Botulinum Toxin and Sialorrhea Associated with Parkinson's Disease

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Abstract

Objective: Sialorrhea or drooling is a common symptom in patients with Parkinson's disease that can affect quality of life. Studies show that Botulinum toxin A and B injections are a promising option for the treatment of sialorrhea and provide relief of symptoms with a relatively small side effect profile.

Methods: Various databases were used to obtain articles published after 2009.

Results: Multiple studies revealed that Botulinum toxin A and B can be injected into the parotid, submandibular, or both glands with or without ultrasound guidance and result in clinical benefit without significant adverse effects.

Discussion: Botulinum toxin A and B appear to be an effective, inexpensive, and safe treatment for patients with Parkinson's disease who suffer from sialorrhea.

Keywords: Parkinson's disease, sialorrhea, Botulinum toxin

Introduction

Parkinson's disease (PD) is a progressive neurodegenerative disorder resulting from degeneration of the basal ganglia.[1] PD is noted for its motor symptoms. However, PD has several non-motor symptoms that tend to go untreated. Sialorrhea or drooling is seen in approximately 10-80% of individuals and can interfere with speaking, eating, and quality of life.[2-4]

The submandibular, sublingual, and parotid glands are responsible for salvia production.[3] It is proposed that sialorrhea occurs in PD patients due to forward head flexion, a tendency to keep their mouth open, reduced swallowing and facial movements, and oropharyngeal dysphagia.[2-5]

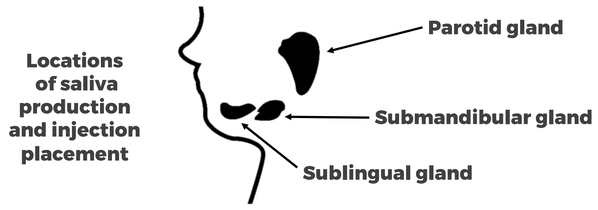
Current treatment options include adrenergic receptor agonists, radiation, gland excision, duct rerouting or ligation, and oral-motor and behavioral therapies.[1,4,6-8] However, several of these therapies are not well tolerated or are ineffective. A recent, alternative treatment is Botulinum toxin.

Botulinum toxin works by inhibiting the release of the neurotransmitter, acetylcholine, at the neuromuscular junction, which results in muscle relaxation, rather than contraction, therefore reducing saliva production in PD patients.[9]

The goal of this review is to explain the use of Botulinum toxin in PD patients diagnosed with sialorrhea and its overall effectiveness.

Methodology

An online search was completed during fall of 2018 to spring of 2019 to obtain articles focused on the use of Botulinum toxin for sialorrhea in Parkinson's disease patients. Inclusion criteria included articles that were published in 2009 or after, only published in English, contained either scientific research with data or commentary on Botulinum toxin use for PD patients with sialorrhea. Seventeen articles were reviewed initially, eleven of these articles met inclusion criteria, seven of which carried out trials with scientific analysis. Eight additional articles, which includes a book and magazine article, were also used in this review for further details.



Results and Discussion

In those studies which only the parotid gland was injected 65-100% of patients reported a decrease in sialorrhea. [2,10-12] 91-100% of patients injected into the parotid and submandibular gland reported improvement in their sialorrhea.[13-14]

One downfall to the both types of Botulinum toxin injection is that there tends to be a latency period of approximately 1-3 weeks between the time of injection and the onset of action.[2, 10-14] On average, studies show that Botulinum toxin is effective for approximately 4 months. [2, 10-14]

Botulinum toxin does not have many serious side effects. The most common adverse effects are typically dry mouth, mild dysphagia, and masseter muscle weakness. [2, 10-14] There are no significant differences in results between those that used ultrasound guidance and those who did not, but it may increase the safety associated with the injection. [2, 10-12]

Limitations can be found in each of the studies. Several of the studies did not conduct their research solely on PD patients with sialorrhea and typically had a small sample size of PD patients. A major limitation to many studies reviewed is the use of subjective parameters to measure subject's response to treatment.

Summary of the studies reviewed

Study	# of PD patients/ total patients	Gland(s) Injected	Botulinum Toxin Type	Total Dose	Ultrasound Guidance	Effectiveness (months)
Martinez-Pole et al. 2018 [2]	21/30	Parotid	A	30-60 U	No	4.4 ± 2.0
Gomez-Caravaca et al. 2014 [10]	41/53	Parotid	A	15-30 U	No	4.38 ± 2.11
Aysu Sen et al. 2014 [11]	16/16	Parotid	A	100 U	No	4.07 ± 2.09
Lagalla et al. 2009 [12]	36/36	Parotid	B	4000 U	No	4.42 ± 1.45
Moller et al. 2015 [13]	6/17	Parotid and Submandibular	B	4000 U	Yes	3.93
Abboud et al. 2019 [14]	7/12	Parotid and Submandibular	A	100 U	Yes	3-9

Conclusion

Studies show that Botulinum toxin can drastically reduce salivation in patients with Parkinson's disease (PD) for a limited period. The use of Botulinum toxin seems to be a safe and effective treatment that can improve a patient's quality of life in several different aspects. Additional research will need to be conducted in the future to enhance the use of Botulinum toxin in PD patients and to determine if ultrasound should be a required recommendation. Further research could be centered around creating an algorithm for the amount of Botulinum toxin that should be used based on the patient's severity and length of symptoms. This algorithm could include which type of Botulinum toxin should be used, what glands should be injected, and if the use of ultrasound guidance should be used. Lastly, it would be beneficial to determine if long-term treatment may lead to any adverse effects. Botulinum toxin injections show a promising option for the treatment of sialorrhea in patients with Parkinson's disease.

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Picture: https://www.kisspng.com/png-salivary-gland-computer-icons-clip-art-1586486/

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