Orofacial Neuropathy: Diagnosis and Treatment

Disclosure

• Nothing to disclose.

Orofacial Pain
Pain which is felt in the mouth, jaws and the face.

More than 1 in 6 adults experienced orofacial pain in the past year

JADA 2015 146; 721
Diagnostic Categories

- Intraoral
- Muscular
- Temporomandibular joint disorders
- Headache disorders
- Extracranial
- Intracranial
- Thoracic
- Neuropathic

Intraoral pain
Est. 95% of orofacial pain is of dental origin

- Dental caries
- Pulpitis, pulpal necrosis, and periapical infection
- Periodontal disease
  - Periodontium
  - Mucogingival
  - Pericoronitis associated with erupting teeth
- Mucosal
  - Mucositis

Cracked tooth syndrome
Mimics neuropathic pain

Cracked tooth symptoms

- Generalized facial pain or discomfort
- Severe stabbing lancinating pain when biting
- Paroxysmal pain
- Sensitivity to hot and/or cold
- Sensitivity to chemical changes (sweet or acidic)
- Pain may be worse immediately after release of biting pressure on tooth
Cracked tooth Imaging

- Dental X-ray
- Hospital CT
- High resolution cone beam CT with custom sections

Cracked tooth examination

- Clinical evaluation
  - Visual exam
  - Percussion
  - Sharp point exploration
  - Thermal testing
  - Dye
  - Pulp testing
  - Transillumination
  - Chewing/biting tests
  - Tooth sleuth

Muscle Pain

- Palpation pain in characteristic locations:
  + Masseter, SCM, splenius capitus, upper traps, anterior temporalis
- Negative laboratory and radiographic findings
- Clinical presentation may resemble neuropathic pain
Diagnostic tests

- Spray and stretch reduces pain
- Trigger point injections

48 year old female with left side facial pain

Right TM joint | Left TM joint

Imaging
- CBCT
- Remodeling and loss of cortical bone
- Subchondral cysts
- Osteophytic activity
- Consistent with osteoarthritis

TM Joint disorders

- Arthritides in TMD
  - Osteoarthritis
  - Rheumatoid arthritis
  - Psoriatic arthritis
  - Internal derangements
  - Disc displacement with or without reduction

Treatment should be specific to the disorder
Intracranial

• Vascular
   • Aneurism
   • Hemorrhage
   • Hematoma
   • Edema

• Nonvascular
   • Neoplasms
   • Edema

• Other
   • MS plaque
   • Posttraumatic changes
   • Meningioma

Intracranial facial pain disorders
Extracranial Causes of Orofacial Pain and Headaches

- Osteomyelitis
- Multiple myeloma
- Sickle cell disease
- Paget’s disease
- Osteoporosis
- Eosinophilic granuloma
- Histocytosis
- Osteoblastoma
- Metastatic tumors
- Carotid artery dissection
- Myofascial pain
- Otitis
- Salivary gland diseases
- Nasal / paranasal sinus complex
- Giant cell arteritis
- Thyroiditis
- Autoimmune disease: Lupus/MS
- Viral / bacterial infections

Other sources of facial pain

Thoracic

- Orofacial pain present in >25% of patients with infarct or artery dissection
  Med Post. 2011;64:575
- Jaw pain in 27% of women and 18% of men with myocardial infarction.
  Am J Crit Care. 2008;17:14-24
- Orofacial pain is the ONLY presenting symptom in 10% of patients with cardiac ischemia.
  J Am Dent Assoc. 2007;138:74
- Orofacial Neuropathy
Categorizing Neuropathies

- Dysesthesia, anesthesia, hyperalgesia, allodynia
- Movement disorders
- Peripheral neuropathies (outside of CNS)
- Central neuropathies (within the CNS)
- Painful/non-painful
  - Episodic
  - Continuous

Orofacial Neuropathic Pain

**Episodic**
- Trigeminal Neuralgia
- Glossopharyngeal Neuralgia
- Ophthalmoplegia
- Nervus Intermedius Neuralgia
- Superior Laryngeal Neuralgia

**Continuous**
- Peripheral Painful Traumatic Trigeminal Neuropathy
- Persistent Idiopathic Facial Pain
- Peripheral Neuritis
- Postherpetic Neuralgia
- Burning mouth syndrome

Diagnosis

- Neurological testing
- Topical anesthetic testing (20% benzocaine)
- Anesthetic blocks (1% lidocaine without vasoconstrictor)
  - starting peripherally moving centrally
- Brain MRI
  - With and without contrast with additional sections through the posterior cranial fossa especially the cerebellopontine angle.
Trigeminal neuralgia management

