



## The use of botulinum toxin in the treatment of the consequences of bruxism on cervical spine musculature



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### ABSTRACT

Hypertonia and hyperactivity of masticatory muscles are involved in pain and contractions of the cervical spine musculature, but their pathophysiology remains nonetheless unknown and its treatment far to be codified. In this study, 8 patients, showing disabling posterior neck muscle contractures linked with bruxism were prospectively treated and followed for an average 15 months period, after having received injections of botulinum toxin A essentially in masticatory muscles. Injections were made every 3 months, varying from 10 to 100 U Botox\* by muscles, without administrating more than 300 U Botox\* in the same patient. The angle of cervical lordosis were calculated on lateral sitting radiographs in neutral position, good results being considered to be achieved in the case of a 2 point diminution of VAS score as well as at least a 5° positive gain in the curve. 7 patients out of 8 showed a real improvement in their symptoms after an average of 3 injections, showing a decrease of 4.5 points on the VAS score and an average increment of 15° in cervical lordosis. Although the follow-up period of patients was relatively short and the sample quite small, the general impression, confirmed by the patients' experience, seems to suggest a potential place for the use of botulinum toxin amongst the array of treatments which can be offered in certain selected cases which associate bruxism and posterior cervical contractions.

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Botulinum toxin (BT) injections have shown their effectiveness in the treatment of temporomandibular joint disorders (Ihde and Konstantinovic, 2007; Tsai et al., 2010), doses used varying according to body weight, muscle tonicity and bruxism intensity. Hypertonia and hyperactivity of masticatory muscles are involved in pain and contractions of the cervical spine musculature (O'Shaughnessy, 1994), often extremely present at the first contact. It has been shown elsewhere that the association of botulinum toxin injections and physiotherapy of the masticatory muscles could lead to release of hypertonia in cervical muscles and diminution of pain, although no

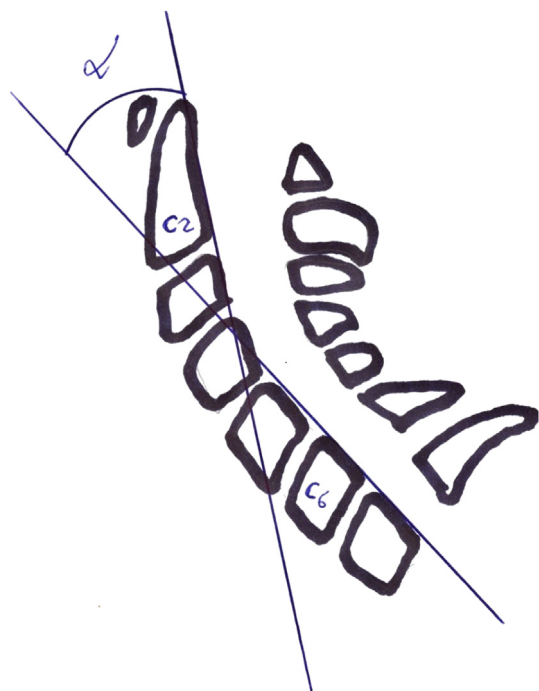
specific medication was used at the same time. Knowing the effects of spinal surgery on sagittal balance (Hosono et al., 1996; Takemoto et al., 2006), the effectiveness of botulinum toxin injections in the treatment of certain dystonias and spasmodic torticollis (Boghen and Flanders, 1993; Poewe et al., 1992; Swope and Barbano, 2008), as more recently proved in post operative pain after cervical spine surgery (Finiels and Batifol, 2010), the search for the real interest of the use of botulinum toxin in such conditions came to light.

### 1. Material and methods

This prospective study was performed after the written consent and approval of the ethics committee of our institution. 8 female patients, showing disabling posterior neck muscle contractures linked with bruxism were

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**Fig. 1.** Measure of the cervical lordosis angle according the criteria of Matsumoto et al. (2008).

prospectively treated and followed for a 15,1 [13–19] month period.

Injections of botulinum toxin A (Botox\*/Allergan Pharmaceuticals, Westport, Ireland) were made under electromyographic control, varying from 10 to 100 U Botox\*, according to the muscles chosen, without administration of more than 280 U Botox\* at the same time. The first follow-up session for each patient was set at 6 weeks and 3 months after injection by a non involved physician. Each time it was necessary, new injections were made at least 3 months after the previous one, in order to avoid the release of toxin antibodies. Pain was measured according to the

visual analogue scale (VAS), on which 0 is for no pain at all, and 10 for maximum pain. At the same time, radiograph measurements were made on profile X-rays of the neck, patients sitting in neutral position. The modification of the angle of cervical lordosis according to Matsumoto's criteria (Matsumoto et al., 2008) were calculated from these measurements, the values obtained being considered negative in the case of kyphotic curvature or curve inversion, and positive in the case of larger or smaller lordotic curvature (Fig. 1).

Good results were considered to be achieved in the case of a 2 point diminution of VAS score as well as at least a 5° positive gain in the curve, towards more lordotic positioning.

## 2. Results

The characteristics of the patients in the series are summarized in Table 1:

### 2.1. Population

All the patients who were injected were female. The average age was 55.8 (27–76) years. All the patients except 3 were active and in employment at the beginning of treatment.

### 2.2. Clinical signs

All the patients showed posterior cervical pain, along with muscular contractures which could be identified to the masseter and/or temporal muscles, sometimes associated with contractures of other muscular groups, improved more or less by physiotherapy, but all showing failure of usual therapies including the use of morphinic drugs and injectable myorelaxants. Measurement of pain on the VAS at the beginning of treatment showed an average value of 5.75 [4–7]; at the end of the treatment period (3 sessions [2–6] on average) this was reduced to 1.25 (0–4), that is to say an improvement of – 4.5 points on the VAS (Table 1).

**Table 1**  
Summary of our series.

Age/sex	Clinical	Muscles/doses	VAS pre/post	α° pre/post
56/F	TMJD, bruxism t and m contractures	m: 10–30 t: 30–40	7/2	5/12
76/F	Centered bruxism + facet wear	m: 40–50	5/4	5/5
49/F	Cranio-cervical trauma, contractures m	m: 40–50 t: 15–25	6/1	19/26
71/F	T and m contractures, VIII G neurinoma	m: 30–40 t: 10–20 p: 20	7/2	11/16
54/F	Hypertrophy of m, tension cephalgia	m: 40–90 t: 10–40	7/1	20/39
27/F	Off-center nocturnal and central diurnal bruxism + facet wear	m: 40–60 t: 15–20 tpz: 60–100	5/0	9/61
45/F	Centered bruxism + TMJD	m: 60–80 t: 30–50	4/0	18/31
69/F	Nocturnal bruxism	m: 40	5/0	–10/12

**Key:** TMJD: Temporomandibular joint disorders, m: masseter muscle, p: parietal muscle, t: temporal muscle, tpz: trapezium muscle, VAS: pain on the visual analogue scale.

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