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# Transposition of Offending Vessel Using Fibrin glue-coated Teflon Sling in Microvascular Decompression to Treat Glossopharyngeal Neuralgia

by

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Major in Medicine

Department of Medical Sciences

The Graduate School, Ajou University

# Transposition of Offending Vessel Using Fibrin glue-coated Teflon Sling in Microvascular Decompression to Treat Glossopharyngeal Neuralgia

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## - ABSTRACT -

# Transposition of Offending Vessel Using Fibrin glue-coated Teflon Sling in Microvascular Decompression to Treat Glossopharyngeal Neuralgia

**BACKGROUND CONTEXT:** Glossopharyngeal neuralgia (GPN), caused by irritation of the glosspharyngeal nerve, can be devastating to the patient, with lancinating pain that can be triggered by simple daily actions such as chewing and swallowing that proper treatment is necessary. However, treatment of GPN is difficult, more medically intractable compared to other cranial rhizopathies that operation is often considered for cure. Microvascular decompression (MVD) in GPN patients are known to show fine outcome, but due to its rarity, not enough reports have been made to prove efficacy and safety of the MVD over other treatments. Recurrence after MVD have also been noted.

**PURPOSE:** To evaluate the outcome of patients who underwent operation for MVD of GPN via new sling technique for better outcome, along with review of literatures.

**STUDY DESIGN:** A retrospective study of patients who underwent same operation under the same diagnosis.

**METHODS:** This single-institution retrospective analysis included 22 glossopharyngeal neuralgia patients who received MVD from 1996 to 2012. The operation was performed by a single experienced surgeon with retromastoid craniotomy via lateral suboccipital approach. Decompression method involved were transposition with glue for eight (36.4%) patients, transposition with sling for seven (31.8%) in those with very tortuous offenders, and interposition for those with many perforating vessels that made transposition impossible.

**RESULTS:** Preoperative symptoms were relieved immediately after the operation in all

patients, and no recurrence has occurred so far during the follow-ups. Postoperative complications occurred in 5 of the 22 patients, all transient, and there was no surgical mortality.

**CONCLUSION:** Glossopharyngeal neuralgia can be safely and affectively treated by MVD, and adequate decompression of the offender is an important factor directly contributing to increased success rate of this surgery. Fibrin glue-coated Teflon sling can contribute to good outcome of the MVD operation by aiding in successful transposition of the offending vessels that may be too tortuous to be affectively decompressed by conventional techniques.

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**Key words**: Microvascular decompression, Glossopharyngeal neuralgia, Teflon, sling

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# I. INTRODUCTION

The glossopharyngeal nerve is the 9th cranial nerve, often called “the neglected cranial nerve” for its small size (Yomo, 2009) and for its relatively deep position within the neck that is it often unnoticed during surgical dissections (Pearce, 2006). It is a mixture of nerve that carries afferent motor and efferent sensory information, exiting from the upper medulla side of the brain stem, just rostral to the vagus nerve (Pearce, 2006). Thus disease involving the glossopharyngeal nerve sometimes exhibits symptoms close to that of the vagus nerve, and this rare form of glossopharyngeal neuralgia (GPN) exhibiting cardiac symptoms are called vago-glossopharyngeal neuralgia (Esaki et al, 2007).

Glossopharyngeal nerve provides efferent motor function to the stylopharyngeus muscle, and involves parasympathetic innervations of the parotid gland. The nerve provides sensory information from the carotid sinus and carotid body, as well as the external ear, internal surface of the tympanic membrane, upper pharynx and posterior one-third of the tongue. Offense on the glossopharyngeal nerve can therefore cause derangement of functions to the organs mentioned above, and related symptoms are the hallmark of glossopharyngeal neuralgia, a disease caused by offense on the glossopharyngeal nerve.

Glossopharyngeal neuralgia is a rare disease, only about 1% frequency of trigeminal neuralgia, estimated to be about 0.8 per 100,000 people. (Resnick et al, 1995)(Yomo et al, 2009) It is widely accepted that GPN occurs secondarily to vascular compression of the glossopharyngeal nerve and the upper fascicles of the vagus nerve (Horowitz, 2004) , although the causes may vary. Some of the common causes are neurovascular compression, infection, Chiari I malformation, infarction, dissection of vertebral arteries, and mechanical compression by a mass such as a CPA tumor. Glossopharyngeal nerve supplies the stylopharyngeus muscle (Ozveren, 2003) , which elevates the pharynx during swallowing and speech that the neuropathy induces classical symptoms of paroxysmal unilateral lancinating pain radiating to the ear, neck, and jaw. These can be triggered by simple daily movement such as swallowing, yawning, eating and talking that if left untreated, it can severely derange the life quality of the patients (Ozenci, 2002). Treatment strategy for GPN is similar to that of TN, although glossopharyngeal neuralgia does not show a high remission rate with medications, relatively intractable to medications compared to other

