Interventional Pain Management
Options for Headaches

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Texas Tech University HSC

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Objectives

- Explore interventional options when conventional therapy is partially effective or ineffective in treating headaches
- Review the relevant anatomy for each block
- Brief overview of the procedures
- Examine available literature

Procedures to Consider

- Occipital nerve block
  - Suboccipital decompression
  - Cryoneurolysis
- Sphenopalatine ganglion block
  - P-EMF
  - RFTC
- Trigeminal nerve/ganglion blocks
  - P-EMF
  - Cryoneurolysis of terminal branches
- Botulinum toxin

Occipital Nerve Block
Indications

- Cervicogenic headaches
- Cluster headaches
- Migraine headaches
- Post concussive headaches
- Occipital neuralgia
### Peripheral Nerve Blocks and Trigger Point Injections in Headache Management – A Systematic Review and Suggestions for Future Research

Art Askenazi, MD; Andrew Bloemenfeld, MD; Uni Noppe, MD; Sameer Narazani, MD; MSc; Brian Groeger, MD, Robert Nett, MD; Guido DeVience, MD; Barbara Rosenthal, MD; Stewart Ippen, MD; Richard B. Lipton, MD, on behalf of the Interventional Procedures Special Interest Section of the American Headache Society

<table>
<thead>
<tr>
<th>Study design</th>
<th>n</th>
<th>Intervention</th>
<th>Results</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retrospective</td>
<td>97</td>
<td>A single or repeated GON block(s) using lidocaine and methylprednisolone</td>
<td>Headache improvement in 54% of subjects for up to 6 months</td>
<td>Gaweł and Rothbart4</td>
</tr>
<tr>
<td>Retrospective</td>
<td>27</td>
<td>Repeated GON and SON blocks using bupivacaine</td>
<td>Headache improvement in 85% of subjects for up to 6 months</td>
<td>Capuani and Fioreto3</td>
</tr>
<tr>
<td>Retrospective</td>
<td>14</td>
<td>A single GON block with or without SON block using lidocaine and epinephrine</td>
<td>Head pain reduction in 6% of subjects at 30 minutes</td>
<td>Bowin and Sand3</td>
</tr>
<tr>
<td>Prospective, non-controlled</td>
<td>19</td>
<td>A single GON block using lidocaine and tramadol, and TPIs using lidocaine</td>
<td>A significant decrease in headache pain in 90% of subjects</td>
<td>Askenazi and Young7</td>
</tr>
</tbody>
</table>

GON = greater occipital nerve; n = number of subjects; SON = suprascapular nerve; TPI = trigger point injections.

*Headache 2010;50:943-952*
Mechanism of Action

- Incompletely understood and may be related to:
  - Anesthetic effects of the drug
  - Physical effect of the injection itself on the nerve via a diffuse noxious inhibitory control mechanism
  - Inhibition of the constant trigeminal hyperexcitability
  - Interruption of the sensory afferent conduction from the epicranial territory which may be the location of the vessels causing the abnormal noxious input

<table>
<thead>
<tr>
<th>Study design</th>
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<th>Intervention</th>
<th>Results</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-blind placebo controlled</td>
<td>23</td>
<td>A single GON block using lidocaine and betamethasone</td>
<td>85% of subjects became attack free within 1 week, 63% remained attack free for 4 weeks</td>
<td>Ambronn et al^1</td>
</tr>
<tr>
<td>Retrospective</td>
<td>14</td>
<td>A single GON block using lidocaine and triamcinolone</td>
<td>64% of subjects became attack free for 4 weeks</td>
<td>Peres et al^2</td>
</tr>
<tr>
<td>Retrospective</td>
<td>15</td>
<td>A single GON block using methylprednisolone</td>
<td>31% became headache free for 3-7 days</td>
<td>Bigo et al^3</td>
</tr>
<tr>
<td>Case series</td>
<td>15</td>
<td>A single GON block using zolpidem</td>
<td>60% had minor headache improvement</td>
<td>Busch et al^4</td>
</tr>
<tr>
<td>Case series</td>
<td>19</td>
<td>GON injection using lidocaine and methylprednisolone</td>
<td>53% had complete and 16% had partial pain relief</td>
<td>Afridi et al^5</td>
</tr>
</tbody>
</table>

