

NIH Pain Consortium

Centers of Excellence in Pain Education



Burning Mouth Syndrome and Related Orofacial Pain

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Introduction

This module covers Burning Mouth Syndrome and related orofacial pain.

After completing this module, you should be able to:

- Describe the epidemiology of Burning Mouth Syndrome (BMS) and co-morbid conditions.
- Identify common differential orofacial pain disorders.
- Review the basic neuroanatomy of the mouth.
- Develop multidisciplinary treatment and monitoring plans for a simulated patient with BMS (Beverly).

The module features seven categories:

- Interview Beverly
- Physical Exam
- Systems Review
- Labs and Tests
- Medications
- Pain Center

- Additional Learning Resources

The following provides a description of the introduction to the patient, Beverly:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and describes her pain experience:

“It’s definitely, um, the roof of my mouth, the tongue especially, um, occasionally the sides. It’s become this thing that just won’t go away. And after having it for so long, I just keep thinking there has to be something that can be done.

Um, you know, one person said maybe it was thrush. Um, I take meds for my fibromyalgia and have dry mouth and so that was, you know, maybe that was what the problem was. My dentist suggested I put glycerin in my, um, water and stuff so that it would lubricate and maybe that would help.

When it first started, I had braces and so, um, that’s what I thought it was related to. Because I’d had some minor little problems along the way. Um, and when I went to him, he had no idea. He said, ‘You know, I,’ he knew I had a sinus infection and so he said, ‘I’m sure that’s just what the problem is.’ Um, and so I was really irritated with him, so I went to my dentist, who I’ve gone to for years, and she looked in and she really couldn’t see anything either. Um, and so I was like, ‘Okay.’

Um, and then a couple weeks later, um, I went in and I saw my rheumatologist, um, I have Fibromyalgia, and she looked at my mouth, and she said, you know, she could tell it was red, um, and that it was inflamed. And she was surprised that, um, that neither of the dentists, you know, really did much about it. Um, and so then she’s the one that suggested I look into pain management.”

Interview Beverly

Interview Subjects

Chief Complaint

The following provides a description of the video of Beverly describing her chief complaint:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to what brings her in for her appointment:

“Um, I just feel like crap. I have this pain and just doesn't go away. I can't figure out what it is. I don't know if it's the face. I don't know if it's the teeth. I've been to the dentist. Not getting much information there. So I'm just not sure what to do.”

What Makes the Pain Better

The following provides a description of the video of Beverly describing what makes her pain better:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to what makes the pain better:

“Sometimes a little better if I keep cold drinks by me. Um, especially if I go to the...stop and get a soda in the morning and it's got some ice in it. That will help. I know I have to stay away from spicy foods. That totally makes it worse.

Um, so I don't know that I've found anything that actually, um, makes it go away. But I guess I've just been living with it, and so if I have a day that, you know, it's there but I don't mind it, I just keep, you know, I keep going on. And I think that's why it took me so long before I ever decided there has to be something wrong.”

Description of Pain

The following provides a description of the video of Beverly describing her pain:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to how she would describe her pain:

“Well, it kind of reminded me of when I first started noticing it, I thought that maybe we had pizza. And you know how pizza gets really hot and cheese burns the top of your mouth? That’s exactly what I thought had happened.

So I thought, ‘Okay, this is going to go away in a few days.’ But it didn’t. And so then I thought, ‘Okay, well, maybe it’s because I’m, you know, I had that. Or maybe it’s some, uh, my husband has tomatoes; I’ve been eating a lot of tomatoes. I do pineapple, all sorts of stuff.’ So I thought well maybe it was citrus stuff.

Um, and I just could never figure out what it was. Um, and it just doesn’t go away. I gave up all that stuff and it, it’s just still there.”

What Makes the Pain Worse

The following provides a description of the video of Beverly describing what makes her pain worse:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to what makes the pain worse:

“Um, spicy foods. Acidic foods. Um, those things totally I have to watch. Which, food is supposed to be something people enjoy. You know, if we’re going, if my friends are going for Mexican, I know right off the bat I’m not going to enjoy myself at all. So I don’t even go.”

Location of Pain

The following provides a description of the video of Beverly describing the location of her pain:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to where she experiences her pain:

“Um, in the mouth. I would say that probably the areas that I notice the most are, well, like the roof of the mouth, like I said. Cause I thought that was related to burning it. Cause that's kind of how it feels, actually. It's felt exactly like when that cheese is so hot and it kind of scalds or burns the upper mouth, your roof of your mouth.

Um, and I notice my tongue really bothers me. Because I kept thinking, 'Well, maybe it's one of the little spots on my tongue.' And I had looked, you know, and I even thought at a point, you know, maybe it's canker sores. I get those. Um. And so I thought, you know. You know, I just kept trying to come up with all these different ideas of as to what it could be. But then it'd get maybe a little better. And, you know, I couldn't see the canker sores. I couldn't...I hadn't had pizza in a long time. I just couldn't figure out what in the world's going on.”

Duration of Pain

The following provides a description of the video of Beverly describing the duration of her pain:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to how long she's experienced her pain:

“Oh gosh. I guess probably at least a year.”

Beverly's Review of Systems

General

In general, Beverly has experienced no weight loss, fatigue, or fever.

CNS/Neuro

Beverly has experienced the following:

- no visual changes
- no confusion
- no loss of consciousness
- presence of anxiety
- presence of headaches
- presence of photophobia, or sensitivity to light
- presence of phonophobia, or sensitivity to sound
- no aura, or visual disturbance

Cardiovascular/Pulmonary

Beverly has experienced the following:

- no chest pain
- no shortness of breath
- no cough
- presence of heart palpitations

Gastrointestinal/Genitourinary

Beverly has experienced the following:

- no nausea or vomiting
- no constipation or diarrhea
- no melena
- no hematochezia
- no hematemesis
- no urinary frequency abnormalities, urinary urgency, urinary retention, or incontinence

Musculoskeletal/Extremities

Beverly has experienced the following:

- no swelling
- no weakness

Beverly's Labs and Tests

Beverly's labs and tests reveal the following:

