



# Treatment options for glossopharyngeal neuralgia

Steven B Graff-Radford<sup>†</sup>,  
Alan Newman &  
Ajay Ananda

<sup>†</sup>Author for correspondence  
Cedars-Sinai Medical Center,  
444 S. San Vicente No.  
1101, The Pain Center,  
Los Angeles, CA,  
90048, USA  
Tel.: +1 310 423 9600  
Fax: +1 310 423 9610  
grauffs@cshs.org

Glossopharyngeal neuralgia is a rare but painful affliction creating pain in the distribution of the nerve. It is an intermittent pain often provoked by non-noxious stimulation such as talking, swallowing or head movement. Glossopharyngeal neuralgia is best evaluated with a careful history, appropriate imaging and treated with pharmacologic approaches as well as surgery.

Glossopharyngeal neuralgia (GPN) is a rare condition involving throat and neck pain. The International Association for the Study of Pain (IASP) defines the condition as sudden, severe, brief, recurrent pains in the distribution of the glossopharyngeal nerve [1]. The International Headache Society recently classified GPN into classic and symptomatic [2]. They provided diagnostic criteria under the major group of cranial neuralgias and central causes of facial pain. Classic GPN is described as a severe transient stabbing pain experienced in the ear, base of the tongue, tonsillar fossa or beneath the angle of the jaw. The pain is felt in the distributions of the auricular and pharyngeal branches of the vagus and glossopharyngeal nerves. It is commonly provoked by swallowing, talking or coughing. It may remit for varying periods. Symptomatic GPN presents with the added presence of an aching pain that may persist between attacks. The diagnostic criteria are reviewed in Table 1.

Often, GPN occurs in episodes such as trigeminal neuralgia (TN), with each episode lasting for weeks to months, but in some patients can be unremitting. GPN is most often unilateral. The right side is affected more often with GPN than with TN. Bilateralism was noted less often in TN than in GPN cases [3]. Mechanical stimulation of the face by swallowing, talking and coughing often triggers the pain of GPN [4].

## Epidemiology

Katusic and colleagues published a 39-year retrospective study on the population of Rochester (MN, USA) [5]. A review of cases from 1945 until 1984 was carried out. It was found that the incidence rate of GPN in this population was 0.7 out of 100,000 for both sexes combined. There were no significant differences between the sexes. They concluded that GPN was generally a mild

disease, since mild attacks were not uncommon, with only 3.6% of GPN sufferers having a second annual recurrence. Only 25% had to have surgery for symptom relief. In addition, 25% had bilateral symptoms.

Rushton and colleagues published a study in 1981 that examined GPN patients at the Mayo Clinic from 1922 to 1977 [6]. The authors reviewed 217 cases – a total of 57% were over than 50-years of age and 43% were between the ages of 18 and 50 years. A total of 161 patients had spontaneous remissions, 37 experienced no relief and 12% had bilateral pain. Syncope, which has been reported to occur with GPN, was rarely seen. A total of 25 patients experienced GPN and TN concurrently. Carbamazepine was the drug of choice and a total of 110 patients experienced good relief from pain with surgical intervention.

Patel and colleagues published a retrospective study of over 200 patients with GPN who underwent microvascular decompression (MVD) surgery at their institution over a 20-year period [7]. They found that 66.8% were female and 33.2% male. Mean age was 50.2 years, with a mean duration of pain of 5.7 years. The most common symptoms were throat and ear pain and throat pain alone. There was not a sided predilection with 54.8% of patients having left-sided symptoms and 45.2% having right-sided symptoms. Kondo and colleagues concluded in their study that GPN is rare, being seen 100-times less often than TN [8]. In summary, GPN is a relatively rare, usually unilateral painful condition that tends to be more common in middle-aged females.

## Differential diagnosis

Differential diagnoses for GPN include, but are not limited to, TN, temporomandibular disorders (TMDs), Eagle's syndrome, certain short-lasting headaches and local pathology.