(GON = greater occipital nerve; n = number of subjects)

(Headache 2010;50:943-952)
Mechanism of Action

- May be related to:
  - Directed local steroid effect
  - Block may affect the spinal trigeminal nucleus, decreasing its sensory input modulating central processes, and thus decreasing trigeminal activity, possibly interrupting the trigeminal autonomic reflex pathway

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**Peripheral Nerve Blocks and Trigger Point Injections in Headache Management – A Systematic Review and Suggestions for Future Research**

Avi Askarmani, MD; Andrew Blumenfeld, MD; Uri Nopolon, MD; Saver Navarria, MD, MSc; Brian Groth, MD; Robert Niti, MD; Euridice DelPiero, MD; Barbara Rosenblat, MD; Stewart Tepper, MD; Richard B. Lipton, MD, on behalf of the International Procedural Special Interest Section of the American Headache Society

Table 3.—Peripheral Nerve Blocks for Chronic Daily Headache

<table>
<thead>
<tr>
<th>Study design</th>
<th>n</th>
<th>Intervention</th>
<th>Results</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prospective, non-controlled</td>
<td>112</td>
<td>Repeated injections to the vicinity of occipital nerve using lidocaine and bupivacaine + saline or triamcinolone</td>
<td>65% experienced headache relief lasting at least one week; 50% experienced relief for more than 4 weeks</td>
<td>Saadah and Taylor17</td>
</tr>
<tr>
<td>Case series</td>
<td>101</td>
<td>GON injection using lidocaine and methylprednisolone</td>
<td>22% had complete response (pain free) and 31% had partial response</td>
<td>Afridi et al13</td>
</tr>
<tr>
<td>Prospective, randomized controlled</td>
<td>37</td>
<td>GON block and TPs using lidocaine, bupivacaine + either saline or triamcinolone</td>
<td>Headache severity decreased significantly at 20 minutes in both groups, with no significant between-group difference</td>
<td>Astkenazi et al13</td>
</tr>
<tr>
<td>Open label</td>
<td>15</td>
<td>GON block using prilocaine and dexamethasone</td>
<td>No change in headache severity in 73% of subjects; worsening of headache in 20%</td>
<td>Leinsich-Dahlke et al13</td>
</tr>
</tbody>
</table>

GON = greater occipital nerve; n = number of subjects; TPs = trigger point injections.

(Headache 2010;50:943-952)
Mechanism of Action

- May be related to:
  - Interruption of the anatomical connections between trigeminal and upper cervical sensory fibers at the level of the trigeminal nucleus caudalis

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**Peripheral Nerve Blocks and Trigger Point Injections in Headache Management – A Systematic Review and Suggestions for Future Research**

Avi Ankrom, MD, Andrew Bluestein, MD, Uri Nepp, MD, Samer Nacarain, MD, MS;
Brian Grosberg, MD; Robert Nett, MD; Tru Dufaure, MD; Barbara Rosenthal, MD; Stewart Tupper, MD;
Richard B. Lipton, MD, on behalf of the International Procedures Special Interest Section of the American Headache Society

