CERVICAL MEDIAL BRANCH BLOCKS

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DEFINITION

• Diagnostic procedure to test if patient’s pain is mediated by one or more medial branches of the cervical dorsal rami.
• Involves anesthetizing the target nerve with a small volume of local anesthetic in an effort to relieve the patient’s pain.
Interruption Of Pain Pathways In The Treatment Of The Cervical Syndrome

Menno E. Sluijter, MD, Consultant Anaesthetist and Cobie C. Koetsveld-Baart, MD, The Pain Relief Unit, Lutherse Diakonessen Ziekenhuis, Amsterdam, Holland*


- **upper syndrome**
  - pain radiating towards the occipital region, with in the C2 or in the C3 dermatome or in both.
- **lower syndrome**
  - radiating to one or both shoulders or arms and hands
- Preliminary block of the posterior primary rami
- Percutaneous facet denervation was performed
  - One lesion near origin of posterior primary ramus
  - Percutaneous selective dorsal root lesion (DRG)
The facet joints recognized as a source of pain seems to be true for the cervical area.

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*Anaesthesia, 1980, Volume 35, pages 302-307*

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<th>Level of Lesion</th>
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<th>C6</th>
<th>C7</th>
<th>C8</th>
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<td>Good</td>
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<td>Poor</td>
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<td>Lower Syndrome</td>
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<td>Total</td>
<td>20 (100%)</td>
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On The Concept Of Third Occipital Headache

NIKOLAI BOGDUK, ANTHONY MARSLAND

Journal of Neurology, Neurosurgery, and Psychiatry 1986;49:775-780

• First report of the diagnostic utility of cervical medial branch blocks was in the context of headache.
• 10 Patients presenting with occipital or suboccipital headache
• Diagnostic and confirmatory blocks of TON
• 7/10 complete relief of all pain for the duration of action of local anesthetic (Bupivacaine)

• Subsequent blocks reproduced exactly the same relief.

"One of the putative causes of headache is osteoarthritis of the C2-3 zygapophysial joint"
The Cervical Zygapophysial Joints As A Source Of Neck Pain
Nikolai Bogduk, Anthony Marsland Spine 1988;13:610-617

- First report of medial branch blocks at all cervical levels
- 24 patients with idiopathic neck pain
- Upper cervical pain - TON, C3, C4, C2 ganglion
- Lower cervical pain - C5-6, C4, C7
The Cervical Zygapophysial Joints As A Source of Neck Pain
Nikolai Bogduk, Anthony Marsland Spine 1988;13:610-617

- 17/24 Complete (100%) temporary relief
- “Prima facie evidence of a substantial incidence of zygapophysial pain syndromes”
Cervical Zygapophyseal Joint Pain Patterns I: A Study In Normal Volunteers

- 4 asymptomatic consenting physicians
- 1 physician with a history of neck pain
- Cervical facet joints injected with contrast medium until pain was elicited
- Areas of tenderness marked on the skin
- The first volunteer had all joint from C2-3 to C6-7 injected on separate occasions at intervals of about 1 week
- The others had 1 or 3 joints injected at a time
Aprill C, Bogduk N. Spine 1992;17:744-747

- 318 patients with neck pain
  - 182 discography
  - 52 facet blocks
  - 76 both procedures
- 82/126 (65%) investigated with facet blocks proved positive i.e. >2X placebo response
- The actual prevalence between 26% to 63%.
- Cervical facet joint pain exits and is not rare
Third Occipital Nerve Headache: A Prevalence Study
Susan M Lord, Les Barmsley, Barbara J Wallis, Nikolai Bogduk

• 100 patients with chronic neck pain after whiplash.
  – 40% headache dominant complaint
• Double blind, controlled diagnostic blocks of the third occipital nerve either lignocaine or bupivacaine
• Positive response – complete relief and longer response with bupivacaine
• 27% (95% confidence interval (95% CI) 18–36%) prevalence of third occipital nerve headache among all 100 patients
• 53% (95% CI 37–68%) prevalence among those with dominant headache
• Third occipital nerve headache is a common condition in patients with chronic neck pain and headache after whiplash
68 patients with chronic neck pain after whiplash.

Dominant feature headache first screened with comparative blocks of C2-3

Negative response or dominant neck pain had placebo controlled local anesthetic blocks of other facet joints

50% prevalence of C2-3 facet joint pain with dominant headache

49% prevalence of lower cervical facet joint pain without C2-3 pain

60% (95% confidence interval 46%, 73%) overall prevalence of cervical facet pain (C2-3 or below)
92 cases reviewed

68/92 (74%) prevalence of cervical facet joint pain in this study of drivers in motor vehicle accidents injured at high speeds
- C2/3 (34%)
- C5/6 (32%)

Conclusion: cervical facet joint pain common among patients with chronic neck pain after whiplash and of major clinical importance.
Cervical Zygapophysial (Z) Joints
C3-C7 Medial Branch of Dorsal Ramus
QuickTime™ and a decompressor are needed to see this picture.
PATIENT SELECTION

• No clinical features or imaging studies correlate
• Cervical zygapophysial joints most likely source of pain on the basis of pre-test probability (prevalence)
• If distribution of pain coincides with known pain referral patterns (studies in normal volunteers)
  – Where the pain starts
  – Pain is most consistent
  – Pain’s greatest intensity
PATIENT SELECTION

• Exclude serious possible causes for neck pain
  • Infection
  • Tumor
  • Vascular
  • Metabolic disease
CONTRAINDICATIONS

