Setting up a post-stroke spasticity clinic: Experience and results at Whangarei

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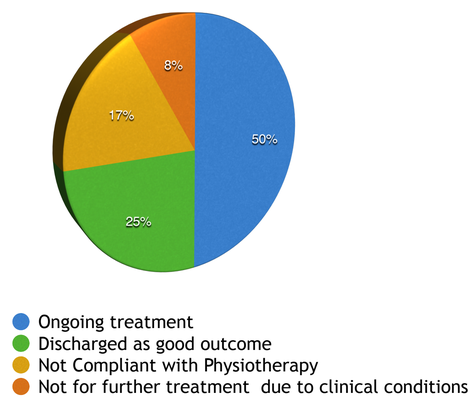
Abstract

Spasticity is a common feature in stroke patients. It is estimated that around 40% of stroke patients develop spasticity within 12 months post stroke. Post-stroke hemiparesis, together with abnormal muscle tone, is a major cause of morbidity and disability. Patients with post-stroke spasticity often demonstrate recognizable antigravity postural patterns characterized by shoulder adduction, elbow and wrist flexion in the upper limb, hip adduction, knee extension and ankle plantar flexion in the lower limb. This “hemiplegic” posture, which is thought to result from increased motor neuron activity in antigravity muscles, significantly interferes with body image, balance and gait. BoTX, one of the most potent biologic toxins known to man (1) acts by blocking neuromuscular transmission via inhibiting acetylcholine release. Since its introduction by Scott(2) to treat strabismus, it has been utilized in various neurologic and non-neurologic indications, such as dystonia, blepharospasm, tremor, hyperhydrosis and cosmetic applications. Focal spasticity, particularly resulting from cerebral disorders, is currently being treated successfully with BoTX via injection in the spastic muscles, and BoTX is now considered the pharmacological treatment of choice in focal spasticity. BoTX treatment in post-stroke upper and lower limb spasticity is a safe and effective procedure to decrease muscle tone and increase the range of motion. More recent studies are demonstrating the importance for the rehabilitation therapist intervention to work alongside the Physician to create more positive and significant effects on active function (3). The Therapist intervention on stroke patients occurs, in our spasticity clinic, approximately 10 days post BoTX treatment. This is crucial, as it enhances the benefits of BoTX. Daily stretching exercise is the key for the long-lasting benefits. BoTx Injections, Ultrasound guided technique (4), performed by a Physician in combination with physiotherapy and outcomes measurements are used to improve upper and lower limb function in stroke patients with spasticity in the clinical setting at Whangarei Hospital. Ultrasound guided techinque has
We would like to share our experience on the benefit of the ultrasound guided technique to target the muscles and our results in setting up and running a spasticity clinic for post-stroke patients at Whangarei Hospital.

Presentation

The management of muscle spasticity proves to be a major challenge in hemiplegia following a stroke.
Spasticity is a well-known motor dysfunction arising from upper motor neuron lesions due to stroke, spinal cord injury, multiple sclerosis and traumatic brain injury. Clinically, it is diagnosed with the velocity-dependent resistance felt by passive examination of joint motion (5). In 1980, Lance1 defined spasticity as “a motor disorder characterized by a velocity-dependent increase in tonic stretch reflexes (muscle tone) with exaggerated tendon jerks, resulting from hyper-excitability of the stretch reflex as one component of the upper motor neuron syndrome.” Setting up a new service is always challenging and for us starting the spasticity service for post-stroke patients at Whangarei Hospital has a challenging task.
First of all we had to discuss with our managers about the importance of the use of BoTX injections to treat focal spasticity post-stroke, which is worldwilde considered a gold standard procedure to prevent and treat focal spasticity post-stroke. We had to present a business case about an estimate annual cost of this procedure and discuss the cost-effectiveness.
Our Physician was trained overseas to perform this procedure under ultrasound guided technique, which is considered a new method for administering injections to the correct point of the correct muscle 1. This meant that we had to find an ultrasound available for the clinic. At the time, we were planning to start the clinic, 27Gauge needles were not available in the hospital. We had to go through a process to have these type of needles approved by the Hospital commission. Creating a spasticity team was easier as the Physiotherapist, Physician and Occupational therapist were all part of the same acute community rehabilitation service. Therefore, we could link our spasticity service to the community team for rehabilitation programmes after the injections.
We also created a specific referral form to be completed only by a physiotherapist. In the referral form, the physiotherapist is asked to provide general clinical information (type and date of the stroke) - identify the patient’s goals, perform the initial measurements: Arm A section A- Arm A section B, Leg section A- Leg section B - Modified Ashworth scores and Tardieu score.
Our patients were then assessed in the clinic by the physician and the physiotherapist. Outcome measurements were reperformed (Asthworth modified score - Tardieu score - Arm A section A and Arm A section B). Patient’s goals and the compliance were discussed with the patient.
Patients were asked for a written consent to take photographs for teaching and learning purpose.
Risk and benefits of BoTX injections with the possible outcome were explained to the patients. After a verbal consent from the patient, the BoTX was injection into to muscle by the Physician under ultrasound guided technique(Fig2).
Patients were then reviewed by the community Physiotherapist approximately 10 days post-injection for assessment and stretching exercises. They had to continue to perform the exercises with the help a relative or carer at home. The compliance of the daily work at home was the key for longstanding effect of the treatment.
Twenty patient were referred to our spasticity clinic in the last 8 months.
60% of the patients referred to our service were considered eligible for BoTX type A injections.
83% had spasticity post- ischaemic stroke, 17% had spasticity post-ICH. Female Mean age was 57.8, Male Mean age was 68. Overall mean age was 63.8.
75% of the patients who received BoTX improved after the first session.
92% treated for upper limb spasticity. 8% treated for lower limb spasticity.
50% of the patients treated have been discharge from our service. Of these 25% discharged as not requiring further injections due to significant improvement in the subjective scores Arm A section A and B and objective scores Tardieu score and Modified Ashworth score with no more spasticity present (Fig1).
17% of the patients have been discharged because not complaint with physiotherapy. Although in 8 % improvement was seen after the first session, the decision was not for further sessions due to high risk of skin infection secondary to atypical rash.
Patients, we are currently reviewing and treating, are highly motivated patients with improvement of their scores at each review. Improvements were shown in the ease of care for the patients, reduce pain and reduced burden of care on carers.