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<th>Intervention</th>
<th>Results</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case series</td>
<td>180</td>
<td>GON and LON Block using methylprednisolone</td>
<td>94% experienced complete pain relief during a mean of 24 days. Significant head pain improvement at 7 weeks, with decreased analgesic use.</td>
<td>Anthony^{a}</td>
</tr>
<tr>
<td>Double-blind, placebo controlled</td>
<td>80</td>
<td>GON and LON Block, with or without local nerve block, using lidocaine, epinephrine, bupivacaine, hyaluronic acid, and dexamethasone</td>
<td>Significant head pain improvement at 7 weeks, with decreased analgesic use.</td>
<td>Naiki et al^{b}</td>
</tr>
<tr>
<td>Case series</td>
<td>47</td>
<td>GON and LON Block, with or without local nerve block, using lidocaine, epinephrine, bupivacaine, hyaluronic acid, and dexamethasone</td>
<td>90% achieved 6 months of pain freedom; 45% required repeated injection.</td>
<td>Naiki et al^{b}</td>
</tr>
<tr>
<td>Prospective, comparative</td>
<td>28</td>
<td>GON or LON nerve block using lidocaine and bupivacaine</td>
<td>Both treatments resulted in decreased frequency and duration of pain, with no significant between-group differences.</td>
<td>Jain et al^{c}</td>
</tr>
<tr>
<td>Prospective, non-controlled</td>
<td>42</td>
<td>GON or LON nerve block using bupivacaine</td>
<td>A significant reduction in mean head pain during 1 week post-injection.</td>
<td>Vincent et al^{d}</td>
</tr>
<tr>
<td>Retrospective</td>
<td>24</td>
<td>GON or LON nerve block using lidocaine and bupivacaine</td>
<td>77% of those who received GON block had pain relief of 50%. Those who received LON block had 20% pain relief.</td>
<td>Bower and Sand{e}</td>
</tr>
</tbody>
</table>

GON = greater occipital nerve; LON = lesser occipital nerve; n = number of subjects; SON = supraorbital nerve.

*(Headache 2010;50:943-952)*
Occipital Decompression

- Variation of the occipital nerve block
- Utilizes volume to release entrapped occipital nerves
Occipital Decompression

- Patients placed prone position
- PA View
- Nuchal ridge identified

Landmarks

2-3 cm lat to the midline along the nuchal ridge
Needle Placement

3.4 cm epimed stealth needle aimed at the posterior arch of atlas.
Lateral View

• Confirmation of dye spread

• Semispinalis capitus

• Suboccipital triangle

Volume Separation

Local anesthetic with steroid are injected under fluoroscopic guidance into the deep muscles of the upper cervical spine
Anterior View

• Final View

• Decompression of the fascial planes

Study sample

• All patients who underwent occipital decompression from March 2006 through November 2007
• N = 29
• 19 women and 10 men
• 23 to 79 years of age
Instrument and Measures

- Variables assessed
  - Numerical Rating Scale pain assessment
  - Activities of daily living
  - Medication usage
- Time frames
  - Pre-treatment
  - Immediate Post-treatment
  - Follow up
- Statistical analysis
  - t-test pre vs post
  - ANOVA for follow up measures age and gender

Outcomes

![Diagram showing pain levels over time](image-url)
### Summary of Results

- Treatment reduced pain
  - From 8/10 to 3/10
  - For 24wks

- Decreased Medications

- Improved Activities of Daily Living

- Benefits were not
  - Age-related
  - Gender-related
Limits

- Retrospective
- No control/non random
- Measure subjective
- No long term follow-up

Sphenopalatine Ganglion Block
Indications

- Indicated for treatment of:
  - Migraine headaches
  - Cluster headaches
  - Post-traumatic headaches
  - Persistent Idiopathic Facial Pain
    - aka “Atypical facial pain”
  - Trigeminal neuralgia
  - Sphenopalatine neuralgia
  - Cancer pain of facial and orofacial structures
Sphenopalatine Ganglion Block

- Techniques:
  - Intranasal
    - Cotton swabs soaked in local anesthetic
    - 4% cocaine
    - 2% lidocaine
    - Viscous lidocaine
  - Intraoral via the palatine foramen
    - Located medial to the 2\textsuperscript{nd} molar
    - Foramen entered with a curved needle

Sphenopalatine Ganglion Block

- Techniques:
  - Infrazygomatic through the mandibular notch
    - RFTC
    - PEMF
Technique

- For RFA, apply sensory stimulation at 50 Hz to localize the ganglion
  - Placement of the needle at the ganglion will generate a paresthesia at the root of the nose
    - The lower the stimulation the better.
  - Best to use a 2-3 mm active tip to decrease the possibility of lesioning the maxillary nerve or palatine nerves
  - Lesion at 67-80 degrees Celsius
  - Pulse RF can be done at 45 volts
Base of "inverted vase"
Pterygomaxillary fissure
Complications