• Absolute
  – Patient not able to give consent
  – Allergy to injectates (local anesthetic, contrast)
  – Local/systemic infection
  – Bleeding diathesis (include anticoagulants)
  – Inability to assess patient response to the procedure
  – Patient unable to remain still during the procedure
  – Anatomical derangements (i.e. congenital or surgical)
  – Pregnancy
CONTRAINDICATIONS

• Relative
  – Comorbidities producing cardiovascular, neurological or respiratory compromise
  – Immunosuppression
General Requirements

• C-arm fluoroscopy
• Radiolucent procedure table
  – Prone and Lateral positioning
• Sterile preparation and drapes
• #22 or #25 Gauge needles
• Non-ionic contrast medium
• Local anesthetic
  – Lidocaine 2 or 4%
  – Bupivacaine 0.5 %
• Monitors and IV access
• Emergency supplies
Longitudinal Bisector  High, Mid, Low Points
C3-4 to C5-6 target is centroid of the articular pillar
INJECTION

Once needle is in correct position
• Inject non-ionic contrast 0.1-0.3 ml to ensure no venous uptake
• Inject 0.3 - 0.5 mls local anesthetic
Validity

- Face validity
- Construct validity
Face Validity

The extent to which a block actually blocks what it purports to block and no other confounding structure (adjacent muscles)
Face Validity of Cervical Medial Branch Blocks

Barnsley L, Bogduk N. Medial branch blocks are specific for the diagnosis of cervical zygapophysial joint pain. Regional Anesthesia 1993;18:343-350

- 16 pts with neck pain-MBB
- 0.5 mls contrast to map spread
- Never spread to
  - ventral ramus,
  - beyond medial fibers of semispinalis capitis
  - adjacent medial branches
- No other structure consistently in field of contrast

“The local anesthetic always reaches the target nerve and does not affect any other diagnostically important structures”
Construct Validity

• Diagnostic blocks correctly discriminate true responses from false responses to an acceptable level of statistical certainty.
False-Positive Rates of Cervical Zygapophysial Joint Blocks

- Comparison between single diagnostic blocks and a criterion standard of double-blind, controlled, differential anesthetic blocks.
- 55 patients with neck pain after MVA
- Initial positive response to MBB-Bupivacaine 0.5% or Lidocaine 2%
- Duration of pain relief assess in a double-blind fashion.
- Procedure was repeated with the complementary anesthetic.
False-Positive Rates of Cervical Zygapophysial Joint Blocks

**Patterns of Response**

- **Concordant** - True positive response
  - Bupivacaine > lidocaine, expected duration of both
- **Discordant**
  - Lidocaine > Bupivacaine, expected duration of either
- **Discrepant** - true negative
  - No relief obtained on second block of same nerves
- **True negative** - neither agent afforded any relief of pain
False-Positive Rates of Cervical Zygapophysial Joint Blocks

- True positive- concordant response only
- 27% (95% confidence interval 15%, 38%) false-positive rate of single blocks (16/60)
- Uncontrolled diagnostic blocks are compromised by a significant false-positive rate that seriously detracts from the specificity of the test.
Do comparative blocks satisfy construct validity?
Can patients differentiate between Bupivacaine and Lidocaine based on duration of block?
Comparative Local Anaesthetic Blocks in the Diagnosis of Cervical Zygapophysial Joint Pain.

- 47 patients with chronic neck pain following whiplash injury.
- MBB with Bupivacaine 0.5% and Lidocaine 2%
- Patients' responses were assessed in a double-blind fashion.
- Positive response followed by repeat block with complementary anaesthetic.
- True-positive = concordant responses
- 34/44 had longer pain relief from bupivacaine
- P = 0.0002 against this result occurring by chance
- Comparative, diagnostic blocks are a valid technique in the identification of painful zygapophysial joints, and constitute an implementable alternative to normal saline controls.
The Utility of Comparative Local Anesthetic Blocks Versus Placebo-Controlled Blocks for the Diagnosis of Cervical Zygapophysial Joint Pain


- 50 patients with chronic neck pain after MVA
- Initial positive response to cervical MBB
- 3 blocks - randomly assigned, double-blind conditions
  - lidocaine, bupivacaine or saline
### Responses To Comparative and Placebo Blocks

<table>
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<tr>
<th>Response Group</th>
<th>Placebo Negative</th>
<th>Placebo Responder</th>
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<tbody>
<tr>
<td>Concordant</td>
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<td>3</td>
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<tr>
<td>Discordant</td>
<td>11</td>
<td>6</td>
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<tr>
<td>Discrepant</td>
<td>6</td>
<td>11</td>
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The Utility of Comparative Local Anesthetic Blocks Versus Placebo-Controlled Blocks for the Diagnosis of Cervical Zygapophysial Joint Pain

**Comparative Blocks**
Positive = Concordant Response

- 88% specificity - few false positives
- 54% sensitivity - high false negatives
- 65% of discordant responders survive challenge with placebo
Comparative Block
Positive = Concordant and Discordant Responders

- 65% specificity
- 100% sensitivity
- Use of comparative or placebo controlled blocks depends on implications of the result obtained

The Utility of Comparative Local Anesthetic Blocks Versus Placebo-Controlled Blocks for the Diagnosis of Cervical Zygapophysial Joint Pain
Cervical Medical Branch Blocks

• Cervical zygapophysial joint pain as source of neck and headache pain supported by literature
• Cervical medial branch blocks are valid diagnostic blocks to identify Z joints as contributing to neck and headache pain
• Technique requires accurate needle placement, confirmation with contrast dye and use of low volume local anesthetic
• Validity
  – Face validity satisfied
  – Construct validity - balance between definition of positive response vs false negative result denying treatment to patients with Z joint pain