Fig 1: Outcome of Patients after 1-2 sessions



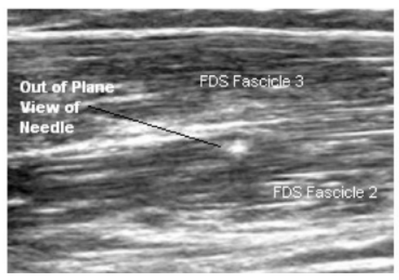


Fig 2: Needle visualisation FDS muscle

Discussion

Stroke is the second leading cause of death and disability globally, according to the World Health Organization(6).
More than one third of stroke survivors never regain adequate limb function. A contributing impediment to regaining function is spasticity. Defined as a motor disorder characterized by a velocity-dependent increase in tonic stretch reflexes (muscle tone) with exaggerated tendon jerks, spasticity results from hyper-excitability of the stretch reflex, one component of upper motor neuron syndrome (7). This may affect limb position and activities of daily living. Spasticity contributes to disability in post-stroke patients with a frequency of 41.6%(7-8). BoTX is a neurotoxin that acts on the neuromuscular junction at the presynaptic site. It inhibits the release of acetylcholine, thus leading to muscle weakness and reduced muscle tone.Side effects of botulinum toxin include local skin reaction and the spread of weakness to the adjacent non-injected muscles (9). Contraindications to BoTX include pregnancy, lactation, neuromuscular junction disorders, and concurrent use of aminoglycosides.
Post-stroke rehabilitation is important to reduce disability and BoTX type A injections is considered a gold standard treatment for focal spasticity (10). Ultrasound enables to visualise in real time the needle's progress, resulting in a precise localisation of the target muscle, while avoiding certain structures like blood vessels and nerves. In addition, this technique allows a passive manipulation of the limb part under study in order to distinguish the muscular body of the target muscle from that of other adjacent muscular structures (12) improvement of spasticity and functional muscle activity depends on the duration of the spasticity, motivation of the patient and family. Moreover, stretching exercises is the key for the success of the rehabilitation programme (12-13). We discharged 16% of the patients from our service, after the first session, because they were not compliant to the physiotherapy programme.
BoTX capacity to release the muscles with high tone does not always translate to any increased muscle activity in the antagonist muscles. In some of our cases the muscle activity did not return, but it did allow for increased ease of care and passive movement. It is important therefore, when selecting a patient for BoTX(14), to establish what the goals and expectations are beforehand. This information can be applied to our practice in the future, when discussing goals and outcomes with patients. With patients showing activity in the antagonist muscles prior to the injection, such as wrist and finger extensors, we may be able to discuss goals of improving active function. However, with those with minimal muscle activity, our goal setting may be based more around passive goals for caregiving. 75% of our patients achieved improvement after the first session, of these 25% did not required further sessions to maintain the results.
We are starting to receive referrals from the acute stroke Unit for acute stroke patients who are beginning to develop spasticity. This is important, as BoTX type A injections performed at an early stage can prevent the development of spasticity and help the patient to achieve the goals during physiotherapy sessions.

Conclusion

BoTX treatment in post-stroke upper and lower limb spasticity is a safe and effective procedure to decrease muscle tone and increase the range of motion (14-16).
BoTX injections are an effective treatment for limb spasticity following stroke. Recent studies are demonstrating the importance for the rehabilitation therapist intervention to work alongside the Physician to create more positive and significant effects on active function. Setting up a spasticity clinic can be challenging and we learned from our experience that it is important to set realistic goals and expectations based on the patient's status prior to the injection. It is important to explain to the patient that BoTX is not a cure-all treatment, and that different patients can expect different results. We found that in literature, different outcomes measures are used in different studies to evaluate spasticity post-stroke (15). We used three different scores in our patients: Arm A section a/b, Tardieu score and Ashworth modified scale to give subjective and objective data. Further studies need to use the same standardized functional outcome measures so that the results can be compared to each other. The use of ultrasound, is the key of our service,as it enables to visualise in real time the position of the needle, resulting in a precise localisation of the target muscle, avoiding certain structures like blood vessels and nerves. Our spasticity service is now considered part of the multidisciplinary stroke rehabilitation programme.

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Patients consent obtained