- Hematoma
  - Large venous plexus
  - Maxillary artery
- Epistaxis
- Nerve injury
- Eye injury
  - Retrobulbar hematoma via the infraorbital fissure
- Intravascular injection
- Maxillary sinus fracture
- Bradycardia- “Konen” reflex with RF lesioning and PRF

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**Table 2. Summary of Sphenopalatine Block/Neurolysis Articles**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Study Type</th>
<th>Diagnosis</th>
<th>No. of Patients</th>
<th>Grade of Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gargiulo et al.</td>
<td>CR</td>
<td>Trigeminal neuralgia</td>
<td>1</td>
<td>1C</td>
</tr>
<tr>
<td>Rush, Reza</td>
<td>CR</td>
<td>Peri-trigeminal headache</td>
<td>1</td>
<td>1C</td>
</tr>
<tr>
<td>Kemp, Grealy</td>
<td>CR</td>
<td>Cluster headache</td>
<td>1</td>
<td>1C</td>
</tr>
<tr>
<td>Saadie, park</td>
<td>CR</td>
<td>CA</td>
<td>1</td>
<td>1C</td>
</tr>
<tr>
<td>Marshall et al.</td>
<td>CR</td>
<td>Trigeminal neuralgia</td>
<td>1</td>
<td>1C</td>
</tr>
<tr>
<td>Peterson et al.</td>
<td>CR</td>
<td>Trigeminal neuralgia, Tooth pain</td>
<td>2</td>
<td>1C</td>
</tr>
<tr>
<td>Quevedo et al.</td>
<td>CR</td>
<td>CRPS lower extremity</td>
<td>2</td>
<td>2C</td>
</tr>
<tr>
<td>Salat et al.</td>
<td>CR</td>
<td>Sphenopalatine neuralgia</td>
<td>2</td>
<td>1C</td>
</tr>
<tr>
<td>Bador et al.</td>
<td>CR</td>
<td>Cluster headache</td>
<td>6</td>
<td>1D</td>
</tr>
<tr>
<td>Puig et al.</td>
<td>CS</td>
<td>Sphenopalatine neuralgia</td>
<td>8</td>
<td>1C</td>
</tr>
<tr>
<td>Bayer et al.</td>
<td>RR</td>
<td>Atypical facial pain, sphenopalatine neuralgia, trigeminal neuralgia, cluster headache</td>
<td>30</td>
<td>1C</td>
</tr>
<tr>
<td>Berger et al.</td>
<td>DP, FC</td>
<td>Low back pain</td>
<td>21</td>
<td>2B</td>
</tr>
<tr>
<td>Janzen et al.</td>
<td>DP, FC</td>
<td>Myofascial pain, fibromyalgia</td>
<td>21</td>
<td>2B</td>
</tr>
<tr>
<td>Ferrante et al.</td>
<td>DP, FC</td>
<td>Myofascial pain, neck, shoulders</td>
<td>23</td>
<td>2B</td>
</tr>
</tbody>
</table>

CR, case report; CS, case series; RR, retrospective review; DP, FC, double-blinded, placebo-controlled; CRPS, complex regional pain syndrome; HA, headache; GA, cancer.
Views and Perspectives

Electrical Stimulation of Sphenopalatine Ganglion for Acute Treatment of Cluster Headaches

Mehdi Ansarinia, MD; Ali Rezaei, MD; Seanart, J; Terper, MD; Charles P. Steiner, BS; Jenna Stump, MS; Michael Stenton-Hicks, MD; Andre Machado, MD; Samer Narouze, MD

Introduction—Cluster headaches (CH) are primary headaches marked by repeated short-lasting attacks of severe, unilateral head pain and associated autonomic symptoms. Despite aggressive management with medications, oxygen therapy, nerve blocks, as well as various screening and neurostimulation techniques, a number of patients are incapacitated and suffering. The sphenopalatine ganglion (SPG) has been implicated in the pathophysiology of CH and has been a target for block, lesioning, and other surgical approaches. For this reason, it was selected as a target for an acute neurostimulation study.

