Neurology Asia 2024; 29(3) : 863 – 866

Effective management of hip adductor spasticity: A case report on diagnostic obturator nerve block and botulinum toxin injection

Richard Soon Kiat Teo, John Yee Cheong, Mazlina bt Mazlan, Tze Yang Chung

Department of Rehabilitation Medicine, Faculty of Medicine, University Malaya, Kuala Lumpur, Malaysia

Abstract

It is important to distinguish spasticity from contracture in patients presenting with upper motor neuron (UMN) syndrome and restricted range of movement (ROM) because treatment strategies differ. We demonstrate how we perform ultrasound-guided obturator nerve (ON) block to distinguish spasticity from contracture in a patient with bilateral hip adductor spasticity secondary to a non-traumatic spinal cord injury. We report here a 26-year-old gentleman with a history of *Mycobacterium tuberculosis* thoracic spondylodiscitis with spinal cord compression. His neurological status was T6 ASIA impairment scale C and his impairments were spastic paraparesis, neurogenic bowel and neurogenic bladder. He had difficulty with wheelchair transfer and positioning, perineal care as well as intermittent self-catheterization due to severe spasticity of bilateral hip adductors with significantly restricted ROM. Bilateral ON block resulted in clinically significant improvement in spasticity and ROM of the right lower limb but not the left. The effects were similar following intramuscular BTX-A injection of bilateral hip adductors. Ultrasound-guided diagnostic ON block via the distal approach is inexpensive, safe and can be readily performed in clinic setting without the need for sedation or prolonged monitoring. Improvement in MAS score of at least 1 point and ROM of at least 15° following ON block should be used to distinguish hip adductor spasticity from contracture in patients with UMN syndrome and reduced ROM. Diagnostic nerve block allows for greater physician certainty when discussing various treatment options including expedited referral for surgical consult. The findings of this report offer insights into the decision-making process in managing complex presentations of UMN syndrome.

Keywords: Hip adductor spasticity, obturator nerve, diagnostic nerve block, botulinum toxin

INTRODUCTION

Severe spasticity and contracture often coexist in patients with upper motor neuron (UMN) syndrome. Accurate differentiation is crucial for deciding treatment strategies especially in resource-limited centres. We describe how we perform ultrasound-guided obturator nerve (ON) block in a patient with bilateral hip adduction deformity to distinguish spasticity from contracture as well as to predict treatment effect of BTX-A injection.

CASE REPORT

Mr A was a 26-year-old gentleman with a history of *Mycobacterium tuberculosis* (MTB) thoracic spondylodiscitis with spinal cord compression 3 years prior. He underwent surgical decompression and spinal fixation as well as completed one year of anti-MTB treatment. He subsequently underwent right transtibial amputation for an infected non-healing ulcer and sustained a neglected left hip posterior dislocation following an episode of severe lower limb spasm. His neurological status was T6 ASIA impairment scale C and his impairments were spastic paraparesis, neurogenic bowel and neurogenic bladder. He was not able to don a prosthesis nor walk after his spinal cord injury due to lower limb weakness, deformity, and spasticity. He remained independent in wheelchair mobility but had difficulty with positioning and transfer. He also had difficulty with perineal hygiene and intermittent self-catheterization.

Mr A was referred for further spasticity management. He was already on high doses of oral spasmolytics. He had scissoring of bilateral

Address correspondence to: Dr Chung Tze Yang, Department of Rehabilitation Medicine, Faculty of Medicine, University Malaya, 50603 Kuala Lumpur, Malaysia. Email: yangman@um.edu.my

Date of Submission: 15 March 2024; Date of Acceptance: 26 June 2024

https://doi.org/10.54029/2024pzk

Figure 1. Scissoring of bilateral lower limb in seated position at baseline (left) with improved seating position post obturator nerve block (right)

lower limb with marked muscle wasting and a well-healed amputation scar [Figure 1]. There was spasticity of bilateral hip adductor muscles with modified Ashworth scale (MAS) of 4. The passive range of motion (ROM) of right and left hip abduction was restricted as denoted by modified Tardieu scale (MTS) R2 of 25° and 15° respectively [Table 1]. A pelvic anteroposterior radiograph showed neglected left hip dislocation with acetabular dysplasia [Figure 2].

