

Lessons from practice

Use of botulinum toxin to heal atypical pressure ulcers in the palm

Clinical record

A 59-year-old woman attended our spasticity clinic with treatment-resistant atypical pressure ulcer in the right hand caused by focal spasticity secondary to upper motor neuron lesion. She had suffered subarachnoid haemorrhage from a ruptured arteriovenous malformation and underwent craniotomy. She was deemed not suitable for structured rehabilitation due to her significant disability and was placed in a residential accommodation. The patient was using an electrical wheelchair and was requiring full assistance with her personal care.

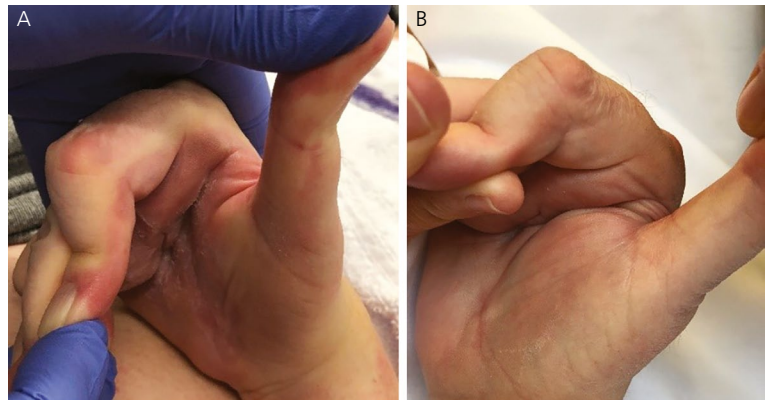
She had typical, dense post-stroke right-sided spastic hemiplegia. In the upper limb, she had shoulder adduction and internal rotation, elbow flexion, wrist palmar flexion with flexed fingers at the metacarpophalangeal and proximal interphalangeal joints. She had a baclofen pump that controlled her lower limb spasticity.

The patient had a clenched fist and spastic fingers, with overgrown nails pressed hard into the palm causing ulceration in the proximal palmar crease and in the metacarpophalangeal crease. The hand smelled offensive. Attempts to open her fingers for cutting nails and cleaning the palm caused severe pain. The patient's carers had attempted to manage her hand with therapy, splinting and dressing, all of which proved unhelpful. This caused significant suffering to the patient and distressed her carers.

On examination, the patient had significant spasticity, with a Modified Ashworth Scale score of 3 and above in the pectoralis major, elbow flexors (ie, biceps and brachialis), and in the flexor digitorum superficialis muscle. The hand exhibited Grade 3 pressure ulcerations — full thickness skin loss involving necrosis of subcutaneous tissue — in the palm (Box 1, A). The spastic muscles were clinically identified and injected with botulinum toxin under electromyography stimulator guidance. The doses used were 150 units for the pectoralis major, 150 units for elbow flexors and 100 units for the flexor digitorum superficialis muscle.

The effect of the toxin was realised in 8 days. After one session of injection, spasticity was significantly reduced to a Modified Ashworth Scale score of 2. The hand could be opened to allow soft splinting with a sheep skin palmar protector and ulcer treatment could be initiated. Later, the patient was able to wear a posey hand cushion, followed by splinting with a foam tube.

1 Image of the patient's hand exhibiting Grade 3 pressure ulcerations in the palm (A). The patient's hand showing the ulcers completely healed after second session of injections (B)



The patient underwent hand therapy, mostly passive stretching. Pain scores improved from 10/10 to 2/10 on the Visual Analog Scale, and the finger-to-palm distance and the passive range of movement significantly increased, which allowed dressing. The carer burden was also reduced considerably. She needed a second session of injections after 5 months. The ulcers were completely healed by 5 months (Box 1, B). We did not inject her further and she continued with hand therapy.

Discussion

Spasticity is a common manifestation of many neurological conditions, such as stroke (28–37%), cerebral palsy (19–92%), multiple sclerosis (41–69%), and traumatic brain injury (13%).¹ Prevalence of spasticity is reported to be 73% in nursing home residents with central nervous system disorders.² In the hand, spastic and distorted fingers, often with overgrown nails, press unremittingly into the palm and may cause pressure ulceration. Spasticity is the commonest cause of atypical pressure ulcers,³ which are described as such because of the atypical location where the pressure is exerted by the spastic fingers. Hand ulcerations caused by focal spasticity can be notoriously treatment-resistant and may cause significant suffering

Lessons from practice

- Untreated spasticity in the vulnerable population living in nursing homes may give rise to long-standing treatment-resistant palmar ulceration, as the spastic fingers press hard on the palm.
- Botulinum toxin injection should be considered first for toning down moderate to severe spasticity followed by dressing, therapy and splinting for healing of the ulcers.
- Patients with atypical ulcers caused by focal spasticity should be referred to a multidisciplinary spasticity clinic.