Methods—Six patients with refractory chronic CH were treated with short-term (up to 1 hour) electrical stimulation of the SPG during an acute CH. Headaches were spontaneously present at the time of stimulation or were triggered with agents known to trigger clusters headache in each patient. A standard percutaneous infraorbital nerve approach was used to place a needle at the ipsilateral SPG in the pterygopatine fossa under fluoroscopy guidance. Electrical stimulation was performed using a temporary stimulating electrode. Stimulation was performed at various settings during maximal headache intensity.

Results—Five patients had CH during the initial evaluation. Three returned 3 months later for a second evaluation. There were 18 acute and distinct CH attacks with clinically monitored visual analog scale (VAS) intensity of 8 (out of 10) and above. SPG stimulation resulted in complete resolution of the headache in 14 attacks, partial resolution (≥50% VAS reduction) in 4, and minimal or no relief in 4 attacks. Associated autonomic features of CR were resolved in each responder. Pain relief was noted within several minutes of stimulation.

Conclusions—Sphenopalatine ganglion stimulation can be effective in relieving acute severe CH pain and associated autonomic features. Chronic long-term outcome studies are needed to determine the utility of SPG stimulation for management and prevention of CR.

Key words: cluster headache, acute treatment, sphenopalatine ganglion, SPG, pterygopalatine ganglion, neurostimulation, neuromodulation

Research Submission

Sphenopalatine Ganglion Radiofrequency Ablation for the Management of Chronic Cluster Headache

Samer Narouze, MD, MS; Leonardo Kapural, MD, PhD; Jose Casanova, MD, PhD; Nagy Mekhail, MD, PhD

Objectives—Chronic cluster headache patients are often resistant to pharmacological management. Percutaneous radiofrequency ablation (RFa) of the sphenopalatine ganglion (SPG) was chosen before to improve episodic cluster headache but not chronic cluster headache. We were interested to examine the effect of such intervention in patients with intractable chronic cluster headache who failed pharmacological management.

Methods—Fifteen patients with chronic cluster headache, who experienced temporary pain relief following SPG-block, underwent percutaneous RFa via the infraorbital approach under fluoroscopy guidance. Collected data include demographic variables, onset and duration of the headache, mean attack intensity (MAI), mean attack frequency (MAFs), and pain disability index (PDI) before and up to 18 months after procedure.

Results—After 1, 3, 6, 12, and 18-month follow-ups, the MAI was 2.6, 3.2, 3.2, 3.4, 4.2, respectively (P<.0001, P<.0001, P<.0001, P<.0005, P<.0003, respectively). The PDI improved from 55 (baseline) to 17.2 and 25.6 at 6 and 12 months respectively (P<.0001). The MAI improved from 17 attacks/wk to 5, 4, 6.4, 7.8, 8 at 1, 3, 6, 12, 18-month follow-up visits (P<.0001, P<.0001, P<.0001, P<.0002, P<.004, respectively).

Conclusions—Our data showed that percutaneous RFa of the SPG is an effective modality for treatment of patients with intractable chronic cluster headache. Precise needle placement with the use of real-time fluoroscopy and electrical stimulation prior to attempting radiofrequency lesioning may reduce the incidence of adverse events.

Key words: cluster headache, sphenopalatine ganglion, radiofrequency ablation, neuromodulation

(Headache 2009;59:571-577)
Mechanism of Action

- May be related to:
  - Ablation or stimulation of the SPG may interfere with superior salivatory nucleus to the SPG efferents or interrupt postganglionic outflow

Trigeminal Nerve/Ganglion Blockade
Trigeminal Nerve/Ganglion Blockade

- Anatomy of the ganglion
  - Resides in the middle cranial fossa at the apex of the petrous portion of the temporal bone
  - Situated in a fold of dura mater that forms an invagination around the posterior two-thirds of the ganglion
    - Region is referred to as the Meckel cavity and contains cerebrospinal fluid
  - Bound medially by the cavernous sinus and optic and trochlear nerves; superiorly by the inferior surface of the temporal lobe of the brain; and posteriorly by the brain stem