- Surgical
- Oral medication
- Topical medications
- Botox

Surgical interventions

- Microvascular decompression
  - World Neurosurg. 2017;103:757
  - Percutaneous balloon compression Neurosurg Clin N Am. 2017;28:429
- Ablative procedures
  - Radio frequency ablation
  - Glyceral injections
  - Cryotherapy
- Stereotactic
  - Gamma knife (Neurosurgery. 2005;56:1295)
  - Linear accelerator (Neurosurgery. 2005;57:1198)

Medication Management of neuralgias and painful neuropathies

- Baseline blood testing
  - CBC
  - Electrolytes
  - Metabolic Panel
  - Renal function
  - Hepatic function
<table>
<thead>
<tr>
<th>Medications</th>
<th>Dosage</th>
<th>Side Effects (partial list)</th>
<th>Notes</th>
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<tr>
<td>Carbamazepine</td>
<td>200-800 mg bid</td>
<td>Stevens-Johnson Syndrome</td>
<td>HF testing</td>
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<tr>
<td>(Tegretol)</td>
<td></td>
<td>Erythema multiforme</td>
<td>HLA B1502 screen</td>
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<td>Hepatotoxicity</td>
<td>Behavior changes</td>
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<td>WD seizures if abrupt</td>
<td></td>
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<tr>
<td>Oxcarbazepine</td>
<td>150-1200 mg bid</td>
<td>Hyponatremia</td>
<td>Electrolyte testing</td>
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<tr>
<td>(Trileptal)</td>
<td></td>
<td>S-J Syndrome</td>
<td>HLA B1502 screen</td>
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<tr>
<td></td>
<td></td>
<td>WD seizures if abrupt</td>
<td>Behavior changes</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>300-1200 mg bid</td>
<td>Fatigue, S-J Syndrome</td>
<td>Cr at baseline</td>
</tr>
<tr>
<td>(Neurontin)</td>
<td></td>
<td>WD seizures if abrupt</td>
<td></td>
</tr>
<tr>
<td>Pregabalin</td>
<td>150-300 mg bid</td>
<td>Dizziness, weight gain</td>
<td>Cr at baseline</td>
</tr>
<tr>
<td>(Lyrica)</td>
<td></td>
<td>WD seizures if abrupt</td>
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Other oral meds for orofacial neuropathy

- Tricyclic antidepressants
  - amitriptyline or nortriptyline
- Phenytion
- Topiramate
- Memantine
- Phentolamine
- Clonazepam

78 year old female

- Routine dental exam 18 mos. ago
- Tooth #30 was painless but dx: cracked tooth
- Crown #30
- Continuous aching pain four months. normal x-ray
- Endodontic procedure completed
- Severe burning continuous pain
- Wants #30 extracted ➔
- O Surg. referred to OFP

IASP: PTTN
Painful Traumatic Trigeminal Neuropathy
Painful post-traumatic trigeminal neuropathy

- Phantom tooth pain
- Atypical odontalgia
- Atypical facial pain
- Persistent dentoalveolar pain
- Peripheral painful traumatic trigeminal neuropathy
- Persistent idiopathic orofacial pain


Persistent severe pain after root canal injury from sodium hypochlorite irrigation

- Started during root canal therapy
- While irrigating with NaOCl patient experienced sudden sharp burning pain
- Rapid facial swelling and profuse bleeding from endodontic access
- For over a week pain continued unchanged
Six months later

- Pain varies in intensity 5-9/10
- More painful after exposure to cold

Examination

- Redness of left cheek and left ear
- Left eye is a somewhat red and effusive

- 80% decrease in sensation of left side CN V1 and CN V2 compared to right side
- 20% decrease in sensation of left side CN V3 compared to right side

SYNAPSE!
Additional Testing

- Cotton-tipped applicator
- Gently touch gingiva in labial vestibule
- Gently stroke gingiva in labial vestibule
- 20% topical benzocaine
- Shallow infiltration with 9 mg lidocaine 2% without epinephrine

ADDITIONAL TESTING

Static mechanical allodynia
Peripheral sensitization

ADDITIONAL TESTING

Dynamic mechanical allodynia
Central sensitization
Anesthetic Testing

Topical benzocaine decreased pain from 8 to 6/10
Lidocaine injection decreased pain from 6 to 3/10

Diagnoses

- Peripheral sensitization
  - Static mechanical allodynia
  - Pain reduction after anesthetic Dx testing
- Central sensitization
  - Dynamic mechanical allodynia
  - Residual pain after anesthetic Dx testing
- Sympathetically mediated pain
  - Autonomic features
  - More pain after exposure to cold
  - Residual pain after lidocaine injection
- Post-Traumatic Trigeminal Neuropathy