The muscle group we targeted for treatment were the bilateral hip adductors. We performed an ultrasound-guided diagnostic ON block via the distal approach.[1] We first obtained a transverse image of the femoral vessels at the inguinal crease using a high frequency (7 to 12 MHz) linear ultrasound probe. We translated the probe medially and caudally to obtain an image of the pectineus and the three overlying adductor muscles with the abductor longus (AL) located most superficial and the abductor magnus (AM) located most deep [Figure 3]. We inject 5 ml (2.5

Table 1: MAS, MTS R1 and MTS R2 at baseline, 30-minutes post obturator nerve block and 2-weeks post BTX-A injection

Hip Adductor	Baseline	Post nerve block (change from baseline)	Post BTX-A (change from baseline)
		MAS *	
Right	4	2 (-2)	2 (-2)
Left	4	4 (0)	4 (0)
		MTS R1 ^	
Right	10°	30° (+20°)	25° (+15°)
Left	10°	15° (+5°)	10° (0°)
		MTS R2 ~	
Right	25°	40° (+15°)	45° (+20°)
Left	15°	20° (+5°)	15° (0°)

* MAS 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; 2 = slight increase in muscle tone shown as a catch and followed by minimal resistance throughout less than half the range of motion; 3 = marked increase in muscle tone through most of the range of motion, the affected part being easily moved; 4 = considerable increase in muscle tone, with passive movement difficult; and 5 = affected part remaining rigid

^ The MTS R1 is the angle in which a catch is elicited during a quick stretch

~ The MTS R2 is the angle of full passive ROM and is measured during a slow stretch

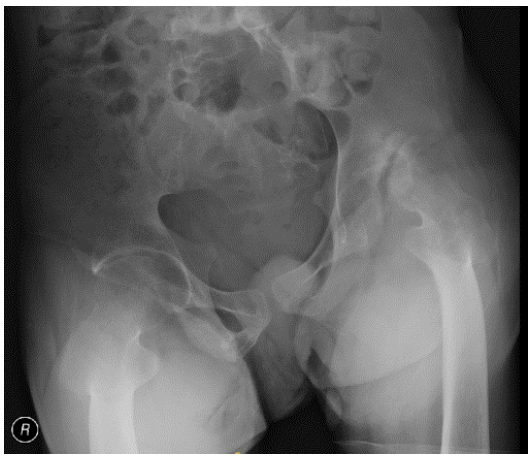

Figure 2. Pelvic AP plain radiograph showing a chronic neglected left hip dislocation.

ml lidocaine 1% plus 2.5 ml bupivacaine 0.5%) local anaesthetic (LA) into the fascia between the abductor brevis (AB) and AM muscle to block the posterior ON branch, followed by another 5ml LA into the fascia between the AL and AB muscle to block the anterior ON branch. Both injections were performed via a single needle entry.

The MAS of the right hip adductors reduced from 4 to 2 whereas the left hip adductors MAS was unchanged. The ROM of the right and left hip abduction improved by 15° and 5° respectively. [Table 1]. Mr A reported better ease of transfer, positioning in sitting and perineal care the following day [Figure 1]. There was also an unexpected improvement in right knee extension active ROM [Figure 4]. The effect of the nerve block lasted for two days.

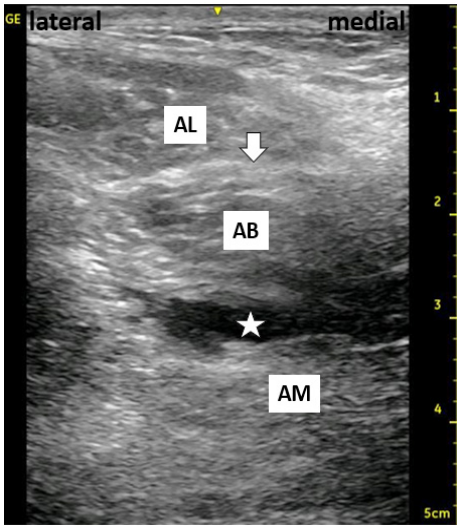

Figure 3. Obturator nerve block via distal approach [AL: adductor longus; AB: adductor brevis; AM: adductor magnus; star: injectate seen after posterior obturator nerve branch block; arrow: target site of anterior obturator nerve branch block]

We proceeded to inject bilateral AL and AB with 125 units each and bilateral AM with 250 units each of Dysport® BTX-A under ultrasound guidance. Two weeks following BTX-A injection, the right hip adductor spasticity improved from MAS 4 to 2 and the ROM improved by 20° from baseline [Table 1]. There was also similar improvement of right knee active extension as compared to post ON block. However, there was no improvement in MAS and ROM of the left hip adductor muscles. Following a discussion with the orthopedic team, Mr A consented to undergo a left hip varus derotation osteotomy with adductor release for contracture due to a neglected left hip dislocation.