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2 Identification of spastic muscles from the positioning of the upper limb/hand and from physical examination

Deformity	Spastic muscles involved
Shoulder adduction/internal rotation	Pectoralis major, Latissimus dorsi, Teres major and Subscapularis
Elbow flexion	Biceps and Brachialis
Forearm pronation	Pronator teres and Pronator quadratus
Wrist palmar flexion	Flexor carpi radialis, Flexor carpi ulnaris
Thumb-in-hand	Flexor pollicis longus, Adductor pollicis, Flexor pollicis Brevis, Opponens pollicis, First dorsal interosseous
Metacarpophalangeal joint flexion	Lumbricals
Clenched fist	Proximal interphalangeal joint flexion — Flexor digitorum longus Distal interphalangeal joint flexion — Flexor digitorum profundus

to the patient and increased carer burden.⁴ Individuals living in nursing homes with irrevocable neurological impairment are a vulnerable group likely to develop pressure ulcers related to spasticity.

The examination should include looking for typical upper limb deformity caused by spasticity. It is important to assess muscle tone, power and reflexes, besides the temperature of the hand (usually cold), hyperhidrosis, bromhidrosis (offensive smell), maceration or skin breakdown around the palmar creases, overgrown nails, and skin infection. The systemic causes of exacerbation of spasticity (ie, constipation, urinary tract infections, pain, deep vein thrombosis, or stress⁵) are also important. It is necessary to identify the spastic muscles (Box 2) and to distinguish between contracture (permanent shortening of muscle due to fibrosis) and spasticity. One way of finding out whether the joint is spastic or contracted is to try passive movement. If the joint can be moved by passive stretching, it is indicative of spasticity. If the joint is in a fixed position with difficulty to move, it is likely to be contracted but should always be referred to the spasticity clinic for specialist assessment.

Spasticity is commonly measured by the Modified Ashworth Scale, as shown in Box 3. The objective assessments of a spastic hand with ulcerations should include the criteria in Box 4.

Botulinum toxin has emerged as the drug of choice in focal spasticity and/or dystonia.^{6,7} It is safe and better tolerated and the effects can last for months.⁸ Physicians should consider botulinum toxin for focal spasticity and dystonia in the upper and lower limbs (such as hands and feet) and/or in the neck (cervical) for patients with neurological disorders causing pain, discomfort, deformity, functional limitation (eg, walking), complications such as skin breakdown or increased carer burden (eg, maintaining hygiene). In many cases, when botulinum toxin is combined as an

3 Modified Ashworth Scale for the measurement of spasticity

Score	Description
0	No increase in muscle tone
1	Slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion (ROM) when the affected part is moved in flexion or extension
1+	Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM
2	More marked increase in muscle tone through most of the ROM, but affected part or parts easily moved
3	Considerable increase in muscle tone, passive movement difficult
4	Affected part or parts rigid in flexion or extension

4 Criteria for the assessment of a spastic hand with ulcerations

Outcome measures	Description
Spasticity	Modified Ashworth Scale (0–4)
Pain	Visual Analog Scale (0–10)
Finger-to-palm distance	Fingertip to the palm distance in centimetres
Passive range of movement	The number of examiner's fingers that could be inserted into patient's palm
Pressure ulcer	Pressure ulcer grading 1–4
Carer Burden Scale for Upper Limb/Hand	Items: <ul style="list-style-type: none"> • cleaning the palm • cutting the nails • dressing • cleaning the armpit 5-point Likert scale (0–4) <ul style="list-style-type: none"> • 0 = no difficulty • 1 = mildly difficult • 2 = moderately difficult • 3 = very difficult • 4 = cannot do task Items scored are summed to give a Carer Burden Scale score (0–16) before and 4 weeks after injection

adjuvant treatment with other rehabilitation therapies the effects can be longer lasting.

Patients with atypical ulcers caused by focal spasticity should be referred to a multidisciplinary spasticity clinic consisting of a rehabilitation medicine physician, nursing staff, a physiotherapist and an occupational therapist.

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