- Sodium level is 136 mmol/L. Normal range for females is 135-146 mmol/L.
- Potassium level is 4.0 mmol/L. Normal range for females is 3.5-5.3 mmol/L.
- Chloride level is 100 mmol/L. Normal range for females is 98-110 mmol/L.
- Carbon dioxide level is 30 mmol/L. Normal range for females is 19-30 mmol/L.
- Blood urea nitrogen level is 12 mg/dL. Normal range for females is 7-20 mg/dL.
- Serum creatine level is 0.87 mg/dL. Normal range for females is 0.6-1.2 mg/dL.
- Calcium level is 9.9 mg/dL. Normal range for females is 8.8-10.4 mg/dL.
- Albumin level is 4/3 g/dL. Normal range for females is 3.6-5/1 g/dL.
- Bilirubin (total) level is 0.8 mg/dL. Normal range for females is 0.2-1.2 mg/dL.
- Alkaline phosphatase level is 95 U/L. Normal range for females is 33-115 U/L.
- Aspartate aminotransferase level is 25 U/L. Normal range for females is 10-40 U/L.

- Alanine aminotransferase level is 31 U/L. Normal range for females is 7-35 U/L.

Beverly has had a CT without contrast that showed negative within the previous thirty days.

Beverly's Medications

Beverly has no known drug allergies.

She currently takes the following medication:

- Acetaminophen, 500 mg tablets sig. 1 tab every four to six hours as needed. Click here to learn more about this medication:
<http://www.fda.gov/Drugs/DrugSafety/InformationbyDrugClass/ucm165107.htm>
- Citalopram 20 mg tablets sig. 1 tab every morning. Click here to learn more about this medication:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4204633/>
- Hydroxyzine HCl 25 mg tablets sig. 1 tab every six hours as needed. Click here to learn more about this medication:
<https://www.ncbi.nlm.nih.gov/pubmedhealth/PMHT0023966/?report=details>

Beverly's Physical Exam

In general, Beverly is alert and oriented to person, place, and time. Her affect and speech is appropriate.

Head, Eyes, Ears, Nose, and Throat examinations reveal the following:

- pupils equal, round, and reactive to light and accommodation (PERRLA)
- conjunctiva anicteric
- hyperopia corrected with glasses
- no lymphadenopathy

Cardiovascular/Pulmonary examinations reveal the following:

- no crackles, rales, rhonchi, or wheezes in the lungs
- regular heart rate and rhythm with no murmurs, gallops, or rubs

Gastrointestinal/Genitourinary examinations reveal the following:

- positive bowel sounds in all four quadrants

Extremities/CNS/Musculoskeletal examinations reveal the following:

- no cyanosis, edema, or jaundice
- normal strength and range of motion bilaterally
- normal deep tendon reflexes bilaterally

Interdisciplinary Pain Center

Pain Assessment

Pain Assessment Tools

Use the link immediately following the name of each pain assessment tool to learn more. Note that tools listed may be subject to individual copyright protections. They are listed here for informational purposes only.

Unidimensional Pain Assessment Tools:

- numeric pain rating scale:
<http://www.rehabmeasures.org/PDF%20Library/Numeric%20Pain%20Rating%20Scale%20Instructions.pdf>
- faces scale: <http://wongbakerfaces.org/>
- visual analog scale:
<http://www.partnersagainstpain.com/printouts/A7012AS1.pdf>
- verbal pain intensity scale:
<http://www.painedu.org/Downloads/NIPC/Pain%20Assessment%20Scales.pdf>

Multidimensional Pain Assessment Tools:

- Brief pain inventory:
http://www.npcrc.org/files/news/briefpain_short.pdf
- McGill pain questionnaire: <http://painmeded.com/wp-content/uploads/2016/10/McGill-Pain-Questionnaire-1-1.pdf>
- PADT:
<https://www.drugabuse.gov/sites/default/files/files/PainAssessmentDocumentationTool.pdf>

- West Haven-Yale MPI:

<http://www.va.gov/PAINMANAGEMENT/docs/WHYMPI.pdf>

Beverly's Pain Assessment

Beverly's information includes her first and last name, Beverly Martin, age 46, MRN# 001343, height sixty four inches, weight one hundred forty pounds, with no known allergies. Her insurance company is CMS.

Beverly reports the severity of her pain as follows:

- now: 4/10
- average: 6/10
- least: 1/10
- worst: 8/10

She reports no relief with current modalities.

Beverly rates how much pain interferes with daily activities as follows:

- activity: 5/10
- mood: 10/10
- walking: 0/10
- relations: 7/10
- concentration: 8/10
- sleep: 1/10
- enjoyment: 10/10
- appetite: 3/10
- work: 3/10

Beverly describes her pain characteristics as follows:

- onset: approximately one year ago
- duration: intensity/severity changes throughout the day with some location changes
- alleviating: some relief while eating
- aggravating: spicy foods

Psychosocial/Psychological Assessment and Evaluation

Beverly's Psychosocial Assessment:

Beverly's information includes her first and last name, Beverly Martin, age 46, MRN# 001343, height sixty four inches, weight one hundred forty pounds, with no known allergies. Her insurance company is CMS.

Beverly reports the distress relating to her pain as follows:

- Patient Health Questionnaire (PHQ-9): 14
- Hamilton Anxiety Rating Scale (HAMA): 18
- Beck Anxiety Inventory (BAI): 23

Beverly shows the following scores on her pain disability index:

- family/home responsibilities: 7
- recreation: 4
- social activity: 8
- occupation: 7
- sexual behavior: 7
- self-care: 3
- life supporting activities: 4

The following describes the scores for Beverly on the pain catastrophizing scale:¹

- I worry all the time about whether the pain will end: 1
- I feel I can't go on: 2
- It's terrible and I think it's never going to get any better: 1
- It's awful and I feel it overwhelms me: 2
- I feel I can't stand it anymore: 3
- I become afraid that the pain may get worse: 4
- I think of other painful experiences: 2
- I anxiously want the pain to go away: 2
- I can't seem to keep it out of my mind: 3
- I keep thinking about how much it hurts: 4
- I keep thinking about how badly I want the pain to stop: 2
- There is nothing I can do to reduce the intensity of the pain: 3
- I wonder whether something serious may happen: 4

¹ Note: the Pain Catastrophizing Scale is under copyright protection. Please seek permission before using.

