Original Research Paper

Volume-8 | Issue-4 | April-2018 | PRINT ISSN No 2249-555X

Dental Science

BOTOX IN DENTISTRY – A SYSTEMATIC REVIEW

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ABSTRACT

Introduction: There are many medical and dental conditions which do not have complete treatment modalities in conventional ways. The botulinum toxin can be used as an alternative treatment modality working through chemo denervation method in many medical and dental conditions. This article explains about botulinum toxin and some of its uses in dentistry.

Background: Dental diseases are a result of two main factors, the microbial colonization in the oral cavity and the overactive orofacial musculature. The hyperactive orofacial musculature exerts excessive biting forces and dental trauma which results in various forms of damage to the teeth and periodontium such as bruxism, TMJ disorders asymmetrical smiles, oromandibular disorders and excessive gingival display and many others.These muscle generated damages can be managed both by non surgical and surgical methods, but are invasive, irreversible and expensive for most of the patients. Recently, injections of Botulinum toxin or botox have shown promising results in managing the hyperactive orofacial musculature.

Reason: Botulinum toxin or popularly known as Botox worldwide,is a neurotoxin which when used in therapeutic doses can produce wonders in cosmetic problems of orofacial regions. Its applications are not just restricted to cosmetic therapy but also has got wide array of uses in the treatment of painful dentalconditions.

KEYWORDS : : Botox, botulinum toxin, bruxism, chemodenervation, cosmetics, dentistry, facial wrinkles, temporomandibularjoint disorders .

Botox:

Botulinum toxin is a deadly poison produced by a Gram-positive bacterium called c botulinum[1]. The bacteria produce 7 antigenically distinct toxins that are lettered A through G. Toxin A, however, has been the most extensively studied[12]. The clinical syndrome of botulism occurs after ingestion of contaminated food, from colonization of the infant gastrointestinal tract, or from wound infection[4]. When foods containing the toxin are ingested, the toxin spreads to peripheral cholinergic nerve endings and blocks acetylcholine release[6]. This results in a bilaterally symmetric descending neuroparalytic illness[8]. The incubation period after ingestion is 18-36 h.

Botulinum toxin:

Botulinum toxin used in dentistry for the treatment conditions, such as parafunctional clenching, extracapsular myogenic temporomandibular disorder, trismus, and the associated headaches, Botulinum toxin which is available in the market is purified exotoxin of the anaerobic bacteria, clostridium botulinum[2]. This neurotoxin is the cause of serious paralytic illness, botulism. Seven types of botulinum toxins have been isolated but only two, Types A and B, have been made commercially available[4]. Initially, only botulinum toxin A was available commercially on prescription but more recently, Type B also available in the market[1].

History:

The idea for a possible therapeutic use for botulinum toxin was first developed by the German physician Justinus Kerner (1786-1862)[3]. He deduced that the toxin acted by interrupting signal transmission within the peripheral sympathetic nervous system, leaving sensory transmission intact[5]. He called the toxin a "sausage poison," because it was observed that illness followed ingestion of spoiled sausage. In 1870, John Muller, another German physician, coined the name "botulism" (from the Latin root botulus, which means "sausage"). In 1949, Burgen was the first to discover that the toxin was able to block neuromuscular transmission[10] .

Mechanism of action:

Toxin binds to the nerve, and then it is internalized into the nerve >Toxin is cleaved by internal proteolytic enzymes, and the degradation by products interferes with the normal process of vesicle fusion to the plasma membrane >Inhibition of the exocytosis of acetylcholine, leading to neuromuscular blocking effect >Although large doses can result in complete paralysis, therapeutic doses allow partial activity, thereby decreasing the visual of hyper functional wrinkles [11].

