Trigger Point Injections

Jason P. Gilleran, MD
Assistant Professor, Dept. of Urology
Oakland University William Beaumont School of Medicine
Introduction & Objectives

• What are trigger point injections (TPI)?
  – Indications
  – How-to perform and medications used
  – Outcomes and potential adverse events

• Other nerve blocks for localized pelvic pain

• Current role of Onabotulinum toxin A (Botox, BTX-A) in pelvic pain
Clinical Presentation

• **Bladder dysfunction**
  – Overactive bladder-urge
  – Urinary retention and voiding dysfunction (staccato voiding pattern)
  – Painful bladder syndrome

• **Bowel dysfunction**
  – Outlet-centered constipation
  – Anismus
  – Dyschesia

• **Sexual dysfunction**
  – Dyspareunia
  – Vaginismus
  – Vestibulodynia/vulvodynia

• **Orthopedic dysfunction**
  – Coccydynia
  – Sacroiliac joint dysfunction
  – Pelvic girdle dysfunction
Etiologies

- **Trauma**
  - Vaginal delivery
  - Pelvic surgery
  - Sports injury
  - Sexual abuse

- **Psychological**

- **Behavioral**

- **Biomechanical**

- **Visceral pain disorders**
  - Endometriosis
  - Painful bladder syndrome
  - Irritable bowel syndrome
  - Fibromyalgia

- **Idiopathic/unknown**

Up to 85% of patients with IC have a component of myofascial pelvic pain  (Peters et al 2006; Bassaly et al 2011)
Vicious Cycle / Cascade of Trigger Point Activation in PFD

- Muscle Spasm → Pain
- Activation of C-fibers
- Release of Substance P
- Mast Cell Activation and Histamine Release
- Further Tissue Damage/Nerve Injury
Inter-relationship of Pelvic Floor Dysfunction

Definition

- A Trigger Point is:
  - A discrete, nodular, focal, hyperirritable area
  - Usually < 1 cm circumference
  - Located in a taut band of skeletal muscle
  - Pain at same location or travels to distant areas

Fibromyalgia Trigger Points
Milieu Changes in Trigger Points

- Higher concentration of:
  - Bradykinin
  - CGRP
  - Substance P
  - TNF-α
  - IL-β, IL-6, IL-8
  - serotonin and norepinephrine

- Lower pH

- Local nociceptor sensitization

- Presence of local ischemia

- Sustained release of acetylcholine
Potential Mechanisms of Action

• Interruption of the reflex arc
  – Mechanical disruption of skeletal muscle fibers
  – Local anesthetic

• Release of endorphins

• Fluid injection may dilute nerve sensitized substances via vasodilation
  – Release of intracellular potassium with subsequent depolarization
Dry Needling

• Acupuncture needle, in-and-out motion
• Two randomized studies in myofascial pain:
  – Dry needling vs 1% lidocaine
    • No difference between the 2 groups
    • Local anesthetic does reduce post-needling soreness

  – Dry needling vs sham
    • DN superior to sham

Ay et al 2009
Tsai et al 2010
Patient Selection

• Hypertonic pelvic floor on exam with discrete areas that reproduce pain
  – “Twitch” sign

• Patient unable to tolerate vaginal dilators, suppositories, pelvic floor myofascial release by trained physical therapist
  – Ideal if done at or just before pelvic floor PT
  – Can aid therapist in performing myofascial release
Clinic Set-Up

- Comfortable exam table and office setting
- “Map out” TPI first
- Vital signs before, during and after TPI
- Cold-pack to external genitalia before and after TPI
- “Coaching”
- Oral diazepam
Cotton swab testing for vestibulodynia. The vestibule is tested at the 2-, 4-, 6-, 8-, and 10-o’clock positions. When pain is present, the patient is asked to quantify it as mild, moderate, or severe.
Pelvic Floor Exam
Corticosteroid crystals do not have any greater propensity to aggregate or change size when mixed with lidocaine solution.

- Safe to coadminister corticosteroids and lidocaine.

Maximum dose of lidocaine (U.S.) is 300 mg. This equates to 30 mL of 1% lidocaine or 15 mL of 2% lidocaine.