Beverly's Psychological Evaluation

How Pain Affects Beverly's Life

The following provides a description of the video featuring Beverly describing how pain affects her life:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to what makes the pain worse:

"It affects everything. I, uh, it's amazing. I just feel like my life is so different now. Um, you know, I used to go out to lunch all the time with my friends at work. And, you know, now I only occasionally go out.

Um, you know, I used to be able to get my work done in a timely manner. And now I find that, you know, that if I have a bad day, then I really gotta catch up. You know, a couple days...it may take me a couple days. Because I just can't get past that pain. Um, you know, the job that I have as a librarian, I'm not up and moving around a lot."

Worst Pain Rating

The following provides a description of the video featuring Beverly rating her worst pain in the last forty eight hours:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to how she rates the worst pain she's felt in the past forty eight hours on a scale of zero to ten:

"Oh, wow. I had a bad day two days ago. And I'd say it was probably an eight. Um, yeah, it was just miserable. I had to work that day, and I had a lot of stuff to do. And it was all I could do to concentrate and not get that out of my mind. It just, um, it's hard for people to understand how frustrating it is to get no relief."

Least Pain Rating

The following provides a description of the video featuring Beverly rating the least pain she felt in the last forty eight hours:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to how she rates the least amount pain she's felt in the past forty eight hours on a scale of zero to ten:

"Occasionally maybe just a one, but I'd say it runs more on a two."

Average Pain Rating

The following provides a description of the video featuring Beverly rating her average pain in the last forty eight hours:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to how she rates the average amount of pain she's felt in the past forty eight hours on a scale of zero to ten:

"I'd say about a six. Um, you know, I mean it's, it's definitely, um, which is why I've come. It's, it's becoming this thing that just won't go away. And after having it for so long, I just keep thinking there has to be something that can be done."

Pain and Mood

The following provides a description of the video featuring Beverly describing how her pain affects her mood:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to whether the pain affects her mood in any way:

"I do get depressed. Um, you know I um, I try and do the best I can. Um, but I have to say this has been going on for a really long time. And nobody seems to know what the problem is. Nobody's been able to give me anything to help the problem. And so at some point, you know, is this in my mind? Um, in which case, you know, then I, it really makes me feel bad about myself, thinking that you know, could I possibly, you know, just be imagining all this?"

Daily Change in Pain

The following provides a description of the video featuring Beverly describing how her pain changes throughout the day:

Beverly's head and shoulders appear in the shot. She speaks directly to the viewer and says the following in response to how her pain changes throughout the day:

“Yeah, it does. It does. Um, you know, some days I'll get up and it won't be bad, and you know, all day long. And I'm like 'this is a good day!' And then the next day I get up and I start out a good day and then it just progresses and gets worse as the day goes on. Um, and some days I get up and it's just horrible all day.”

Diagnosis

Differential Diagnosis

Read through each of the following differential diagnosis for the listed orofacial pain disorders to learn more about their presentation.

Primary Burning Mouth Syndrome

Primary Burning Mouth Syndrome is a disease of exclusion without an obvious cause. Diagnosis follows:

- Oral screenings for cancer and candidiasis (poor oral hygiene, underlying medical condition, immunosuppression, a poorly fitting prosthesis, etc.)
- Medication reconciliation (reaction to new medication?)
- Allergy assessment (allergic reaction to a new toothpaste, home care product, or food?)
- Examining specific triggers (spicy foods, tomato sauce, cinnamon, mint, etc)
- Assessment of other medical conditions/life stressors that contribute psychosomatically

See “Secondary Burning Mouth Syndrome” for symptoms and location shared between both diagnoses.

Secondary Burning Mouth Syndrome

Symptoms:

Tingling, moderate to severe burning, numbness, xerostoma, dysgeusia, scalding, perceptions of foreign body in mouth.

Location:

Symmetrical / bilateral in most occurrences. Usually confined to the anterior 2/3 of the tongue dorsum, gingiva, lateral borders of the tongue, and the anterior hard palate.

Course:

Average time to diagnosis is 6 years. Typically spontaneous onset of symptoms with daily intensity varying depending on Type.

Types:

1. pain free upon awakening with worsening pain throughout the day.
2. continuous pain throughout the day, but absence of symptoms at night.
3. intermittent symptoms with pain-free days.

Glossopharyngeal Neuralgia

Symptoms:

Paroxysmal (abrupt, short attacks), stabbing, sharp, and/or shooting pain.

Location:

Posterior tongue, pharynx, lower jaw angle, ear, tonsillar fossa, and typically with unilateral distribution.

Course:

Paroxysms last seconds and are frequently trigger dependent. Symptoms are clustered for weeks to months, followed by periods of remission.

Trigeminal Neuralgia

Symptoms:

Abrupt, severe, stabbing, electric or “shock-like” pain.

Location:

Unilateral, confined to cranial nerve V (trigeminal nerve) and its three branches (ophthalmic, maxillary, and mandibular).

Course:

Symptoms typically brief and quickly arise and resolve (paroxysms) with some triggers and trigger zones described.

Post-Herpetic Neuralgia

Symptoms:

Burning, sharp, stabbing pain that is constant or intermittent. May be associated with allodynia and sensory deficits.

Location:

Unilateral, confined to affected dermatome(s), most commonly trigeminal, cervical, or thoracic.

Course:

May present as continued pain from original zoster rash or as long as months to years following a zoster episode.

Temporomandibular Disorder

Symptoms:

Dull, constant, aching, radiating pain associated with ear stiffness, pain, or fullness.

Location:

Unilateral with origin at the mandibular angle. Can radiate to the ear, eyes, and even posterior neck.

Course:

Waxes and wanes, with exacerbation following eating in most instances.

Diagnosis Review Questions

Review the following description of an orofacial pain disorder as described by a woman in her thirties and select the corresponding diagnosis.

“I’ve been having this awful pain that feels that something is, or someone is stabbing me at the back of my throat, and even the tongue on one side. Sometimes it feels as if it’s occurring in my ear. It seems like when I cough a lot I experience some of the pain. I think I’ve probably gone days and sometimes weeks without having any of the pain, but it will come back for really no rhyme or reason. When it does come back, it’s there anywhere from three to five times each day. It’s really bad and nothing that I have actually ever tried over the counter has really helped.”

