

*Short Communication***Simplified technique for injection of Botulinum Toxin to Obturator Internus muscle using ultrasound-guided nerve stimulation for persistent pelvic pain**Susan Florence EVANS¹ and Justin Matthew PORTER²¹Gynaecology, Pain Medicine, Pelvic Pain SA, Norwood, and ²Pulse Anaesthetics, Rose Park, South Australia, Australia

Botulinum toxin (BoNT) injections have been used to reduce muscle spasm in the presence of severe pelvic pain. However, while pubococcygeus is easily accessed vaginally, injection to obturator internus is more complex – with variation in operative technique and needle placement confounding the ability to assess outcomes. We describe a simplified technique for BoNT injection to obturator internus using neurostimulation under ultrasound guidance.

Key words: botulinum toxin, pelvic pain, neurostimulation, obturator internus, persistent pain, ultrasound-guided injection.

Introduction

Pelvic pain is estimated to affect between 15% and 25% of women.^{1,2} As with many types of persistent pain, muscle spasm may accompany persistent pelvic pain. Symptoms suggestive of pelvic muscle pain include dyspareunia, sharp, stabbing pains on one or both sides of the pelvis often with radiation to the back or anterior thigh, and aggravation of pain by movement, prolonged postures, menses or painful urinary symptoms.

Mild to moderate cases can be managed effectively with a combination of pelvic physiotherapy to ‘down-train’ muscles, increased gentle exercise with avoidance of aggravating activities and the use of neuropathic medications. However, where pain is severe, these treatment options may be impractical or inadequately effective.

Botulinum toxin (BoNT) injections are used in a wide range of medical conditions where muscle spasm is present, including migraine, cerebral palsy, torticollis, blepharospasm and detrusor overactivity. Injections of BoNT to pubococcygeus and obturator internus have been used in the management of the severe pain associated with pelvic muscle spasm.^{3–5}

While pubococcygeus is easily accessed vaginally, obturator internus lies posterior to the obturator foramen. The muscle is fan shaped, arising from the

pelvic surface of the obturator membrane and inferior pubic ramus. It converges to form a tendon, which exits the lesser sciatic foramen and attaches to the greater trochanter of the femur. As such, spasm in obturator internus commonly makes movement or walking difficult.

This article presents a simplified technique for the injection of BoNT to obturator internus that is easily learnt and uses readily available equipment.

Injection Technique

Botulinum toxin at a dose of either 300 Ipsen Units (Dysport™, Ipsen Biopharm Ltd, Wrexham, UK) or 100 Botox units (Botox™, Allergan Inc, Irvine, CA, USA) is diluted in 15 mL of 0.75% ropivacaine solution and drawn up into a 20-mL syringe.

The syringe is attached to nerve stimulator needle tubing (Pajunk, Norcross, GA, USA, SonoPlex Stim cannula, 50 mm 22G, or 100 mm 21G for high BMI patients) with electrode attached via ECG dot to the skin of the patients abdomen. The nerve stimulator is set to a frequency of 2 Hz and current of 1 mA.

The left obturator internus muscle belly is palpated on the pelvic side of the obturator foramen with the forefinger and middle finger (Fig. 1). The muscle is gently held against the obturator foramen between the fingers vaginally and the thumb externally. The thumb is used to palpate the bony margins of the obturator foramen medially and plan the insertion point of the needle – aiming to pass through the obturator foramen at approximately the level of the clitoris and close to the groin crease, into the muscle behind. Exact insertion points will vary with pelvic dimensions.

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Figure 1 Insertion of Nerve Stimulator Needle through the Obturator Foramen to Obturator Internus.

Correct Needle Placement

Correct placement of the needle in the muscle can be confirmed by either one of the following techniques:

- Introduction of the needle until a 2 Hz myofascial twitch in the free external end of the needle can be demonstrated. This twitch ceases when the BoNT/ropivacaine solution is injected.
- Introduction of the needle until muscle twitch in obturator internus can be visualised on ultrasound.

While injection with neurostimulation alone can be effective, isolated muscle bundles may be missed – and treatment may be incomplete with isolated taut bands of persistent muscle spasm found on examination 2–3 weeks' post procedure. The combination of both techniques streamlines the procedure.

Injection of Botulinum Toxin

Once the needle is correctly positioned a volume of BoNT/ropivacaine is injected with subsequent cessation of muscle twitch. Injection at 3–5 sites is usually required to treat the entire obturator internus muscle. The procedure is repeated on the contralateral side.

An even injection technique beginning at the lower edge of the muscle and moving upwards, rather than starting at the centre of the muscle is recommended.

Following injection of obturator internus bilaterally, injection of pubococcygeus is undertaken per vagina. Injections into pubococcygeus can be easily performed using a 23G, 90 mm spinal needle without ultrasound or

nerve stimulation to a depth of 4–5 mm at 2–3 sites bilaterally.

The proportion of BoNT/ropivacaine solution injected at each site is varied depending on careful assessment of symptoms and examination findings at the pre-operative consultation. Where pain is evenly bilateral with both obturator internus and pubococcygeus affected, we have found 5 mL to the left obturator internus, 5 mL to the right obturator internus, 2.5 mL to right pubococcygeus and 2.5 mL to left pubococcygeus to be effective. Where pain is unilateral or maximal in one muscle group, these amounts are varied accordingly.