Maximum safe dose of bupivacaine is approximately 150 mg (2 mg/kg). This equates to 25 mL of 0.5% bupivacaine or 50 mL of 0.25% bupivacaine.
Supplies
Spinal Needle and Medication
Trumpets

‘Straight’ trumpet
- Deeper injection sites
- Less likely to move

‘Curved’ trumpet
- Follows contour of finger
- Improved access
Levator TPI with Straight Trumpet
Levator TPI with Curved Trumpet
Potential Adverse Events

- Transient exacerbation of pain
- Vasovagal syncope
- Vaginal hematoma
  - Tampon (ade)
- Paresthesias / dysesthesias in LE
- Urinary retention or incontinence
- Myonecrosis due to bupivicaine toxicity?
  - Currently using Ropivicaine as long-acting anesthetic

Outcomes after Trigger Point Injections

  - 18 consecutive women, mean age 51
  - 3-5 injections, depending on number of points
  - VAS at baseline and 3 months post TPI
  - 72% success rate
  - No dedicated pelvic floor myofascial release

Compression Techniques?

- Study of 60 pts receiving TPI to trapezius muscle with/without 30, 60 s of “ischemic compression” using pressure algometer

- Significant improvement in pain scores and ROM in all groups, but greater improvement in the compression group, regardless of time
Periurethral Block

• Focal, urethral pain
  – Dysuria and dyspareunia
• RULE OUT INFECTION (Ureaplasma, Mycoplasma) AND URETHRAL DIVERTICULUM (MRI)
• 4-5 cc bupivicaine / triamcinolone bilateral with one finger in vaginal canal for guidance
Botulinum Toxin for Pelvic Floor Dysfunction / Hypertonicity
Botox for Other Myofascial Pain Syndromes

• Currently FDA approved for:
  – Migraine headache
  – Blepharospasm and strabismus
  – Cervical dystonia and upper limb spasticity
  – Axillary hyperhidrosis
  – Neurogenic detrusor overactivity and idiopathic overactive bladder (OAB)

OFF LABEL INDICATION FOR MYOFASCIAL PAIN SYNDROMES
Myofascial Pain Syndromes

- Complex regional pain syndrome
- Trigeminal and occipital neuralgia
- Chronic masticatory pain (bruxers)
- Phantom limb pain
- Piriformis muscle syndrome
Botulinum toxin in the treatment of myofascial pain syndrome

William P. Cheshire ¹,* , Sandra W. Abashian and J. Douglas Mann

Department of Neurology, University of North Carolina, 751 Clinical Sciences Building, Chapel Hill, NC 27599 (USA)

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• 6 pts randomized to Botox 50 U vs saline

• 4/6 demonstrated > 30% reduction in pain (compared to none with saline)
  – Pain scores
  – Muscle firmness, pain thresholds
Mechanism of Action of onabotulinum-a toxin

• Cleaves the SNAP-25 protein that blocks fusion of ACh vesicles to synaptic membrane and thus prevents release
• Takes 5 days for complete process, maximal effect at 2 weeks
  – Nerve ending “dies”, but begins regrowth at approximately 45 days
• Duration of efficacy approx 6 months
Mechanism of Action

A Normal Neurotransmitter Release
- SNARE Proteins Form Complex
- Vesicle and Terminal Membranes Fuse

B Exposure to Botulinum Toxin
- Light Chain Cleaves Specific SNARE Proteins
- Light Chain
  - Types B, D, F, G
  - Types A, C, E
- Heavy Chain
  - Type C
- Botulinum Toxin
- Membranes Do Not Fuse
- SNARE Complex Does Not Form
- Neurotransmitter Not Released
- Muscle Fiber Paralyzed

Advantages / Differences in Botox use vs Local anesthetics, other agents

- Longer efficacy than lidocaine or dry needling due to electrical “inactivation” of trigger points

- Excessive acetylcholine at neuromuscular junctions may explain why Botox may be beneficial

- 24 women mean age 25 yrs
  - 3rd and 4th degree vaginismus
- 150-400 U of Botox injected into puborectalis muscle 3 sites each side of vagina
- Mean follow up 12.1 months (2-24)
- 18 able to have satisfactory intercourse after 1 injection, 1 required 2nd injection