Matthews J, Merrill R. J Am Dent Assoc 145:514

Plan

- Neurosensory stent
  - Capsaicin 0.025%
  - Orabase (Benzocaine 20%)

Pt was instructed to wear the stent Full time and re-apply medication Every 3 hours
Stent delivery

**Capsaicin**
- Repeated application of capsaicin can produce a persistent local effect on nociceptors
- Substance P depletion or defunctionalization
- Reduces spontaneous neuronal activity
- Loss of responsiveness to a wide range of sensory stimuli

54 year old female with persistent gingival pain 11 months after implants placed
- Two implants - mandibular left
- Continuous “Burning” gingival pain
- Sensitive to touch between #19 implant and tooth #20 (Static mechanical allodynia)
- Dx Test: 90% decrease in pain with topical 20% benzocaine

Pain was eliminated after 8 weeks wearing neurosensory stent and topical medication.
IMPLANT NEUROPATHY

Treatment and prognosis

- Topical medications
- Microsurgical repair
- Implant removal (when appropriate)
- Oral medication management

- Up to one third of nerve injuries resulting from implant placement never recover fully.


Various Mechanisms and symptoms

- Secondary to neuronal injury
  - Magnitude and duration of the injury
  - Mechanical deformation
  - Transection
  - Partial
  - Complete
  - Traumatic Neuroma formation
  - Ischemia
  - Vascular compression
  - Compartment syndrome

- Anesthesia
- Paresthesia
- Dysesthesia
- Allodynia
- Hyper- or Hypoalgesia

Neuroanatomy and gene expression

- A mandibular canal in the inferior aspect of the mandible may be more likely to have extensive arborization outside the inferior alveolar canal
- Genetic dimorphism including epigenetic phenomena
Other medications for the NS stent

Lidocaine
sodium channel blocker

Carbamazepine
Sodium channel blocker
• Membrane stabilizer
  • renders the Na⁺ channel more susceptible to blockade
  Rizzo M. J Neurosci 1997;152;105
  • Reduces NMDA signaling
  • GABA receptor agonist by inhibition of GABA-A and GABA-B receptors.
  Magnani V. J. Mel Neurosci 2006;18:89

Other medications for the NS stent
Chasing neuro receptors

• Gabapentin
  • Increases noradrenergic descending inhibition
  • Hiroki T. Anesth Analg 2017
  • Ca²⁺ Channel blocker, δ subunit
  • Dhand A. Brain 2014;137;313
  • Protects interneurons
  • Peng B. Neurosci Lett 2011;491;10
  • Reduces allodynia and hyperalgesia
Other medications for the NS stent
Chasing receptors

- Clonidine (0.01-0.02%)
- Alpha 2 receptor agonist
- Important where there is evidence of sympathetically mediated pain and Alpha-2C subtype expressed on c-fibers.

Other medications for the NS stent
Chasing receptors

- Ketamine (1-2%)
- NMDA receptor antagonist
- Reduces effects of substance-P (Tam E. Open Neurol J 2012;6:58)

Advantages of topicals

- Evade first-pass metabolism
- Targeted distribution
  - No titration, minimal systemic drug levels, little abuse potential
- Medically compromised patients
Pilot study of oral topical in neurosensory stent

- 39 patients
  - Deafferentation pain (PTTN)
  - Traumatic neuroma
  - Trigeminal neuralgia
- Assigned into three groups
  - Topical treatment only (12)
  - Systemic treatment only (10)
  - Combined topical + systemic (17)


Results

<table>
<thead>
<tr>
<th></th>
<th>Starting VAS</th>
<th>After Treatment VAS</th>
<th>Weeks to Max benefit</th>
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<tbody>
<tr>
<td>Combined Topical and Systemic</td>
<td>7.5 ± 0.403</td>
<td>3.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Systemic Only</td>
<td>8.6 ± 0.611</td>
<td>5.1</td>
<td>4</td>
</tr>
<tr>
<td>Topical Only</td>
<td>6.1 ± 0.716</td>
<td>3.6</td>
<td>3</td>
</tr>
</tbody>
</table>


Conclusions

- Topical medications
  - Used alone or in combination with systemic medications
  - Highly effective in providing rapid relief when compared to systemic medications alone

Other medications for Neuro-sensory stents

- 5% Ketoprofen
- 5% Gabapentin
- 2% Carbamazepine
- 1% Lidocaine
- 1% Ketamine
- 0.01% Clonidine

The carrier is crucial, work with your compounding pharmacist to achieve optimal absorption rate.

BOTOX for trigeminal neuralgia


Orofacial Pain

The first step toward successful treatment is accurate diagnosis.