Trigeminal Nerve/Ganglion Blockade

- Anatomy:
  - Contains sensory and motor fibers of the face, nasal and oral mucosa, teeth, and anterior two thirds of the tongue
  - Communicates with the autonomic nervous system via the ciliary, sphenopalatine, otic, and submaxillary ganglion
  - Communicates with the oculomotor, facial, and glossopharyngeal nerves
Trigeminal Nerve/Ganglion Block

- Headache indications:
  - Migraine headaches
  - Cluster headache
Complications

- High spinal
- Intracranial bleed
- Meningitis
- Hematoma
- Intravascular injection
- RFTC
  - Weakness of the muscles of mastication
  - Numbness
  - Anesthesia dolorosa

- Examined the effect of a combined SON + supratrochlear nerve (STN) block on acute headache in 70 women with migraine, using lidocaine 2% and epinephrine. Acute attack symptoms were relieved in 82% of the subjects, and the therapeutic effect was complete within 10-15 minutes of the injections.

Percutaneous Retrogasserian Glycerol Rhizolysis for Treatment of Chronic Intractable Cluster Headaches: Long-term Results

- Prospective, consecutive series, 18 patients with intractable CH were followed for a mean of 5.2 years (range, 40–78 mo) after they had undergone PRGR, performed using a standard technique. The significance of this technique as an alternative to PRFR is that it should result in a lower rate of both corneal and facial anesthesia and provide an acceptable degree of pain relief.

- Fifteen patients (83%) obtained immediate pain relief after one or two injections; the majority of them experienced relief after the first injection. CH recurred in seven patients (39%) over the course of the study. Two of these patients received a second injection, and both met with equal success. The overall daily headache frequency decreased from 3.5 ± 0.3 attacks per day preoperatively to 0.6 ± 0.2 attacks per day at last follow-up. The severity of these headaches, as assessed by verbal pain scales, also decreased from 10 preoperatively to 4.4 ± 1.4 at follow-up.
Long-term Results of Radiofrequency Rhizotomy in the Treatment of Cluster Headache
Jamal M Taha MD, John M Tew Jr MD
Headache 1995;35:193-6

- Retrospective review of seven patients (ages 36 to 68 years) with chronic cluster headache who responded to percutaneous stereotactic radiofrequency rhizotomy after medical treatment failed. All patients had immediate pain relief after surgery.

- At follow-up (median 5 years, range 2 to 20 years), two patients remained pain-free 7 and 20 years later (excellent results); three patients had mild pain recurrence that was well controlled on medications (good results) 6 to 12 months after surgery; and two patients had major pain recurrence 4 days and 2 months after surgery (poor results). One patient had transient diplopia and keratitis without permanent sequelae.

- There was no association between patient age or sex, pain duration, preoperative response to lidocaine blockade, or previous surgery with pain relief.

- The authors conclude that
  - (1) Some patients with chronic cluster headache treated by percutaneous stereotactic radiofrequency rhizotomy achieve long-term pain relief

Mechanism of Action

- May be related to:

  - Interruption of the trigeminocephalic system
  - Appears to be at the level of the trigeminal nerve and/or ganglion and might involve effects on areas of demyelination in damaged, presumably nociceptive axons
Botulinum Toxin

Botox Studies

The role of botulinum toxin in management of pain: an evidence-based review
Enisela Germera, Anders Fuglsang-Frederiksen and Troels S. Jensen