1. [temporomandibular disorder](#)
2. [post-herpetic neuralgia](#)
3. [burning mouth syndrome](#)
4. [glossopharyngeal neuralgia](#)

Review the following description of an orofacial pain disorder as described by a man in his mid-forties and select the corresponding diagnosis.

“The pain is on the left side of my face and mouth. It feels like I’m being burned almost constantly. But sometimes it feels like I’m being stabbed. Some areas of my mouth are numb, but even a light touch on my cheek can really hurt. So this all started a couple months after I had the shingles.”

1. [temporomandibular disorder](#)
2. [post-herpetic neuralgia](#)
3. [burning mouth syndrome](#)
4. [glossopharyngeal neuralgia](#)

Review the following description of an orofacial pain disorder as described by a man in his early forties and select the corresponding diagnosis.

“I’ve been dealing with this pain for years. It’s more on the right side of my face than the left. It really hurts most right around where my jaw seems to be, especially when I eat. It’s really there almost constantly though. When it’s really bad, it seems like it even moves. I think I’m crazy, but sometimes I feel it behind my eye, and even sometimes behind my ear, like there’s something in there. If I to describe the pain, I would definitely say it’s achy and bothersome.”

1. [temporomandibular disorder](#)
2. [post-herpetic neuralgia](#)
3. [burning mouth syndrome](#)
4. [glossopharyngeal neuralgia](#)

Review the following description of an orofacial pain disorder as described by a woman in her late twenties and select the corresponding diagnosis.

“I’ve been dealing with this pain for almost six months. It feels like my entire mouth has been scalded, like I drank something that’s way too hot. It really burns. And it seems to get worse throughout the entire day. Sometimes it feels like its numb, or tingly. And the front part of my tongue and the roof of my mouth has the worst pain.”

1. [temporomandibular disorder](#)
2. [post-herpetic neuralgia](#)
3. [burning mouth syndrome](#)
4. [glossopharyngeal neuralgia](#)

Beverly's Diagnosis

How would you diagnose Beverly?

1. [Post-herpetic neuralgia](#)
2. [Organic etiology](#)
3. [Primary Burning Mouth Syndrome](#)
4. [Secondary Burning Mouth Syndrome](#)
5. [Temporomandibular Disorder](#)
6. [Glossopharyngeal Neuralgia](#)
7. [Trigeminal Neuralgia](#)

Treatment

Pharmacotherapy

Burning Mouth Syndrome

Burning Mouth Syndrome pharmacotherapies as follows:

Clonazepam

- Available as Klonopin®.
- long-acting benzodiazepine
- numerous FDA-approved indications, none pain related
- Efficacy for Burning Mouth Syndrome: open-label studies assessing topical clonazepam as a mouth wash (full text: <http://painmedicine.oxfordjournals.org/content/painmedicine/15/12/2164.full.pdf>) and oral tablet (abstract: <https://www.ncbi.nlm.nih.gov/pubmed/22344742>)
- Side effects: addiction, withdrawal related seizures, sedation, and cognitive impairment.

Clonazepam is classified by the Drug Enforcement Agency as a controlled substance, abusable by patients.

Gabapentin

- Available as Neurontin®, Gralise®, Horizant®, generic.
- Anticonvulsant in the gabapentin class that selectively inhibits $\alpha_2\delta$ calcium channels.
- FDA-approved for numerous pain-related conditions not including Burning Mouth Syndrome.

- Efficacy supported by one randomized, controlled study at doses of 300 mg daily (full text: http://www.medicinaoral.com/pubmed/medoralv16_i5_p635.pdf)
- Side effects: weight gain, ataxia, sedation. Must be renally dosed.

Paroxetine

- Available as generic.
- Anti-depressant medication. Exhibits selective serotonin reuptake inhibition.
- FDA indicated for numerous anxiety-related disorders, but nothing pain-related.
- Efficacy for Burning Mouth Syndrome supported by one, 12-week, open label study at doses of 10 - 20mg daily (abstract: <https://www.ncbi.nlm.nih.gov/pubmed/18996028>).
- Side effects: suicidal ideation, weight gain, sedation, sexual dysfunction, and hyponatremia.

Milnacipran

- Milnacipran (Savella®): FDA approved for the treatment of Fibromyalgia. Uses outside of this indication are considered off-label.
- Milnacipran is pharmacologically a serotonin & norepinephrine reuptake inhibitor.
- Efficacy for Burning Mouth Syndrome is supported by one open label study (abstract: <https://www.ncbi.nlm.nih.gov/pubmed/21738023>). Doses studied began at 30mg of milnacipran daily.
- Side effects: nausea, headache, weight gain, and sexual dysfunction.

Glossopharyngeal Neuralgia and Trigeminal Neuralgia

Both Glossopharyngeal Neuralgia and Trigeminal Neuralgia are treated similarly. The following pharmacotherapies can be used for both:

Carbamazepine

- Carbamazepine (CBZ): anticonvulsant with potent sodium channel inhibition.
- FDA-approved to treat Trigeminal Neuralgia.
(Trigeminal/Glossopharyngeal Neuralgia essentially treated identically.)
- CBZ is considered the treatment of choice for both conditions with guidelines supporting its use and reviewing numerous controlled studies (abstract: <https://www.ncbi.nlm.nih.gov/pubmed/18716236>).
- Numerous toxicities and side effects for CBZ exist.

Baclofen

- Baclofen: skeletal muscle relaxer with effects at the spinal cord level of primary afferent nerve terminals.
- FDA approved for spasticity due to multiple sclerosis or spinal cord injury.
- Efficacy for trigeminal neuralgia supported by a small, double-blinded cross-over study in doses up to 80mg daily (abstract: <https://www.ncbi.nlm.nih.gov/pubmed?term=6372646>).
- Side effects: headache, drowsiness, hypotension, and a severe sudden withdrawal syndrome.

Oxcarbazepine

- Oxcarbazepine (Trileptal®): anticonvulsant pharmacologically similar to carbamazepine as a potent sodium channel antagonist.
- Several randomized controlled studies exist to support similar efficacy of oxcarbazepine to carbamazepine for the treatment of trigeminal neuralgia (guidelines: <http://www.neurology.org/content/71/15/1183.full.pdf+html>).
- Side effects: similar with hyponatremia, drug rash, and aplastic anemia continuing to be of concern. Overall, fewer significant drug interactions exist with oxcarbazepine.

