

Head and Neck : Interest of Botulinum Toxin against Pain and Inflammation

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Submitted: 10 Apr 2018; **Accepted:** 19 Apr 2018; **Published:** 25 Apr 2018**Abstract**

To describe the treatment by Botulinum Toxin (BoNTA) for seven painful pathologies of head and neck : cervical neuralgia, trigeminal neuralgia, migraine headache, articular pain, hypertrophic scars pain and inflammation, post-operative muscular pain of the cervical spine and muscle pain due to stiffness of the cervical spine following hypertonia and hyperactivity of the manducatory muscles. BoNTA has been used for forty years by its action on muscle. During the last decade new indications have been added, following the proof of the effect of the BT on numerous neurotransmitters.

Technically, we inject into the muscles to relax them, into the keloid scars or immediately around to stop the inflammation, to relieve pain, we simply follow it, by topping of the skin, the scalp or the oral mucosa, depending on the pathology and the painful zone. For the temporo-mandibular joint, the injection is directly placed in the articulation.

The toxin is very efficient on paroxysmal pain and for all these indications, we note a real decrease of the VAS score. For some indications, the dosage can be high, but there are no side effects or very limited. Except migraine headache, the other indications are new and there are not so many teams doing it.

Keywords: Botulinum Toxin, Pain, Inflammation, Intra-articular joint, Keloid Scars

But I have to declare that I have no conflict of interest with the Allergan* laboratory.

Introduction

The aim of this work is to present seven different pathologies causing pain and sometimes inflammation of the head and neck, which are well relieved by botulinum Toxin. Most of these indications are recent and not very well known.

We knew for a long time that Botulinum Toxin (BT) relaxed muscles and if the dosage increased, we could reach palsy. Later, we begun to use the toxin to drain the glands or to decrease secretions. Over the years, the injectors noticed that the toxin could decrease pain, but we thought that muscle relaxation was the origin of the relief, even if it appeared before the muscular effect. Almost fifteen years ago, the real explanation was found : Botox* acted on pain.. !

The way to relieve these pathologies will be explain:

- Cervical neuralgia
- Trigeminal neuralgia
- Migraine headache
- Articular pain of the temporomandibular joint
- Hypertrophic scars pain and inflammation
- Post-operative muscular pain of the cervical spine
- Muscle pain due to stiffness of the cervical spine following hypertonia and hyperactivity of the manducatory muscles.

Previously, we thought that the only effect of BT was on acetyl choline, with the different steps : first the endocytosis, then the migration, the blocking, the axon collaterals birth and finally, the functional recovery [1]. But, of course, that theory did not explain the analgesic and anti-inflammatory effect of the toxin.

To begin with, note that for all this article, the toxin used is Botox (Allergan Pharmaceuticals, Westport, Ireland). I work with it because it is a good product, safe and with very little diffusion. As you know, we have to say each time what units we are speaking of, because there are no international units and every manufacturer has its own .

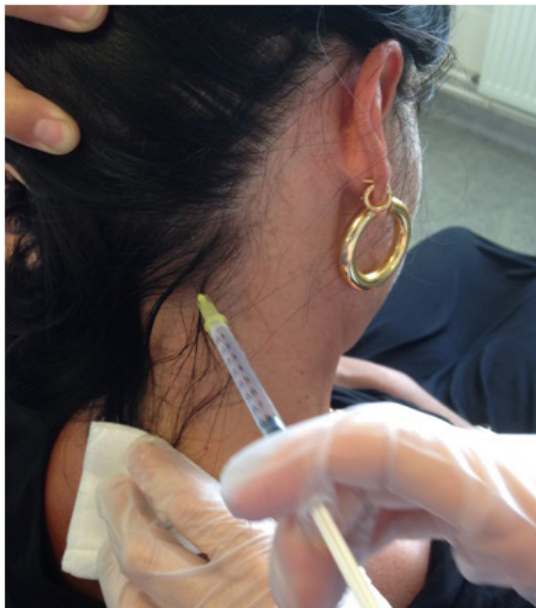
In fact, because BT works on other neurotransmitters too : Glutamate, P Substance, CGRP, ... During the last decade, numerous studies from around the world demonstrated the efficiency of the treatment with BT on pain and inflammation [2,3]. The injections are done in the classic aseptic way. The simple dilution is 100 U Botox* in 1 ml of 0,9% sodium chloride in a graduated syringe. For double dilution, it is 100 U in 2 ml.