<table>
<thead>
<tr>
<th>Study</th>
<th>Patients</th>
<th>Treatment</th>
<th>Primary Endpoint</th>
<th>Follow-up</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathew et al. [49]</td>
<td>80 patients with chronic migraine</td>
<td>BOTOX 1000 units (100 U per site)</td>
<td>Headache frequency and duration of attacks</td>
<td>1, 3, 6, and 9 months</td>
<td>Similar effect, BOTOX better tolerated</td>
</tr>
<tr>
<td>Rhoton et al. [51]</td>
<td>60 patients with chronic TTH</td>
<td>50%</td>
<td>Headache frequency and duration of attacks</td>
<td>4, 8, and 12 weeks</td>
<td>Negative</td>
</tr>
<tr>
<td>Schule-Matin et al. [53]</td>
<td>113 patients with TTH</td>
<td>50 U</td>
<td>Headache intensity on a daily basis</td>
<td>12 weeks</td>
<td>Negative</td>
</tr>
<tr>
<td>Paez et al. [54]</td>
<td>40 patients with chronic TTH</td>
<td>100 U</td>
<td>Headache intensity, mean number of headache days, and number of days on which symptomatic treatment was taken</td>
<td>4, 8, and 12 weeks</td>
<td>Negative</td>
</tr>
<tr>
<td>Silverstein et al. [55]</td>
<td>300 patients with chronic TTH</td>
<td>50, 100, and 150 U</td>
<td>Mean change from baseline in the number of TTH headache days per month</td>
<td>60 and 90 days</td>
<td>Negative</td>
</tr>
<tr>
<td>Hadlow et al. [56]</td>
<td>23 patients with TTH and trigger points</td>
<td>Botulinum toxin A 40 U per site/week</td>
<td>Headache frequency, intensity, and duration of attacks</td>
<td>2 weeks, 1 month, 2 months, and 3 months</td>
<td>Negative</td>
</tr>
<tr>
<td>Handy et al. [57]</td>
<td>26 patients with chronic TTH</td>
<td>Botulinum toxin A 2-12 U/kg</td>
<td>Headache days per month, headache intensity</td>
<td>30 and 90 days</td>
<td>Negative</td>
</tr>
</tbody>
</table>

Current Opinion in Anaesthesiology 2010, 23:602—610
A multicentre, double-blind, randomized, placebo-controlled, parallel group study of multiple treatments of botulinum toxin type A (BoNT/A) for the prophylaxis of episodic migraine headaches

M Reijjä, AC Poole, J Schoenen, J Pasqualetti, X Lei & C Thompson for the European BoNT/A Headache Study Group

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Cephalalgia

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Our aim was to evaluate the safety and efficacy of botulinum toxin type A (BoNT/A; BOTOX®) for prophylaxis of episodic migraine. In this double-blind, placebo-controlled study, patients were randomized to 225, 130 or 75 U of BoNTA or placebo after a 30-day placebo run-in for three 90-day treatment cycles. The primary efficacy endpoint was the mean reduction from baseline in the frequency of migraine episodes at day 180 in the placebo non-responder stratum. All groups (N=455) improved, with no significant differences. At day 180, the frequency of migraine episodes was reduced from baseline means of 4.3, 4.7, 4.2 and 4.4 by 1.6, 1.2, 1.5 and 1.4 for BoNTA 225 U, 150 U and 75 U and placebo, respectively. The primary endpoint was not met. Treatment-related adverse events were transient and mild to moderate. BoNTA treatment was safe and well tolerated but did not result in significantly greater improvement than placebo in this study. Several factors may have confounded the results. Botoxum toxin type A, episodic migraine, prophylaxis.

OnabotulinumtoxinA for treatment of chronic migraine: Results from the double-blind, randomized, placebo-controlled phase of the PREEMPT I trial

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Abstract

Objective: This is the first of a pair of studies designed to assess efficacy, safety and tolerability of onabotulinumtoxinA (BOTOX®) as headache prophylaxis in adults with chronic migraine.

Methods: The Phase III REsearch Evaluating Migraine Prophylaxis Therapy 1 (PREEMPT 1) is a phase 3 study, with a 24-week, double-blind, parallel-group, placebo-controlled phase followed by a 32-week, open-label phase. Subjects were randomized (1:1) to injections every 12 weeks of onabotulinumtoxinA (155U–155U; n=344) or placebo (n=338) (two cycles). The primary endpoint was mean change from baseline in headache episode frequency at week 24.