Therapeutic Uses:

Botulinum toxin may be used for a variety of disorders ranging from pain management to the treatment of tremors and tics, to the improvement of the appearance of dynamic facial wrinkles[3]

Some of the treatment modalities of botulinum are discussed below
Focal dystonia

- Involuntary, sustained or spasmodic patterned muscle activity
- Cervical dystonia Blepharospasm
- Laryngeal dystonia Limb dystonia
- Oromandibular dystonia Orolingual dystonia
- Truncal dystonia
- Velocity-dependent increase in muscle tone
- Stroke
- Traumatic brain injury Cerebral palsy
- Multiple sclerosis
- Spinal cord injury

Non-dystonic disorders of involuntary muscle activity

- Hemifacial spasm
- Tremor
- Tics
- Myokymia and synkinesis Myoclonus
- Hereditary muscle cramps
- Disorder of conjugate eye movement and rapid involuntary rhythmic eye movement

Disorders of localized muscle spasm and pain Chronic low back pain

- Myofascial pain syndrome
- Temporomandibular joint disorders associated with increased muscle activity.
- Tension headache
- Migraine headache
- Cervicogenic headache

Hyperkinetic facial lines

- Hypertrophic platysma muscle bands

Sweating disorders

- Frey syndrome[7]Uses of botulinum in dentistry:

Pathologic Clenching:

Pathologic clenching is a disorder leading to chronic trauma to teeth, gingiva, and underlying tissues. Low doses of botulinum toxin Type A can potentially reduce this disorder. Because parafunctional clenching

leads to periodontal trauma, limiting clenching before and after periodontal surgery can benefit healing[6].

Mandibular Spasm:
This type of muscular spasm results from spasm of all muscles of mastication and associated mandibular muscles. This disorder places limitations on completing the basic oral hygiene necessary to prevent oral disease.other impairments can include: Restrictions on dental treatment, difficulty with eating and diminished oral utility[5].

Bruxism:
Botulinum neurotoxin has shown promise in decreasing the symptoms of bruxism.9 Ivanhoe et al.10 reported success with a 200 U dose of botulinum toxin Type A in a separate brain- injury case report. A long-term, open-label trial study with a history of severe bruxism who were refractory to medical and dental procedures, to them botulinum toxin Type A injections were given into the masseters (mean dose: 61.7 U/side; range 25 U to 100 U), which results in a total duration of therapeutic response of 19 weeks[5].

Trigeminal Neuralgia :
It is a unilateral neurological disorder affecting orofacial muscles leading to acute severe pain. Botox can be used as an adjunctive treatment modality in these patients which acts on nerve endings, thereby reducing the severity of the pain[13].

Enhancing Facial Aesthetics:
The facial wrinkles can be treated with Botox. But, the pathogenesis of wrinkles should be known first . The use of fillers in the lower face and the use of Botox for the upper face are advised[9]

Side Effects of Botox Therapy:
- The muscles injected can be sore for a few days after the injections
- Botox can cause temporary partial weakening of the muscles injected[10]
- When Botox is used for a long time, it may cause atrophy of the muscles injected.

This atrophy is reversible if the therapy is discontinued
- There have been reports of temporary side effects such as like symptoms, palpitations, tingling sensations, or nausea. These side effects are rare and usually go away within 1-2 days[10].

Contraindications to Botox Therapy:
Hypersensitivity to any botulinum toxin preparation.
Infection at the proposed injection site.

The contraindications include pregnancy, lactation, neuromuscular diseases (myasthenia gravis, Eton-Lambert syndrome), motor-neuron diseases, concurrent usage of amino glycosides and sensitivity to toxin[6].

The potential adverse effects of Botulinum toxin in oromandibular disorders include facial nerve palsy, pain at the injection site, flu-like symptoms, non-targeted muscle weakness, dysphagia, and hematoma[4].

These complications are generally transient and resolve within a couple of weeks[2].

Conclusion:
Chemodenervation using botulinum toxin is useful in many of the conditions of dentistry. The controlled use of this therapy is more important rather than its radical use[10].

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