**Keywords:** glossopharyngeal nerve, glossopharyngeal neuralgia, temporomandibular disorder, temporomandibular joint, trigeminal neuralgia



**Table 1. Integrated Health Service (IHS) criteria for glossopharyngeal neuralgia.**

| Criteria                                      | Symptoms  |
|---|---|
| <b>Classical glossopharyngeal neuralgia</b>   |   |
| A   | Paroxysmal attacks of facial pain lasting from a fraction of a second to 2 minutes and fulfilling criteria B and C  |
| B   | Pain has all of the following characteristics: <ol style="list-style-type: none"> <li>1 Unilateral location</li> <li>2 Distribution within the posterior part of the tongue, tonsillar fossa, pharynx or beneath the angle of the lower jaw and/or in the ear</li> <li>3 Sharp, stabbing and severe</li> <li>4 Precipitated by swallowing, chewing, talking, coughing or yawning</li> </ol>     |
| C   | Attacks are stereotyped in the individual patient   |
| D   | There is no clinically evident neurologic deficit   |
| E   | Not attributable to another disorder  |
| <b>Symptomatic glossopharyngeal neuralgia</b> |   |
| A   | Paroxysmal attacks of facial pain lasting from a fraction of a second to 2 minutes, with or without persistence of aching between paroxysms, and fulfilling criteria B and C  |
| B   | Pain has all of the following characteristics: <ol style="list-style-type: none"> <li>1 Unilateral location</li> <li>2 Distribution within the posterior part of the tongue, tonsillar fossa, pharynx or beneath the angle of the lower jaw and/or in the ear</li> <li>3 Sharp, stabbing and severe</li> <li>4 Precipitated by swallowing, chewing, talking, coughing and/or yawning</li> </ol> |
| C   | Attacks are stereotyped in the individual patient   |
| D   | A causative lesion has been demonstrated by special investigations or surgery   |

TN is a unilateral disorder characterized by brief electric shock-like pains, abrupt in onset and termination, limited to the distribution of one or more divisions of the trigeminal nerve [9]. TN is the most similar condition to GPN and is mistaken for GPN more than any other condition.

TMDs can be unilateral or bilateral, painful or non-painful, and are located in and around the temporomandibular joint (TMJ). Painful TMD include arthritides of the TMJ, derangements of the joint, sprain of the joint, myalgia, myofascial pain, tendonitis, trismus, and spasm. These TMD pains can be similar to GPN when TMD is unilateral and intermittent. The best manner of differentiating these disorders is to ascertain the presence of temporomandibular joint noise, limited range of jaw motion (less than 40mm measured between the incisors), pain on joint palpation and worsen-

ing of the pain with chewing. If there is the presence of three out of four of the above it is more likely the pain is attributed to the jaw than GPN.

Eagle's Syndrome occurs from the elongation of the styloid process. The pain associated with this condition is often unilateral and can occur in the throat and ear, as in GPN. The symptoms from Eagle's Syndrome can occur from compression from the elongated styloid process of the glossopharyngeal, vagus, and/or trigeminal nerves. Bilateral elongation is common, but bilateral symptoms are less common [10]. Eagle's Syndrome is the most important cause of symptomatic GPN. Stylectomy is the treatment for Eagle's Syndrome and should be considered prior to surgical treatment for GPN [11].

### Pathophysiology

In most cases it is thought that the primary cause of GPN is from compression of the nerve by a blood vessel. The vessel is usually the posterior inferior cerebellar artery [12]. This is supported from success of microvascular decompression surgery [13] as well as from electron microscopic observations of nerve injury of the glossopharyngeal nerve in patients with GPN [14]. This pathophysiology of vascular nerve compression is also supported by imaging that shows the compression. A study by Karibe and colleagues demonstrated that using magnetic resonance imaging (MRI) with a sequence of constructive interference in steady-state (CISS) they were able to accurately delineate microvascular compression to the glossopharyngeal nerve at its cisternal portion. They confirmed the results of the MRI during a microvascular decompression surgery [15].

