

Botulinum Toxin Treatment in the Healing of Pressure Ulcers Resulting from Spasticity in Multiple Sclerosis – A Single Case Study

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Introduction

Treatment of spasticity in patients with multiple sclerosis (MS) can be complex and challenging. Oral treatments can be poorly tolerated and despite their use, secondary complications such as contracture, bony deformity and pressure ulcers can occur.

In patients with lower limb spasticity, injection of botulinum toxin (BoNT) has been shown to reduce hypertonia, increase passive range of motion, and reduce pain [1]. However BoNT is not currently licensed for the treatment of spasticity in MS and to date, very few research studies have evaluated the use of BoNT in the treatment of spasticity in MS.

This case report investigates the use of BoNT injections to facilitate healing of pressure ulcers resulting from spasticity and spasm, in a patient with secondary progressive MS (SPMS).

Methods

- Literature review on the use of BoNT treatment as an adjunct to aid healing of pressure ulcers. (Words/phrases searched: spasticity, spasms, dyskinesia, dystonia, multiple sclerosis, botulinum toxin, pressure ulcers).
- Two single case studies were identified involving patients who had developed pressure ulcers in the context of spasticity, spasms or dyskinesia after sustaining either a brain or spinal cord injury [2, 3].
- Targeted BoNT treatment was successfully utilised to aid the healing of pressure ulcers resistant to topical treatment.

History

A 51-year-old woman with SPMS experienced frequent spasms pulling her feet into plantarflexion and inversion, a progressive loss of range of movement at the ankles resulting in an abnormal resting position (Figure 1) and difficulty sourcing and applying appropriate footwear. In addition, she developed significant painful, infected pressure ulcers of both feet.

Initial management included up to twice weekly dressing at her local podiatry clinic. However healing was poor and she experienced two wound infections requiring treatment with antibiotics.

She was only able to tolerate Nabiximols (THC:CBD oromucosal spray: delta-9-tetrahydrocannabinol: cannabidiol: Sativex®, GW Pharma Ltd, UK), which partially reduced her spasms. Other oral antispasticity medications were not tolerated due to side effects of sedation and weakness.

Physical management strategies (stretches and splinting) were unsuccessful due to the strength of the spasms and the poor skin quality. The patient declined intrathecal baclofen (ITB) therapy.

She had no other medical history.

Additional medications included: modafinil, calcium and vitamin D supplements.



Figure 1. Feet resting position in sitting



Figure 2. Pressure ulcer dressings on both feet

Assessment of the lower limbs revealed:

- 3 dressed pressure ulcers (Figure 2).
- Muscle stiffness (Table 1).
- Frequent spasms, with great toe extension and foot inversion (Table 2).
- Poor foot and ankle alignment with loss of joint range of movement (Table 3).

| Muscle Group | Left Leg | Right Leg |
|-----------------|----------|-----------|
| Hip flexors | 0 | 0 |
| Hip extensors | 2 | 1 |
| Knee flexors | 0 | 0 |
| Knee extensors | 0 | 0 |
| Ankle PFs | 2 | 2 |
| Ankle invertors | 2 | 2 |

| Date | Pre-Injection | | 6 weeks post -injection | |
|---|--|--|--|--|
| | Left | Right | Left | Right |
| Spasm frequency | 4 | 4 | 1 | 1 |
| Spasm Severity | 2 | 2 | 1 | 1 |
| Spasm Description (direction, duration, spontaneous or triggered) | Great toe ext, ankle PF and INV, then knee ext | Great toe ext, ankle PF and INV, then knee ext | Occasional mild spasms triggered by end of range stretch; no toe involvement | Occasional mild spasms triggered by end of range stretch; no toe involvement |

| LEFT Leg | Resting Position (degrees) | | Passive Range of Movement (degrees) | |
|-----------|----------------------------|-----------------|-------------------------------------|---------------------|
| | pre- injection | post- injection | pre-injection | post- injection |
| Ankle PF | 55 | 50 | 50 off plantargrade | 45 off plantargrade |
| Ankle INV | 60 | 40 | 30 off neutral | 5 off neutral |
| RIGHT Leg | Resting Position (degrees) | | Passive Range of Movement (degrees) | |
| | pre- injection | post- injection | pre-injection | post- injection |
| Ankle PF | 50 | 40 | 50 off plantargrade | 40 off plantargrade |
| Ankle INV | 50 | 40 | 15 off neutral | 10 off neutral |

Treatment

These measures suggest a picture of generalised spasticity. However, in view of her intolerance to oral medication, we elected to target specific muscles with BoNT.

The goals of treatment were:

- To reduce the number of spasms in her feet;
- Improve the resting alignment of her feet;
- To facilitate better healing of her pressure ulcers.

The patient was made aware of the risks of BoNT treatment, including muscle weakness and its potential impact on her ability to perform transfers.

BoNT type A (Allergan BOTOX®) injections were undertaken under electromyography (EMG) guidance and muscle stimulation (Table 4).

Post BoNT injection management included multidisciplinary team input (physiotherapy, podiatry, tissue viability, and wheelchair services) in the community. [4,5].

| LEFT lower limb | BOTOX ®(units) | Sites |
|--------------------------|----------------|----------|
| Tibialis posterior | 80 | 1 |
| Tibialis anterior | 40 | 1 |
| Extensor hallucis longus | 40 | 1 |
| RIGHT lower limb | | |
| Tibialis posterior | 80 | 1 |
| Tibialis anterior | 40 | 1 |
| Extensor hallucis longus | 40 | 1 |
| Total Dose | 320 | 6 |

A second course of treatment to the same muscles was performed 4 months later.

Results

- Goals successfully achieved:
 - Significant reduction in spasm frequency.
 - A small improvement in foot resting position and passive range (Tables 2 and 3) which facilitated a change in pressure distribution in sitting.
 - Improved healing of pressure ulcers.
 - At 3 months: improved healing.
 - At 6 months: right ulcers completely healed; left ulcers: significant healing.
 - At 9 months: all ulcers completely healed.
- Additional benefit: increased ease of footwear application and tolerance.
- She remains stable and continues to undergo twice yearly review including repeat BoNT treatment, with no signs of recurrence.

Discussion

- BoNT treatment can reduce focal spasticity and spasms to minimise associated problems such as adaptive soft tissue shortening, poor positioning and pain [1].
- Pressure ulcers can be an associated complication of spasticity, stiffness and spasms.
- Pressure ulcers can prove fatal and cost the NHS between £43-374 per day [7].
- We postulate that BoNT treatment, as part of a coordinated MDT approach, can play a role in facilitating the healing of pressure ulcers, as a secondary complication of spasticity.
- Larger studies are needed to further evidence these findings and inform future clinical practice. Additional patient reported outcome measures that would enhance future studies may include the Leg A [8] and MSSS-88 [9].

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