Results: No significant between-group difference for onabotulinumtoxinA versus placebo was observed for the primary endpoint, headache episodes (<5.2 vs. <5.3; p=0.344). Large within-group decreases from baseline were observed for all efficacy variables. Significant between-group differences for onabotulinumtoxinA were observed for the secondary endpoints, headache days (p=0.006) and migraine days (p=0.002). OnabotulinumtoxinA was safe and well tolerated, with few treatment-related adverse events. Few subjects discontinued due to adverse events.

Conclusions: There was no between-group difference for the primary endpoint, headache episodes. However, significant reductions from baseline were observed for onabotulinumtoxinA for headache and migraine days, cumulative hours of headache on headache days and frequency of moderate/severe headache days, which in turn reduced the burden of illness in adults with disabling chronic migraine.
OnabotulinumtoxinA for treatment of chronic migraine: Results from the double-blind, randomized, placebo-controlled phase of the PREEMPT 2 trial

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Abstract

Objective: This is the second of a pair of studies designed to evaluate the efficacy and safety of onabotulinumtoxinA (BOTOX®) for prophylaxis of headaches in adults with chronic migraine.

Methods: PREEMPT 2 was a phase 3 study, with a 24-week, double-blind, placebo-controlled phase, followed by a 32-week, open-label phase. Subjects were randomized (1:1) to injections of onabotulinumtoxinA (155U-195U) n = 347, or placebo (n = 358) every 12 weeks for two cycles. The primary efficacy endpoint was mean change in headache days per 28 days from baseline to weeks 21-24 post-treatment.

Results: OnabotulinumtoxinA was matrically significantly superior to placebo for the primary endpoint, frequency of headache days per 28 days relative to baseline (−6.9 onabotulinumtoxinA, −6.7 placebo, p < .001). OnabotulinumtoxinA was significantly favored in all secondary endpoint comparisons. OnabotulinumtoxinA was safe and well tolerated, with few treatment-related adverse events. Few patients (2.5% onabotulinumtoxinA, 4.6% placebo) discontinued due to adverse events.

Conclusions: The results of PREEMPT 2 demonstrate that onabotulinumtoxinA is effective for prophylaxis of headache in adults with chronic migraine. Repeated onabotulinumtoxinA treatments were safe and well tolerated.
OnabotulinumtoxinA for Treatment of Chronic Migraine: Pooled Results From the Double-Blind, Randomized, Placebo-Controlled Phases of the PREEMPT Clinical Program

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Objective.—To assess the efficacy, safety, and tolerability of onabotulinumtoxinA (BOTOX®) as headache prophylaxis in adults with chronic migraine.

Conclusions.—The pooled PREEMPT results demonstrate that onabotulinumtoxinA is an effective prophylactic treatment for chronic migraine. OnabotulinumtoxinA resulted in significant improvements compared with placebo in multiple headache symptom measures, and significantly reduced headache-related disability and improved functioning, vitality, and overall health-related quality of life. Repeat treatments with onabotulinumtoxinA were safe and well tolerated.

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Botulinum Toxin

- Proposed mechanism of action for preventing migraines
- OnabotulinumtoxinA is thought to block peripheral signals to the central nervous system and indirectly inhibit central sensitization, leading to headache prophylaxis

Occipital Nerve Blocks in Postconcussive Headaches
A Retrospective Review and Report of Ten Patients

Jeffrey S. Hecht, MD

Headaches are common following traumatic brain injuries of all severities. Pain generators may be in the head itself or the neck. Headache assessment is discussed. Diagnosis and treatment of cervical headaches syndromes and, in particular, occipital neuralgia are reviewed. Finally, a retrospective study of 10 postconcussive patients with headaches who were treated with greater occipital nerve blocks is presented. Following the injection(s), 80% had a “good” response and 20% had a “partial” response. Occipital nerve block is a useful diagnostic and treatment modality in the setting of postconcussive headaches. **Key words:** brain concussion, brain injuries, cervicogenic headache, headache, head injuries, occipital nerve block, occipital neuralgia, pain therapy, postconcussive syndrome, whiplash
I only had enough room to go up to 2012.

Ha! That’ll freak somebody out someday.

Thank You