Lamotrigine

- Lamotrigine (Lamictal®): anticonvulsant. Actions include sodium channel antagonism and glutamate release inhibition.
- FDA approved for only bipolar disorder and certain epilepsies.
- Efficacy for trigeminal neuralgia supported by a small double-blind study (<https://www.ncbi.nlm.nih.gov/pubmed?term=9415509>) for adjunctive use and an open label study (<https://www.uptodate.com/contents/trigeminal-neuralgia/abstract/46?utdPopup=true>) for monotherapy.
- Side effects: increased liver enzymes and drug rash when titrated quickly. Significant drug interactions exist.

Post-Herpetic Neuralgia

Amitriptyline

- Amitriptyline: tricyclic antidepressant with pharmacologic properties of serotonin and norepinephrine reuptake inhibition.
- Frequently used to treat neuropathic pain syndromes. Not FDA approved for this use.
- Amitriptyline efficacy for post-herpetic neuralgia supported by several randomized controlled studies (review: <http://www.nejm.org/doi/pdf/10.1056/NEJMcp1403062>).
- Side effects: dry mouth, sedation, urinary retention, and QTc prolongation.

Gabapentin

- Gabapentin (Neurontin[®], Gralise[®], Horizont[®], generic): anticonvulsant in the gabapentinoid class that selectively inhibits $\alpha_2\delta$ calcium channels.
- FDA-approved for post-herpetic neuralgia.
- Efficacy supported by four randomized, controlled study at doses of 300mg daily (systematic review abstract: <https://www.ncbi.nlm.nih.gov/pubmed?term=24771480>).
- Side effects: weight gain, ataxia, sedation. Must be renally dosed.

Topical Lidocaine

- Topical lidocaine: available commercially in numerous preparations, including an FDA approved 5% patch to treat post-herpetic neuralgia.

- Lidocaine: antiarrhythmic. Pharmacologically acts as a potent sodium channel antagonist.
- 5% topical lidocaine patch may be worn over the site of zoster infection for 12 hours, with a 12 hour lidocaine-free period. Up to 3 patches may be worn concurrently.
- Side effects: generally limited to site reactions.

Pregabalin

- Pregabalin (Lyrica®): a gabapentinoid similar to gabapentin. Inhibits specific subtypes of the presynaptic calcium channel.
- FDA approved for numerous chronic pain conditions including post-herpetic neuralgia.
- Efficacy for post-herpetic neuralgia may be found in this review article: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3915349/>.
- Side effects: similar to gabapentin and include weight gain, edema, somnolence, and ataxia.
- Pregabalin must be renally dosed.

Temporomandibular Disorder

Few pharmacologic interventions have proven effective in well-controlled studies for chronic temporomandibular joint disorder.

Amitriptyline, naproxen, and cyclobenzaprine may provide limited benefit.

(Cochrane Review abstract:

<https://www.ncbi.nlm.nih.gov/pubmed?term=20927737>).

Pharmacotherapy Review Questions

Which pharmacotherapy can be best used to treat Burning Mouth Syndrome?

1. [amitriptyline](#)
2. [clonazepam](#)
3. [carbamazepine](#)
4. [cyclobenzaprine](#)

Which pharmacotherapy can be best used to treat Trigeminal Neuralgia?

1. [amitriptyline](#)
2. [clonazepam](#)
3. [carbamazepine](#)
4. [cyclobenzaprine](#)

Which pharmacotherapy can be best used to treat Post-Herpetic Neuralgia?

1. [amitriptyline](#)
2. [clonazepam](#)
3. [carbamazepine](#)
4. [cyclobenzaprine](#)

Which pharmacotherapy can be best used to treat Temporomandibular Disorder?

1. [amitriptyline](#)
2. [clonazepam](#)
3. [carbamazepine](#)
4. [cyclobenzaprine](#)

Dental Interventions

For Burning Mouth Syndrome:

- tongue protectors
- correction of parafunctional habits (repeated muscle movements)
- treatment of potential underlying causes (e.g., oral candidiasis or salivary dysfunction)
- correction of poorly fitting prosthesis

Counseling

For orofacial pain syndromes:

- individual or group education
- instruction on self-management therapies
- problem solving skills
- relaxation and biofeedback
- team conferences
- risk and adherence assessment

Complementary and Alternative Therapy

For Burning Mouth Syndrome:

- acupuncture (abstract:
<https://www.ncbi.nlm.nih.gov/pubmed/25987645>)
- lycopene enriched olive oil (abstract:
<https://www.ncbi.nlm.nih.gov/pubmed/24612248>)
- alpha lipoic acid (in combination with gabapentin; full text:
<https://www.ncbi.nlm.nih.gov/pubmed/27302545>)
- capsicum (capsaicin; full text review:
<https://www.ncbi.nlm.nih.gov/pubmed/21743415>)
- hypericum perforatum (full text review:
<https://www.ncbi.nlm.nih.gov/pubmed/18331283>)

Outcomes

Beverly was diagnosed with Type 2 Burning Mouth Syndrome after being ruled out for oral candidiasis and other common orofacial pain disorders.

She was referred to the psychologist / counselor at the interdisciplinary pain center for acceptance and coping therapy as well as cognitive behavioral therapy for her anxiety.

She was prescribed clonazepam 0.5mg dissolvable wafers to be used orally every 12 hours.

Her citalopram was discontinued and she was started on paroxetine 20mg tablets to be taken by mouth at bedtime.

She was provided patient educational materials on avoidance of aggravating factors and parafunctional habits.

She will begin acupuncture next week.

Learning Resources

The pathogenesis review begins with an overview of the trigeminal nerve.

Pathogenesis of Orofacial Pain

Trigeminal Nerve Overview

The following provides a description of the video overview of the trigeminal nerve:

The side view of a woman's face appears and starts to rotate toward the viewer. When the frontal view of the woman's face reaches the viewer, the skin becomes transparent to reveal the skull and select blood vessels and nerves underneath. The head then completes a rotation of one hundred eighty degrees. When the head reaches the opposite direction from its start, the skin remains translucent to show the skull, blood vessels, and nerves. Flashes of light travel along the nerves from the mouth toward the spinal cord before the image becomes a static side view of the face.