DISCUSSION

It is often difficult to distinguish spasticity from contracture in patients with UMN syndrome and reduced ROM especially in centres where examination under anesthesia[2] is not readily available. Traditionally, a value less than 20° difference between MTS R1 and R2 (R2 – R1) has operationally been used to define contracture that would not benefit from BTX-A injection.[3]

We demonstrate the benefits of utilizing diagnostic ON block to determine the relative contribution of hip adductor spasticity and contracture. Similar recommendations have been proposed for spastic equinovarus deformity in stroke survivors.[4] The right ON block resulted in clinically significant improvement of right hip adductor spasticity and ROM despite having a baseline MTS R2 - R1 of only 15°. The subsequent BTX-A injection resulted in similar improvements. Conversely, the 5° improvement in left hip abduction ROM post ON block was not observed post BTX-A injection. This likely represents a measurement error as the improvement post nerve block does not meet the minimal detectable change of 15°.[5]

Our decision to inject BTX-A in favour of phenol chemo-neurolysis was due to the potential risk of phenol induced dysesthesia in a patient with sensory sparing spinal cord injury. We blocked the anterior and posterior branches of the ON via ultrasound guidance without the need for nerve stimulation. This technique can be adopted in other centres with limited resources.

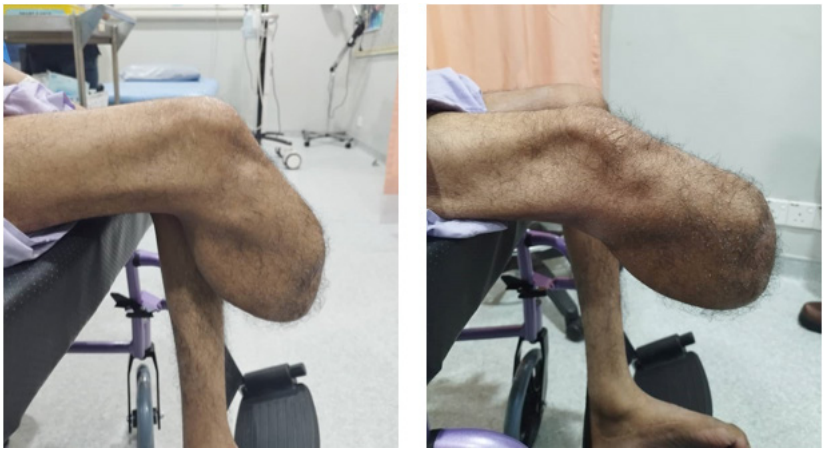

Figure 4. Active right knee extension at baseline (left) and post obturator nerve block (right)

Additionally, Mr A experienced an unexpected improvement in the right knee active extension post ON block and BTX-A injection. We postulate that this improvement is due to a reduced flexor synergy effect. The adductor muscles do not participate in knee flexion, and it is unlikely that the ON block would have spillover effects unto the motor innervation of the knee flexor muscles.

In conclusion, in patients with UMN syndrome and reduced ROM, we recommend the use of diagnostic nerve block to distinguish the relative contribution of spasticity as well as to predict the quantum of improvement post BTX-A injection. Improvement in MAS score of at least 1 point and ROM of at least 15° following ON block should be used as threshold to diagnose hip adductor spasticity that would likely benefit from BTX-A injection.[5,6] Ultrasound-guided diagnostic nerve block is inexpensive, safe and can be readily performed in clinic setting without the need for sedation or prolonged monitoring. It allows for greater physician certainty when discussing various treatment options including expedited referral for surgical consult.

DISCLOSURE

Financial support: None

Conflicts of interest: None

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