the hypertonic muscles, and contributing to the correction of facial asymmetry and synkinesis.

Synkinesis corresponds to involuntary abnormal muscle contraction during voluntary movements, attributed to aberrant reinnervation after nerve injury. It may be oro-ocular when the patient closes the eye while smiling or eating, or ocular-oral, when the patient twitches the lip while closing the eye. Activation of the platysmal bands to the movement of the contralateral hemiface also occurs.[1] In addition to the platysmal bands, the patient presented oro-ocular synkinesis. In the synkinesis treat-

Table 1: Dose applied according to muscle group

Muscle Group	Dose used on non-paralyzed side	Total units used
Frontalis	5 points, 0.5-2U	7.5U
Glabella-procerus	2 points, 3-7 U	10U
Nasalis	1 point, 3U	3U
Masseter	3 points, 6-7U	19U
Orbicularis oris	4 points, 0,5U	2U
Depressor anguli oris	1 point, 3U	3U
Mentalis	1 point,2U	2U
Platysma	2 points,2U	4U

Table 2: Literature review

AUTHOR	n	WITH BP	LOCAL	TOXIN USED	DOSE/ AVERAGE DOSE USED	APPLICATION INTERVAL	DURATION OF THE EFFECT	FOLLOW-UP
Chua CN *et al*, 2004[8]	5	3	England	Abobotulin toxin A	40 - 120U	3 months	2 - 3 months	*
Finn JC, 2004[9]	2	1	USA	*	*	*	*	*
Bulstrode NW *et al*, 2005[2]	23	23	England	Abobotulin toxin A	*	1 month	*	37 months
Borodic G *et al*, 2005[10]	30	20	USA	*	*	*	*	*
Ito H *et al*, 2007[11]	11	7	Japan	Onabotulinum toxin A	5,76U (4-18,75U)	14,5 weeks	*	43 months
De Maio *et al*, 2007[12]	18	*	Brazil	Abobotulin toxin A	112U	*	3 - 6 months	180 days
Toffola ED *et al*, 2009[13]	30	11	Italy	Onabotulinum toxin A	15,7U (7,5-27,5U)	*	4 months	*
Álvaro MLN *et al*, 2010[14]	48	48	Spain	Onabotulinum toxin A	*	4 months	*	18 months
Terzis JK *et al*, 2012[15]	18	18	USA	*	45U	3-4 months	3-4 months	at least 18 months
Sadiq SA *et al*, 2012[16]	14	1	England	Abobotulin toxin A	30U (10-80U)	*	média de 13 semanas (7 a 24 sem.)	*
Filipo *et al*, 2012[17]	41	28	Italy	Onabotulinum toxin A	17-36U	singles application	2-3 months	2 years and 3 months
Choi KH *et al*, 2013[18]	42	24	South Korea	Onabotulinum toxin A	on the paralyzed side: 10 to 26U; on the non paralyzed side: 35 to 72U	*	*	2 years
Monini *et al*, 2013[19]	20	0	Italy	Onabotulinum toxin A	10 a 40U	*	*	2 years
Kim J *et al*, 2013[20]	18	9	South Korea	Onabotulinum toxin A	47,5±8,4U (32-68U)	singles application	6 months	2 years
Mendonça MCC *et al*, 2014[21]	12	2	Brazil	Onabotulinum toxin A	8,2-51U	90 - 120 days	*	2 years and 11 months
Pourmomeny AA *et al*, 2015[22]	34	34	Iran	Abobotulin toxin A	*	singles application	*	4 months
Risoud M *et al*, 2015[23]	30	0	France	Onabotulinum toxin A	on the paralyzed side: 10.4U; on the non paralyzed side: 9.8U	4-6 months	*	average 2.3 anos
Salles AG *et al*, 2015[24]	353	79	Brazil	Onabotulinum and Abobotulin toxin A	17,3U-38,5U (2-106U)	196 days	*	11 days
Remigio AFN *et al*, 2015[25]	55	*	Brazil	Onabotulinum and Abobotulin toxin A	Onabotulinum toxin A 15-70 U or Abobotulin toxin A 16-64 U	*	6 months	6 months
Mandrini S *et al*, 2016[26]	27	13	Italy	Onabotulinum toxin A	5.9U-18.6U	average 7.7 months	5 months	*
Bennis Y *et al*, 2016[27]	50	*	France	*	21-37U	*	*	*
Sahan *et al*, 2017[28]	1	0	Turkey	Botulinum toxin type A + hyaluronic acid	20,5U	*	*	4 months
Neville *et al*, 2017[29]	51	*	England	*	0,5 a 5U a cada ponto. Dose total não informada	4 meses	3-4 meses	18 meses

Dose administered according to muscle group (BP: Bell's palsy, * not reported)

ment, the botulinum toxin punctual injections into the orbicularis and platysma muscle relieve the spasms and should be associated with physiotherapy, with a particular focus on biostimulation exercises.[6] Selective application to the unaffected hemiface, forehead, and depressor anguli oris muscle may be considered in an attempt to improve facial asymmetry, as performed in the reported patient. It is essential to highlight that the application to the paresthetic zygomatic muscle or affected by synkinesis is not recommended to prevent loss of its smile function.[1]

According to Jowett *et al*.[7], the recommended starting dose for correction of contralateral eyebrow weakness is 9U of toxin into the frontal muscle, distributed in three zones, following a triangular pattern, always 1.5 cm above the eyebrow to prevent eyelid ptosis. The starting dose for the platysma muscle would be 20U distributed in four zones (rectangular pattern), 2 cm below the mentum.

Some patients require three to four annual applications, while others do not benefit from the treatment. The reported patient has already undergone about 16 annual applications without loss of efficacy. She denies adverse events and is undergoing adjunctive physiotherapy.

The literature review (Table 2) showed that the number of patients involved in each study on facial paralysis and treated with botulinum toxin ranged from one to 353, and the botulinum toxin used was onabotulinum toxin A and abobotulinum toxin A. The average dose used in each patient ranged from 2U to 120U, the application interval ranged from single application to 7.7 months, with duration of effect from two to six months and follow-up from one month to 11 years.

CONCLUSION

Botulinum toxin application in the treatment of patients with sequelae of Bell's palsy (approximately 16% of cases)[2] is an adjunctive therapy for reducing synkinesis and facial asymmetries. Often performed by other medical specialties, it is also an area of expertise for dermatologists, requiring the study and mastery of the technique for patient safety and obtaining satisfactory results.

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