During this animation, the following audio plays:

“A cursory understanding of the innervation of the face and mouth is necessary. Many of the orofacial pain syndromes are unilateral in nature, owing to the related dermatome of the nerve or nerves involved.”

The side view of the face shows a red area to indicate the trigeminal nerve and its three branches, with the accompanying audio:

“Largely, the face and mouth are innervated by the fifth cranial nerve, or the trigeminal nerve.”

The side view of the face fades, to be replaced with two opposing transparent facial side views showing skull, blood vessels, and the trigeminal nerve. In both side views, the view can see the base of the trigeminal nerve in front of the ear on either side of the head. While the animation plays, the following audio accompanies it:

“There are two symmetrical trigeminal nerves that supply both sides of the face and mouth via three centric branches.”

Ophthalmic Branch (CN-V₁)

The following provides a description of the image of the ophthalmic branch of the trigeminal nerve, otherwise known as the fifth cranial nerve, branch one (CN-V₁):

The image shows the side of the face, with skin thinned to transparency to show the skull, and select blood vessels and nerves underneath. The trigeminal nerve appears yellow in color. The ophthalmic branch of the trigeminal nerve follows a path from in front of the ear, under the cheekbone, then directs upwards by the apple of the cheek to circle above the eye socket and back down toward the top of the nose.

The image shows a highlighted area that covers the very top of the nose where it attaches to the skull, the eye socket, and the area just around the eye socket. The highlighted area carries a label that describes it as the fifth cranial nerve's first branch.

Text describing the innervation of the ophthalmic branch of the trigeminal nerve lists the following areas:

- forehead
- eye
- sinuses
- anterior nose
- scalp
- parts of meninges

Maxillary Branch (CN-V2)

The following provides a description of the image of the maxillary branch of the trigeminal nerve, otherwise known as the fifth cranial nerve, branch two (CN-V₂):

The image shows the side of the face, with skin thinned to transparency to show the skull, and select blood vessels and nerves underneath. The trigeminal nerve appears yellow in color. The maxillary branch of the trigeminal nerve follows a path from in front of the ear, under the cheekbone, and through the roof of the mouth before directing down toward the teeth in the upper jaw.

The image shows a highlighted area that covers the nose, and a portion of the face that reaches from the top of the nose to the bottom of the upper lip on the vertical axis, then horizontally sweeps across the side of the face from just below the eye and above the upper jaw toward the ear. The highlighted area carries a label that describes it as the fifth cranial nerve's second branch.

Text describing the innervation of the maxillary branch of the trigeminal nerve lists the following areas:

- cheek
- lower eyelid
- upper lip
- upper teeth
- upper gums
- hard palate

Mandibular Branch (CN-V₃)

The following provides a description of the image of the mandibular branch of the trigeminal nerve, otherwise known as the fifth cranial nerve, branch three (CN-V₃):

The image shows the side of the face, with skin thinned to transparency to show the skull, and select blood vessels and nerves underneath. The trigeminal nerve appears yellow in color. The mandibular branch of the trigeminal nerve follows a path from in front of the ear down the bottom of the jaw, before directing upward toward the teeth in the lower jaw.

The image shows a highlighted area that covers the top of the bottom lip to the chin on the vertical axis, then sweeps horizontally toward the rear of the jaw, when it curves upwards toward the ear. An arrow designates the lingual nerve as one of the smaller branches of the mandibular nerve, located toward the middle of the jaw, where the tongue would be located behind the teeth from the side facial viewpoint of the image. The highlighted area carries a label that describes it as the fifth cranial nerve's third branch.

Text describing the innervation of the mandibular branch of the trigeminal nerve lists the following areas:

- lower lip
- lower teeth
- lower gums
- chin
- jaw²
- tongue³

Primary Afferent Nerves

The following provides a description of the video depicting primary afferent nerves:

An unmyelinated afferent nerve appears. It resembles a tree on its side, with a root system at one end, and bare branches at the other, with a cylindrical 'trunk' between. The 'trunk' houses a cell body, which appears as a nodule in the smooth track of the 'trunk.' Red arrows flow from the left of the image, starting at the 'roots' and approach the right of the image, where the 'branches' reside. As the animation plays, the following audio accompanies it:

“Primary afferent nerves communicate noxious or painful stimuli, light touch, and proprioception.”

² Except mandibular angle.

³ Via the lingual nerve branch

The unmyelinated afferent nerve fades and a myelinated primary afferent nerve replaces it. It resembles the unmyelinated nerve exactly, with the addition of what look like oval beads on a string encasing the nerve along the trunk, insulating the electrical impulse of the nerve to make it conduct more quickly. The following audio plays during the display of the myelinated primary afferent nerve:

“Larger, myelinated primary afferent nerves conduct nerve impulses extremely fast.”

The myelinated nerve fades and the unmyelinated afferent nerve from the beginning of the video replaces it, with the following audio:

“While smaller unmyelinated afferents conduct nerve signals much slower.”

The unmyelinated nerve fades and a myelinated primary afferent nerve replaces it. A jagged red slash can be seen cutting through the middle of the nerve, with red lines flashing on either side to represent damage. The following audio can be heard:

“Damage to these nerves, either due to direct trauma.”

The traumatized nerve fades and a myelinated primary afferent nerve replaces it. The bead-like myelination looks withered instead of smooth and the red arrows representing the nerve signal don't reach the other end of the nerve. The audio describes it as:

“Hypoxia.”

The nerve affected by hypoxia fades and a myelinated primary afferent nerve replaces it. The bead-like myelination can barely be seen and the red arrows representing the nerve signal don't reach the other end of the nerve. The audio continues with:

“Or various demyelinating diseases may cause these nerves to dysfunction.”

A red film appears over the demyelinated primary afferent nerve to represent neuropathic pain, with the accompanying audio:

“This may result in neuropathic pain.”