### Secondary causes of GPN

Compression of the nerve can also be caused by cerebellopontine angle tumors. Multiple sclerosis (MS) may also be associated with GPN. A report by Minagar and colleagues found that four of their multiple sclerosis patients had GPN. Three of the four patients responded to carbamazepine and the fourth responded to other treatment. They concluded that GPN may be associated with MS and responds to carbamazepine [16].

Other secondary causes of GPN include: Eagle's Syndrome, malignancies of the neck, Paget's disease, Arnold Chiari malformation [17,18], and neck trauma with foreign-body impaction [19].

**Other features**

Cardiac dysrhythmias and syncope have been described as associated features of GPN [20]. The pathophysiology of these associated features is thought to be vagally mediated. Treatment of GPN pharmacologically or surgically should eliminate these associated features, but a temporary pacemaker can be utilized while the GPN is being controlled [21].

**Testing**

Imaging of the brain is required. Specifically, an MRI and Magnetic Resonance Angiography (MRA) of the brain focusing on the posterior cranial fossa and upper cervical spine should be ordered. Also, a panoramic radiograph should be taken to rule out Eagle's syndrome. An electrocardiogram (ECG) should also be ordered to rule out cardiac abnormalities.

**Treatment**

Treatment for GPN is nonsurgical with pharmacotherapy and surgical.

***Pharmacotherapy***

The medications of choice are carbamazepine and gabapentin although theoretically any membrane stabilizer could be used. Garcia-Callejo and colleagues reported on nine patients resistant to other therapies who were treated with gabapentin alone, or in combination with carbamazepine for a period of 2 to 16 months. They found that gabapentin alone, or with carbamazepine, reduced the frequency and severity of pain in seven of the patients, but was less effective in those patients who had a vascular compression on imaging studies [22]. Carlsen and colleagues reported on a case where gabapentin successfully treated a patient who had GPN with cardiac syncope. The sixty-one year old man had resolution of both pain and cardiac syncope with Gabapentin [23]. Other medications that have been reported to be helpful for GPN include amitriptyline, baclofen, diazepam, and phenobarbital [24,25]. Table 2 provides a list of medications and doses that may be effective.

***Surgical therapy***

In 1920 Sicard and Robineau first described surgical treatment of GPN. Their initial method employed sectioning of the glossopharyngeal nerve and the pharyngeal branches of the vagus nerve and part of the sympathetic chain of the neck. In reviewing the initial

patients with GPN treated with section or avulsion of the glossopharyngeal nerve alone, Dandy, in 1924, noted the pain classically persists unless the upper two or three rootlets of the vagus nerve are sectioned as well [26]. White and Sweet then appropriately coined the term "vagoglossopharyngeal neuralgia" for this condition in 1969. Although some surgeons report vagal pain is referred to the external auditory meatus, beneath the angle of the jaw, it is clinically not possible to differentiate whether the distribution of the pain is from a 9th or 10th nerve origin. The root entry zones of 9 and 10 are very close to one another, and compressing lesions invariably compress both simultaneously.

In 1959, Gardner and colleagues postulated the role of vascular compression in the hyperactive dysfunction of cranial nerves V and VII, in TN and hemifacial spasm, respectively [27,28]. Laha and Janetta in 1977 first published on the efficacy of MVD by relieving compression at the root entry zones of these cranial nerves, as well as cranial nerve IX and X in GPN. The decided benefit is high efficacy in symptom resolution with preservation of normal neural structures and function. This is in stark contrast to the more historical methods of rhizotomy. In 1981 Rushton reported an 85% pain relief rate immediately following rhizotomies of the 9th and 10th nerve, with no long-term follow up. Resnick described 40 patients treated with MVD for GPN from 1971 to 1995 with 79% complete (>95%) relief immediately, and substantial pain reduction (>50%) in 10 years. At 4 years, 92% of their patients had substantial to complete pain relief. Kondo reported on 20 patients with GPN treated from 1980 to 1995, all of which had complete and sustained pain relief [29]. The largest report comes from Patel and colleagues, comprising a series of 217 MVDs for GPN from 1973 to 2000 with immediate pain relief of over 90% with long term relief (>10 years) over 75%, with a modern complication rate under 6% [30].