- 12 women age 18-55 injected with 40 U Botox in puborectalis & pubococcygeus mm
  - Significant reduction in pain VAS for dyspareunia, dysmenorrhea, and non-significant reduction in non-menstrual pelvic pain and dyschezia
  - Reduction in pelvic floor manometry pressures at 4 and 12 weeks
  - QoL and sexual activity scores improved


- 30 women, mean age 31 yrs with > 2 years of chronic pelvic pain
- Double-blind, randomized (80 U Botox vs saline), controlled study
- VAS reduction for dyspareunia, pelvic pain
  - 66 → 12 (placebo 64 → 27) and 51 → 22
- Pelvic floor pressure measurements
  - 49 → 32 cm H2O (placebo 44 → 39)
RCTs of Botox for Myofascial Pain

• Systematic review (Ho, 2007)
• 5 RCTs of 272 subjects (173 Botox, 99 placebo), short term (1-3 mos)
• Botox dose range from 10-230 U
• 4/5 show no difference vs placebo
  – Visual analogue scale (VAS), disability scale
  – Pressure pain threshold, pain algometry
  – Rescue pain medications used
• Retrospective cohort review of 29 women
  – Mean age 55 (32-62)
• Non-standardized dosing 100-300 U
• Done in office or under conscious sedation
• Variable follow up (<2 weeks or >6 weeks) with no long-term follow up
• No standardized technique for palpation – points done, amount of pressure
### TABLE 2. Comparison of Pain and Symptoms Before and After Botox Injection

<table>
<thead>
<tr>
<th>Pain and Symptoms</th>
<th>Before Botox Compared With Visit 1 (n=29)</th>
<th>Before Botox Compared With Visit 2 (n=18)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Botox</td>
<td>Visit 1</td>
</tr>
<tr>
<td>Weeks after injection</td>
<td>-</td>
<td>2.0 (2.0–3.0)</td>
</tr>
<tr>
<td>Pain score</td>
<td>9.5 (8.0–10.0)</td>
<td>0.0 (0.0–3.0)</td>
</tr>
<tr>
<td>Pain category</td>
<td>&lt;0.0001</td>
<td>-</td>
</tr>
<tr>
<td>None</td>
<td>0 (0.0)</td>
<td>15 (51.7)</td>
</tr>
<tr>
<td>Mild</td>
<td>0 (0.0)</td>
<td>6 (20.7)</td>
</tr>
<tr>
<td>Moderate</td>
<td>3 (10.3)</td>
<td>2 (6.9)</td>
</tr>
<tr>
<td>Severe</td>
<td>26 (89.7)</td>
<td>4 (13.8)</td>
</tr>
<tr>
<td>Missing</td>
<td>0 (0.0)</td>
<td>2 (6.9)</td>
</tr>
<tr>
<td>Postvoid residual</td>
<td>10 (0.0–30.0)</td>
<td>15 (0.0–68.0)</td>
</tr>
<tr>
<td>Urine retention</td>
<td>1 (3.5)</td>
<td>4 (13.8)</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>12 (41.4)</td>
<td>4 (13.8)</td>
</tr>
<tr>
<td>Fecal incontinence</td>
<td>0 (0.0)</td>
<td>2 (6.9)</td>
</tr>
</tbody>
</table>

Data are presented as median (interquartile range) or n (%).

*Comparison is for 26 women who had a pain score before the injection and at visit 1.
Botox for Vestibulodynia

- 64 women randomized to 20 U BTX vs NS
- EMG guidance into bulbospongiosus
- VAS Likert scale at 3 and 6 mos follow up

- No statistical significant difference in pain scores between 2 groups

Future Use of Botox for Pelvic Pain

- Randomized studies to address:
  - Placebo effect
    - 200 U vs 20 mL saline at 2 weeks
    - Botox with pelvic floor PT – 12 week outcome
    - Botox vs trigger point injection with anesthetic
  - Effect of using needle EMG to localize Botox injections
    - Questionnaire outcomes on continence, bowel and sexual function
Conclusions

• TPI a helpful adjunct to mainstay of conservative therapy, namely pelvic floor PT

• Diagnostic aid when unclear about etiology of pelvic pain

• Botox for pelvic floor hypertonicity may have a larger role in future, but better-conducted, randomized studies are needed
Thank You