Occipital Neuralgia

In our department, we begun in 2011 to treat occipital or Arnold's neuralgia. Occipital neuralgia is flash paroxysmal pain, originating from the cervico-occipital joint, more specifically, the sub-occipital triangle. It is an irritatio of the dorsal primary ramus of the second cervical spine nerve. It can be accompanied by migrainous episodes. The pain is radiating upwards along the scalp.

It can also move downwards towards cervical muscles and causing contractions. Trapezius, Supra-spinalis, Splenius capitis and Levator scapulae can be injected as well as the scalp. So, we inject both the cervical muscles with intra-muscular injections and the scalp, following the pain.

In our study on 111 cases, we compared 3 different treatments : radiofrequency denaturation, nerve stimulation system and BT injections [4]. We demonstrated the lack of a significant difference, in term of efficacy, between the 3 techniques. The good results were close to 85%, but only the toxin showed a total lack of adverse effects from its use.



You have here an example of multi-injections of the scalp, following the pain. You can inject fifty to one hundred units in double dilution by topping of the scalp. Sometimes, it can be bilateral.



Here, you can see an injection of the supra-spinalis muscle.

Trigeminal Neuralgia

You can inject the trigger zone, if it exists or, the cutaneous projection of the pain, by topping of the part of the face, in simple or double dilution, injecting from 20 to 80 U. We have to be careful to facial assymetry.

In some zones of the face, you have to put some units on the other side to balance the muscular effect of the toxin, by diffusion, even if the injections are not intra-muscular. The injection can be gingival or cutaneous. Often, intraoral injections are aimed at a trigger zone. In the study, we showed the lack of significant difference between injecting the painful zone or injecting a possible trigger zone. One hundred percent of our patients improved [5].



Nota Bene

It is also efficient on Cluster Headache. It is again a treatment by topping of the scalp in the painful zone. The injection dosage is from 60 to 150 U, in simple or double dilution, depends on the width of the area. It is a good indication for patients recalcitrant to conventional preventive treatment (Verapamil). It is a rare indication, but the treatment is effective, even on eye-watering, with very little toxin in the lacrimal gland [6].



In our study, 66% of our patients have had a reduction of at least 2 points on the VAS score, but all patients experienced, to some extent, a reduction in pain by one month [8,9].



Migraine Headache

Migraine headache is a long recognized indication for BT. The injections are done according to the recommendations of the clinical study PREEMPT (Phase III REsearch Evaluating Migraine Prophylaxis Therapy), in corrugator, procerus, frontalis, occipitalis, cervical points, paraspinal, trapezius and temporal. We inject 155 U or 195 U if you add injections according to the method « follow the pain ». We have to adapt the treatment to our patient pain [7].

Articular Pain of The Temporomandibular Joint

For the temporomandibular joint (TMJ), we inject 30 U in simple dilution, in each articulation, but not systematically bilateral. The asepsis is very important, because we are near the brain, and we know that excluding HIV patients, up to 45% of cerebral abscesses are due to infections from the oro-facial area.

So, this joint is very special for that reason. The local anesthetic is, of course, to decrease the pain during the injection and so, to decrease the risk of vasovagal syncope. That is also the reason why I always have a trained nurse with me. Abscess and vasovagal syncope are the 2 serious risks of this injection.

This treatment is used only for severe and chronic pain. When the Visual Analogical Scale (VAS) evaluation of the pain is greater than 5/10 and all the other classic treatments (physiotherapy, usual grade I to III analgesic medications, dental groove, intra-muscular injections of BT in the masseter and/ or temporal muscles and intra-articular injections of hyaluronic acid) led to no improvement. Release or diminution of the pain is the only goal of the injection, without any hope of increasing mouth aperture or diminishing crackles in the joint.

Without the need to use fluoroscopy, anatomical landmarks are used as follows : posterior aspect of ascending branch of the mandible towards the condyle, inferior border of the zygomatic arch and, as possible, perception of the movement of the condyle at mouth's aperture. Injection is done under aperture of the mouth, in the posterior part of the joint.