There are certain anatomic factors that make MVD for GPN potentially more difficult and dangerous when compared with MVD for TN or HFS. First, in GPN, the compressing vessel is often found in the posterolateral sulcus of the medulla. As such, there is a greater need for cerebellar retraction to explore the root entry zones of cranial nerve IX and X. Similarly, IX and X are considerably smaller in diameter than

**Table 2. Pharmacotherapies that may be used in glossopharyngeal neuralgia therapy.**

| Generic name  | Trade name | Dosage (mg/day) |
|---------------|------------|-----------------|
| Carbamazepine | Tegretol   | 100–2000        |
|               | Carbitrol  |                 |
| Duloxetine    | Cymbalta   | 20–90           |
| Gabapentin    | Neurontin  | 100–5000        |
| Clonazepam    | Klonopin   | 0.5–8           |
| Lamotrigine   | Lamictal   | 50 – 500        |
| Baclofen      | Lioresal   | 10–80           |
| Oxcarbazepine | Trileptal  | 150–2400        |
| Phenytoin     | Dilantin   | 200–600         |
| Pregabalin    | Lyrica     |                 |
| Topiramate    | Topamax    | 50–1000         |
| Valproic acid | Depakote   | 125–2500        |
| Venlafaxine   | Effexor    | 37.5–225        |

V and VII, and thus more subject to mechanical. Hopefully the better understandg of neuropathic pain will lead to earlier detection and improved therapy for those who suffer from Glossophangeal neuralgia. It is clear that there

### Highlights

- Glossopharyngeal neuralgia is a painful, somewhat rare affliction that is best evaluated through history, examination and imaging and treated pharmacologically and surgically.
- Paroxysmal pain often lasts seconds to minutes but can be disabling preventing speech, eating severely limiting finction.
- Pain may be perceived anywhere in the distribution of the glossopharyngeal nerve.

are only a few who develop this painful affliction yet, when present, the disability is significant. It is, therefore, hoped that the mechanisms be better elucidated and improved therapies be created to eradicate the suffering, trauma from manipulation. The most common offending vessels in GPN are an elongated and ecstatic PICA or an atherosclerotic and distorted vertebral artery. Direct mobilization of either of the vessels away from the brainstem may subject the delicate array of perforating arteries that branch from PICA or AICA to injury that may result in brainstem infarction. Despite these anatomic challenges, when reviewing case series of MVDs for GPN during the modern surgical era using MRI guidance and microsurgical techniques [31,32], the average incidence of postoperative palsies involving cranial nerve IX and X are less than 5%. This is in gross contrast to rhizotomy which has a lower long term control rate with a much higher incidence of IXth and Xth nerve palsies.

### Expert commentary

GPN is a relative rare painful condition that is most often unilateral and more commonly seen in middle aged women. It is usually a short lasting intense pain that occurs in the distribution of the glossopharyngeal nerve. Proper diagnosis includes a thorough history and exam as well as imaging studies. Secondary causes of GPN need to be ruled out. Once the diagnosis is made, treatment should consist of pharmacotherapy. Surgical interventions should also be considered.

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### Affiliations

Steven B Graff-Radford, DDS, Co Director, Adjunct Associate Professor

Cedars-Sinai Medical Center, 444 S. San Vicente # 1101, The Pain Center, Los Angeles, CA, 90048, USA

Tel.: +1 310 423 9600

Fax: +1 310 423 9610

graffs@cshs.org

Alan Newman, DDS

Cedars Sinai Medical Center, 444 S. San Vicente # 1101, The Pain Center,

Los Angeles, CA, 90048, USA

Tel.: +1 310 423 9600

Fax: +1 310 423 9610

anewman@ucla.edu

Ajay Ananda, MD

Cedars-Sinai Medical Center, 444 S. San Vicente # 1101, Maxine Dunitz Neurosurgical Center,

Los Angeles, CA, 90048, USA

Tel.: +1 310 423 9700

Fax: +1 310 423 0810

ajay.ananda@cshs.org