Nociceptive Signal Transduction

The following provides a description of the video depicting primary afferent nerves:

An unmyelinated afferent nerve appears. It resembles a tree on its side, with a root system at one end, and bare branches at the other, with a cylindrical ‘trunk’ between. The ‘trunk’ houses a cell body, which appears as a nodule in the smooth track of the ‘trunk.’ Red dots flicker beside the ‘roots’ outside the nerve and trigger red arrows inside the nerve that then flow to the right starting at the ‘roots’ and approach the ‘branches.’ As the animation plays, the following audio accompanies it:

“Generally, free nerve endings respond to noxious or painful stimuli, communicated via inflammatory cytokines.”

Miniature snowflake and sun images replace the red dots in the animation. Nerve signals represented by red arrows flowing to the right from the ‘roots’ to the ‘branches’ of the nerve continue while the audio says:

“Extreme temperatures, hot or cold, or mechanical stimulation. This is called nociceptive signal transduction.”

The single unmyelinated afferent nerve fades, to be replaced with two unmyelinated afferent nerves laid end to end, the ‘branches’ of the first situated right next to the ‘roots’ of the second. Red dots surround the ‘roots’ of the first nerve and small circles labeled “sodium” appear around the nodule in the ‘trunk’ of the nerve that represents the cell body, which appears closed. Suddenly, the cell body opens two channels, one on the top, and one on the bottom, and the sodium circles enter. Red arrows show the first nerve firing once the sodium depolarizes the cell. The following audio plays during this part of the animation:

“Sodium channels open, and sodium rushes into the nerve cell, causing depolarization and propagation of the action potential.”

The animation continues as before, with the addition of little blue circles located in the space between the two nerves. The red arrows designating the nerve firing then appear in the second nerve, flowing to the right from ‘roots’ of the second nerve to the ‘branches’ of the second nerve. The following audio plays:

“Once the action potential reaches the synaptic cleft, excitatory neurotransmitters are released, thus triggering second order neurons.”

Pathogenesis Descriptions

Organic Etiologies

Some diseases and syndromes may mask as Burning Mouth Syndrome, including:

- Facial palsies or parotid tumors that can impinge on the facial nerve and cause dysesthesia, numbness, persistent pain, or dry mouth.
- Cancer
- Xerostomia (dry mouth due to lack of salivary flow)

Burning Mouth Syndrome

Bilateral pain on anterior 2/3 of the tongue. May be idiopathic or secondary due to mechanical or local factors. Proposed theories include:

- Crosstalk dysfunction of sensory processing between trigeminal and facial nerves in patients considered to be “supertasters.”
- Small and large fiber neuropathy, although pain is frequently bilateral along with oral autonomic dysfunction.
- Centrally-mediated dopaminergic dysfunction leading to sensitization.

Glossopharyngeal Neuralgia

Pain on the posterior 1/3 of the tongue. Patho-etiologicals may be idiopathic or secondary in nature. Secondary causes include:

- Demyelinating lesions of Cranial Nerve IX and X
- Peritonsillar abscess
- Carotid aneurysm
- Vascular compression
- Metabolic abnormalities

Trigeminal Neuralgia

Most commonly described as unilateral short, sharp paroxysm. May be idiopathic or most frequently caused by direct vascular compression of Cranial Nerve V (trigeminal nerve). Other causes include:

- Demyelinating disorder
- Centrally-mediated pain generators
- Sensitization leading to allodynia, or light touch pain triggers

Post-Herpetic Neuralgia

Following herpes zoster infection, inflammation may occur at the level of the peripheral nerve, the trigeminal root, or the trigeminal ganglion leading to nerve fibrosis.

Temporomandibular Neuralgia

Temporomandibular joint disorder, or TMD, may arise from numerous proposed etiologies.

- Direct joint trauma, inflammation, and degeneration
- Variations in pain threshold (psychosomatic)
- Posture and position of the head, neck, and jaw

Pathogenesis Review Questions

Which of the following descriptions corresponds to symptoms of Burning Mouth Syndrome?

1. Pain on anterior two thirds of the tongue, bilaterally.
2. May be due to position of the head, neck, or jaw.
3. Short, sharp paroxysms that are unilateral.
4. Pain on posterior one third of tongue.
5. Typically follows herpes zoster infection.

Which of the following descriptions corresponds to symptoms of Glossopharyngeal Neuralgia?

1. Pain on anterior two thirds of the tongue, bilaterally.
2. May be due to position of the head, neck, or jaw.
3. Short, sharp paroxysms that are unilateral.
4. Pain on posterior one third of tongue.
5. Typically follows herpes zoster infection.

Which of the following descriptions corresponds to symptoms of Trigeminal Neuralgia?

1. Pain on anterior two thirds of the tongue, bilaterally.
2. May be due to position of the head, neck, or jaw.
3. Short, sharp paroxysms that are unilateral.
4. Pain on posterior one third of tongue.
5. Typically follows herpes zoster infection.

Which of the following descriptions corresponds to symptoms of Post-Herpetic Neuralgia?

1. [Pain on anterior two thirds of the tongue, bilaterally.](#)
2. [May be due to position of the head, neck, or jaw.](#)
3. [Short, sharp paroxysms that are unilateral.](#)
4. [Pain on posterior one third of tongue.](#)
5. [Typically follows herpes zoster infection.](#)

Which of the following descriptions corresponds to symptoms of Temporomandibular Disorder?

1. [Pain on anterior two thirds of the tongue, bilaterally.](#)
2. [May be due to position of the head, neck, or jaw.](#)
3. [Short, sharp paroxysms that are unilateral.](#)
4. [Pain on posterior one third of tongue.](#)
5. [Typically follows herpes zoster infection.](#)

Review Articles

The following represent freely available review articles about Burning Mouth Syndrome:

- Miziara 2015: [Therapeutic Options in Idiopathic Burning Mouth Syndrome](#)
- Coculescu 2014: [Burning Mouth Syndrome: a Review on Diagnosis and Treatment](#)
- Kohorst 2015: [The Prevalence of Burning Mouth Syndrome](#)
- Aravindhham 2014: [Burning Mouth Syndrome: a Review on Its Diagnosis and Therapeutic Approach](#)
- Gurvits 2013: [Burning Mouth Syndrome](#)

Related Websites

- NIDCR: [National Institute of Dental and Craniofacial Research](#)
- [Mayo Clinic](#)
- AAOM: [The American Academy of Oral Medicine](#)
- ACPA: [American Chronic Pain Association](#)
- ADA: [American Dental Association](#)
- AAOP: [American Academy of Orofacial Pain](#)

Answer Key

Pathogenesis Review Questions

Which of the following descriptions corresponds to symptoms of Burning Mouth Syndrome?