Ultrasound Technique

A 50 mm 6–15 MhZ linear-array transducer is positioned in a parasagittal plane at the level of the inguinal crease partially over the anterior pubic ramus (Fig. 1). The transducer is covered with a sterile probe cover.

The obturator internus muscle is visualised through the sonographic window created by the obturator foramen.

The injection needle is visualised 'in-plane' as it passes through the obturator foramen into the obturator internus muscle (Fig. 2). Myofascial twitching is elicited within this muscle at points of hyperexcitation using the nerve stimulator. Once located, these areas are injected with BoNT/ropivacaine solution.

Pudendal Block

Following injection of BoNT, a pudendal block is performed per vagina with 5 mL of 0.75% ropivacaine bilaterally to improve postoperative comfort.

Anaesthetic Technique

Women presenting for this procedure generally have severe persistent pelvic pain. This pain can lead to a number of changes to their psychological and physiological

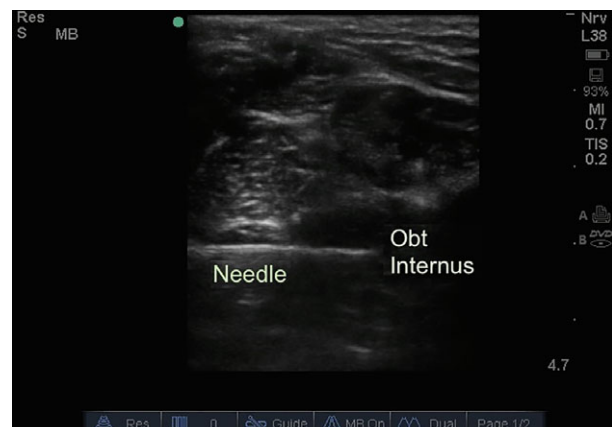


Figure 2 Ultrasound Image of Needle Injection into Obturator Internus.

condition that present additional anaesthetic challenges, including:

- Anxiety and depression,
- Persistent pelvic pain,
- Functional limitation which may be associated with weight gain and high body mass index and
- Opioid tolerance

These functional impairments often determine these women as ASA 3 with regard to anaesthetic risk. These factors in combination with the internal nature of the injection make this procedure unsuitable for injection without anaesthesia.

General anaesthesia is induced and maintained via a total intravenous technique.⁶ It is important to avoid the use of muscle relaxants so that the nerve stimulator may be used. Where obturator internus injection takes place prior to laparoscopy during the course of a single anaesthetic, a laryngeal mask is inserted initially for the BoNT injection. On completion of the BoNT injection, muscle relaxant is given and endotracheal tube inserted for the laparoscopy.

A multimodal analgesic approach is employed to account for the patient factors outlined above. Agents used include fentanyl, ketamine,⁷ paracetamol and parecoxib. With this technique, we have observed a high degree of patient satisfaction and a low incidence of postoperative nausea and vomiting.

The use of a pudendal block, ropivacaine as diluent for the BoNT, and the anaesthetic described provides excellent patient comfort with many women waking with substantial resolution of their pain.

We have found that in those women with more severe pain, a ketamine infusion as a monitored patient overnight before discharge may be beneficial.⁷

Postoperative Management

Short-term difficulty initiating a void or unsteady walking secondary to the block occurs in some women, and bladder catheterisation overnight has been required on occasion.

The woman should be warned that her pain will resume in the window between resolution of the ropivacaine block and initiation of BoNT effect, 10–14 days after injection. If prewarned, most women accept this readily.

A postoperative review at 2–3 weeks is recommended with examination of muscles vaginally, unless vaginal or examination contraindicated. Generally, softer, less tender muscles with noticeably less pain than noted at examination prior to her procedure can be demonstrated. Where pain relief is substantial, the opportunity should be taken to wean off opioids, increase gentle regular exercise, resume pelvic physiotherapy to ‘down-train’ muscles, manage constipation and reduce bladder over-activity. Neuropathic medications such as amitriptyline, serotonin and norepinephrine reuptake inhibitors (SNRIs) or

anticonvulsants should be continued, where these have been effective and well tolerated. Useful resources include:

- Pelvic muscle relaxation audiofile (MP3) downloaded from www.thepelvicfloorclinic.com.au
- Easy stretches to relax the pelvis from the Pelvic Pain Foundation of Australia at www.pelvicpain.org.au

While a single BoNT injection combined with nonsurgical treatments is sufficient for long-term benefit in many women, those with severe, long-term persistent pain may require the support that additional 6-monthly injections provides, to allow them to cease opioids, resume employment or education and manage their pain.

Conclusion

In appropriately selected women, we have found that this procedure is valuable in management where pelvic muscle spasm has resulted in substantial functional impairment.

Despite the likely high prevalence of pelvic pain conditions, research remains scarce. By documenting this technique, we hope to raise awareness of the importance of pelvic muscle spasm in persistent pelvic pain and provide an additional treatment option for those affected. Our unit is currently planning a multicentre study in conjunction with pelvic physiotherapists to document outcomes from this procedure.

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