Role of Botulinum Toxin in the Management of Trigeminal Neuralgia

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Trigeminal neuralgia (TN) is a clinical condition characterized by paroxysmal attacks of severe and electric shock-like pain along the distribution of one or more branches of the trigeminal nerve. Various medicinal or surgical modalities have been employed in the past with variable success. Newer methods were tried in search of permanent cure or long-lasting pain relief. The purpose of this paper is to present the review of the literature regarding the use of botulinum toxin in the management of trigeminal neuralgia.

Introduction

Botulinum neuro toxins, causative agents of botulism in humans, are produced by Clostridium botulinum, an anaerobic spore-former Gram positive bacillus. In 1820, justinus kerner german medical officer gave the first complete description of botulinum called sausage poisoning .It Recognized in 1896 by Emile van Ermengen described botulinum toxin as bacterial origin. The English philosopher John Locke in 1677 firstly described the trigeminal neuralgia (TN). In 1756, Nicolaus Andre coined the term "tic douloureux" for the condition characterized by trigeminal neuralgia pain as well as muscle spasm. In 1773, John Fothergill gave detailed description of the trigeminal neuralgia. Trigeminal neuralgia (TN) is a painful disorder of the trigeminal nerve characterized by paroxysmal attacks of severe, electric shock-like pain typically present on one side of the face. Pain is unilateral and follows one or more of the distributions of the trigeminal nerve. Mandibular and maxillary divisions are more commonly involved than ophthalmic division. There is a slight predilection for female sex. The right side of the face is more commonly involved than the left side of the face. The botulinum toxin (BTX) is a naturally occurring neuro toxin that is produced by gram positive anaerobic bacteria Clostridium botulinum. There are seven distinct antigenic subtypes of botulinum toxin.

Preparation

The BTX-A is prepared by Hall strain Clostridium botulinum fermentation. It is precipitated, filtered, and fur-ther processed into a vacuum dried fine powder. A standard vial of BTX-A contains 100 units of toxin, 0.5 mg of human albumin, and 0.9 mg of sodium chloride.

Dose

The dose of BOTOX injected intramuscularly depends on the muscle size.

After injection, BTX starts to weaken the muscle within 24-72 hours, and maximal effect occurs after about 14 days; benefit can last for 3-6 months.

- Small muscles-vocal cords- 0-75 U
- neck muscles -100-150U
- lower limb muscles -200-300U

Mechanism of action of botulinum toxin (btx)

The main effect of botulinum toxin type-a (btx-a) is on muscle contraction because of its binding to the presynaptic nerve terminals, thus inhibiting the release of the acetylcholine (ach). It produces its antinociceptive effect in trigeminal neuralgia by several mechanisms. A direct analgesic action has been recognized, suggesting that btx may act through an alternative mode of action.

Review

Author	No. of pt	Dose	Criteria for success	Results	Adverse effects
Borodic et al	11	25–75U	at least 50%reduction in frequency of paroxysm and intensity of pain,	eight patients with beneficial effects	transient facial asymmetry during dynamic movements, slight erythema, or edema of skin at injection site
Turk et al	8	100U	at least 50%reduction in frequency of paroxysm and intensity of pain,	eight patients show beneficial effects	mild facial asymmetry
Zuniga et al	12	20–50U	decrease in frequency of paroxysmal attacks of pain per 24 hours.	ten patients show significant reduction in pain	transient facial asymmetry
Wu et al	42	75U	patients with >50% reduction in pain intensity	patients with positive outcomes	transient treatment-related adverse effects.
Piovesan et al	13	25–75U	at least 50%reduction in the dose ofmedication	four patients were pain free and 9 patients have >50% reduction in the medication dose	transient facial asymmetry

Estimated Lethal Human Dose

- The lethal dose of BOTOX in humans is not known, although it has been estimated to be about 3000 U.
- The usual maximum total recommended dose at an injection site is about 600-800 U.

Contraindications for Use of Botulinum Toxin (BTX)

- The use of botulinum toxin during lactation and pregnancy remains controversial.
- Allergy or hypersensitivity reaction to botulinum toxin or human albumin.
- It is not recommended in individuals with neurological diseases such as multiple sclerosis, myasthenia gravis, and Eaton-Lambert syndrome.
- Botulinum toxin injections must be avoided or delayed in patients taking amino glycosides as they interfere with neuromuscular transmission.

Discussion

The review of the literature reported success with the use of botulinum toxin type-A (BTX-A) in the management of trigeminal neuralgia refractory to other treatment modalities. But a critical appraisal of the review is essential to establish it as one of the treatment modalities. Although the above mentioned studies favor the use of BTX-A, few points definitely need to be discussed.In the study conducted by Borodic and Acquadro, trigeminal neuralgia patients have characteristic features of inflammatory phenomenon, that is, erythema and edema along with pain . These inflammatory features are not regular features of trigeminal neuralgia