1. Pain on anterior two thirds of the tongue, bilaterally. (correct)
2. May be due to position of the head, neck, or jaw. (incorrect)
3. Short, sharp paroxysms that are unilateral. (incorrect)
4. Pain on posterior one third of tongue. (incorrect)
5. Typically follows herpes zoster infection. (incorrect)

Which of the following descriptions corresponds to symptoms of Glossopharyngeal Neuralgia?

1. Pain on anterior two thirds of the tongue, bilaterally. (incorrect)
2. May be due to position of the head, neck, or jaw. (incorrect)
3. Short, sharp paroxysms that are unilateral. (incorrect)
4. Pain on posterior one third of tongue. (correct)
5. Typically follows herpes zoster infection. (incorrect)

Which of the following descriptions corresponds to symptoms of Trigeminal Neuralgia?

1. Pain on anterior two thirds of the tongue, bilaterally. (incorrect)
2. May be due to position of the head, neck, or jaw. (incorrect)
3. Short, sharp paroxysms that are unilateral. (correct)
4. Pain on posterior one third of tongue. (incorrect)
5. Typically follows herpes zoster infection. (incorrect)

Which of the following descriptions corresponds to symptoms of Post-Herpetic Neuralgia?

1. Pain on anterior two thirds of the tongue, bilaterally. (incorrect)
2. May be due to position of the head, neck, or jaw. (incorrect)
3. Short, sharp paroxysms that are unilateral. (incorrect)
4. Pain on posterior one third of tongue. (incorrect)
5. Typically follows herpes zoster infection. (correct)

Which of the following descriptions corresponds to symptoms of Temporomandibular Disorder?

1. Pain on anterior two thirds of the tongue, bilaterally. (incorrect)
2. May be due to position of the head, neck, or jaw. (correct)
3. Short, sharp paroxysms that are unilateral. (incorrect)
4. Pain on posterior one third of tongue. (incorrect)
5. Typically follows herpes zoster infection. (incorrect)

Diagnosis Review Questions

Review the following description of an orofacial pain disorder as described by a woman in her thirties and select the corresponding diagnosis.

“I’ve been having this awful pain that feels that something is, or someone is stabbing me at the back of my throat, and even the tongue on one side. Sometimes it feels as if it’s occurring in my ear. It seems like when I cough a lot I experience some of the pain. I think I’ve probably gone days and sometimes weeks without having any of the pain, but it will come back for really no rhyme or reason. When it does come back, it’s there anywhere from three to five times each day. It’s really bad and nothing that I have actually ever tried over the counter has really helped.”

1. temporomandibular disorder (incorrect)
2. post-herpetic neuralgia (incorrect)
3. burning mouth syndrome (incorrect)
4. glossopharyngeal neuralgia (correct)

Review the following description of an orofacial pain disorder as described by a man in his mid-forties and select the corresponding diagnosis.

“The pain is on the left side of my face and mouth. It feels like I’m being burned almost constantly. But sometimes it feels like I’m being stabbed. Some areas of my mouth are numb, but even a light touch on my cheek can really hurt. So this all started a couple months after I had the shingles.”

1. temporomandibular disorder (incorrect)
2. post-herpetic neuralgia (correct)
3. burning mouth syndrome (incorrect)
4. glossopharyngeal neuralgia (incorrect)

Review the following description of an orofacial pain disorder as described by a man in his early forties and select the corresponding diagnosis.

“I’ve been dealing with this pain for years. It’s more on the right side of my face than the left. It really hurts most right around where my jaw seems to be, especially when I eat. It’s really there almost constantly though. When it’s really bad, it seems like it even moves. I think I’m crazy, but sometimes I feel it behind my eye, and even sometimes behind my ear, like there’s something in there. If I to describe the pain, I would definitely say it’s achy and bothersome.”

1. temporomandibular disorder (correct)
2. post-herpetic neuralgia (incorrect)
3. burning mouth syndrome (incorrect)
4. glossopharyngeal neuralgia (incorrect)

Review the following description of an orofacial pain disorder as described by a woman in her late twenties and select the corresponding diagnosis.

“I’ve been dealing with this pain for almost six months. It feels like my entire mouth has been scalded, like I drank something that’s way too hot. It really burns. And it seems to get worse throughout the entire day. Sometimes it feels like its numb, or tingly. And the front part of my tongue and the roof of my mouth has the worst pain.”

1. temporomandibular disorder (incorrect)
2. post-herpetic neuralgia (incorrect)
3. burning mouth syndrome (correct)
4. glossopharyngeal neuralgia (incorrect)

Beverly's Diagnosis Question

How would you diagnose Beverly?

1. Post-herpetic neuralgia (incorrect)
2. Organic etiology (incorrect)
3. Primary Burning Mouth Syndrome (incorrect)
4. Secondary Burning Mouth Syndrome (correct)
5. Temporomandibular Disorder (incorrect)
6. Glossopharyngeal Neuralgia (incorrect)
7. Trigeminal Neuralgia (incorrect)

Pharmacotherapy Review Questions

Which pharmacotherapy can be best used to treat Burning Mouth Syndrome?

1. Amitriptyline (incorrect)
2. clonazepam (correct)
3. carbamazepine (incorrect)
4. cyclobenzaprine (incorrect)

Which pharmacotherapy can be best used to treat Trigeminal Neuralgia?

1. Amitriptyline (incorrect)
2. Clonazepam (incorrect)
3. carbamazepine (correct)
4. cyclobenzaprine (incorrect)

Which pharmacotherapy can be best used to treat Post-Herpetic Neuralgia?

1. amitriptyline (correct)
2. clonazepam (incorrect)
3. carbamazepine (incorrect)
4. cyclobenzaprine (incorrect)

Which pharmacotherapy can be best used to treat Temporomandibular Disorder?

1. Amitriptyline (incorrect)
2. Clonazepam (incorrect)
3. Carbamazepine (incorrect)
4. cyclobenzaprine (correct)