Hypertrophic Scars Pain and Inflammation

In our department, we do not reoperate on a scar with pain and inflammation reaction without BT. We have hypertrophic and keloid scars after otoplasty and cervico-facial lifting. We inject 50 to 100 U for every scar, every 3 months, during 2 to 3 years, stopping very slowly. We use the anti-inflammatory and antalgic action of the toxin, that is to say, by inflammation mediators (as glutamate or P-substance) liberation inhibition [10].





As you see in this example, for this young man, the left ear was reoperated. The second photo is the result one year after the end of the treatment.

For this injection too, the asepsis is very important. We have a specific, aseptic room and we do the injection using an equimolar mixture of oxygen and nitrous oxide (EMONO), plus sometimes, local anesthesia, because, as you can guess, it is very painful.



Post-Operative Muscular Pain Of The Cervical Spine

It is a non conventional indication. Painful posterior cervical muscles are injected : trapezius, supra-spinalis, splenius capitis and rhomboids. We inject 20 to 100 U by muscle to a maximum of 360 U on the same patient, performed every 3 months if necessary. We do not begin injections immediately after surgery, but after 6 months of ineffective classic drug treatment. In our study, 82% of

our patients improved. This was seen by the VAS score, the lordotic angles on X-rays and the quality of life. VAS score minored at 4,6 points (only 0,6 after conservative treatment) [11].

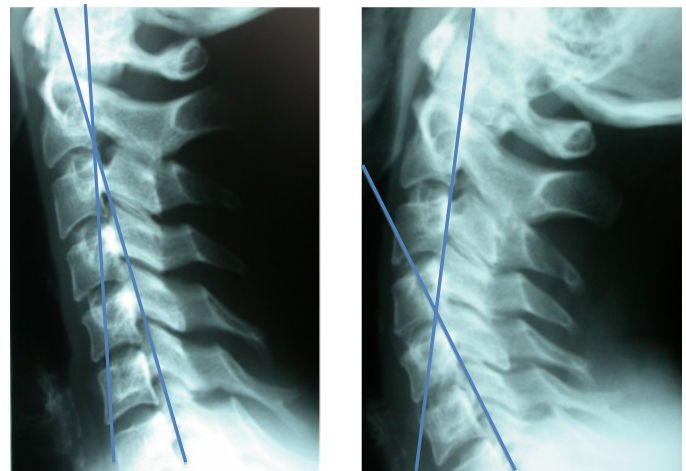


Here, the injection of the Trapezius

Muscle Pain Due To Stiffness of The Cervical Spine Following Bruxism

Bruxism is repetitive and involuntary contractions of the jaw-lifting muscles, without physiological efficacy. For severe bruxism, it is usual to have cervical pain, because the extreme contraction of the manducatory muscles impacts the cervical muscularity. Very severe bruxism present damages which are not only in the maxillofacial area. The cervical muscles can be contracted, hypertrophic and extremely painful. The original issue is the manducatory muscles, but in these cases, we have to treat the neck at the same time or eventually in priority. The trapezius, supra-spinalis and levator scapulae can be injected in addition to the masseter and temporal muscles. When you have to inject neck muscles to both relax muscles and decrease pain, the dosage can be high : especially the trapezius which can be injected with 100 to 150 U.

But, sometimes, the simple fact of injecting the masseter and temporal muscles is enough to change the cervical posture of the patient. So, again, we monitor the lordotic angle X-rays.



In this example, this woman went from minus 5° to plus 22° in nine months, and only with injections in the masseter muscles. The décontraction of the manducatory muscles, relaxes the cervical muscles and the curve of the cervical spine returns to normal. To measure the angles, we use the Matsumoto's criteria, that is to say,

the angle between the posterior walls of C2 and C6. In our study, 96% of our patients were relieved [12].

So, BT is effective against pain and muscle hypertonicity. There are no notable side effects. The cost is reasonable. The treatment is simple. There is no habituation or diminution of efficacy over time. With an injector experienced in the use of this product, patients can have a less « toxic » treatment for their bodies than a lot of drugs, even if its name scares people... !

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