cranial rhizopathies. Invasive procedures such as rhizotomy and alcohol block has been tried as well but has not been proven much effective when complications are put into consideration. Microvascular decompression (MVD) is considered a good treatment choice, but due to the rarity of the GPN, there are not as many papers published on the operative outcome of the GPN, and most of these do not have a large pool of patients compared to papers on other cranial rhizopathies. The papers do not always assure very high cure rate either, with complete pain relief achievement in 76% and substantial improvement in a further 16% of the group, during a mean follow-up of 48 months (Resnick et al, 1995) Nervertheless, MVD is considered a good treatment choice despite its possible complications and recurrence. This paper attempted to evaluate the safety and affectivenss of the MVD by reporting outcome of patients who underwent operation for microvascular decompression (MVD) of glossopharyngeal neuralgia via new sling technique, along with review of literatures.

# II. MATERIALS AND METHODS

## *A. Materials*

Between 1996 and 2012, 22 glossopharyngeal neuralgia patients underwent microsurgical decompression at Ajou University hospital. All the patients had been refractory or only partially responsive to medical treatment, and operation was recommended only to patients with typical clinical symptoms, intractable to medicines, and those with predictable offending vessel identified with a MRI (magnetic resonance image) scans.

There were 15 men and 7 women in this retrospective study, ranging in age from 32 to 72 years (mean 52.5years). The duration of symptoms varied from 2 months to 11 years (mean 43 months). The right side was affected in 6 cases, and the left in 16 cases. The patients were followed up for from 4 months to 17years (mean 27 months) after the surgery.

## *B. Methods*

Preoperative analysis was done with an electromyogram - motor nerve conduction velocity (EMG-MCV) of facial nerve (Medelec Synergy (EMG/EP), Young-Woo Meditec, Korea) and otolaryngologic evaluation was also carried out to differentiate peripheral lesions causing symptoms. Pure tone audiometry (Orbital 922, Medicine, the U.S.), speech audiometry (Autoflex 100, Medicine, the U.S.), and impedance audiometry (Autoflex 100, Medicine, the U.S.) was checked as well.

MRI, Magnetic resonance angiography (MRA), and computed tomographic angiography (CTA) were studied pre-operatively to define relationships between offending vessels and affected nerve. MRI was performed on 1.5T (Sigma EXCITE, General Electronics, the U.S.) or 3.0-T scanners (Achieva, Philips, Netherland) randomly. Included series were fast imaging employing steady-state acquisition (FIESTA) with field of view (FOV) of 16, slice 0.6-0.8mm and space zero. In time of flight (TOF) image, FOV of 16 and slice 0.8mm was used for setting.

## *C. Surgical technique*

All patients received the surgery under general anesthesia, placed in a lateral decubitus position, with the affected side turned upward. Cranium was fixed with a cranial fixation

device (4-pin Mizuho frame, Mizuho, Japan). Operation was performed by a single experienced surgeon, all with lateral suboccipital approach via retromastoid craniotomy. Intra-operative brain stem auditory evoked potential (BAEP) and sensory evoked potential (SEP) monitoring was done to check the function of the brainstem and cranial nerve, by a single, experienced physical technician during the operation.

About 7cm longitudinal linear incision was made, two fingerbreadths behind the ear. Soft tissue and muscle dissection was made, and after thorough bleeding control, a craniotomy bone flap was removed with a high-speed drill and perforator (Midas, Codman, the U.S.), to reveal intracranial space below the transverse-sigmoid junction with sigmoid sinus exposed. Dura was opened in a Y-shape, parallel to and 5-7mm from the sigmoid sinus. Prophylactic atrophine was injected before manipulation of the offending vessels to refrain from possible cardiac and/or hemodynamic instability. With a careful retraction of the cerebellum under microscope (Pentero, Carl Zeiss, Germany), proximal portion of glossopharyngeal and vagus nerve was exposed from the caudal part of the low cranial nerves. Offending vessels were observed compressing root entry zone (REZ) of the glossopharyngeal nerve, vagal nerve, or both. MVD was performed with various techniques including interposition, transposition of the offending vessels using Teflon prosthesis (Bard PTFE FELT, the U.S), or sling technique (Fig. 1).

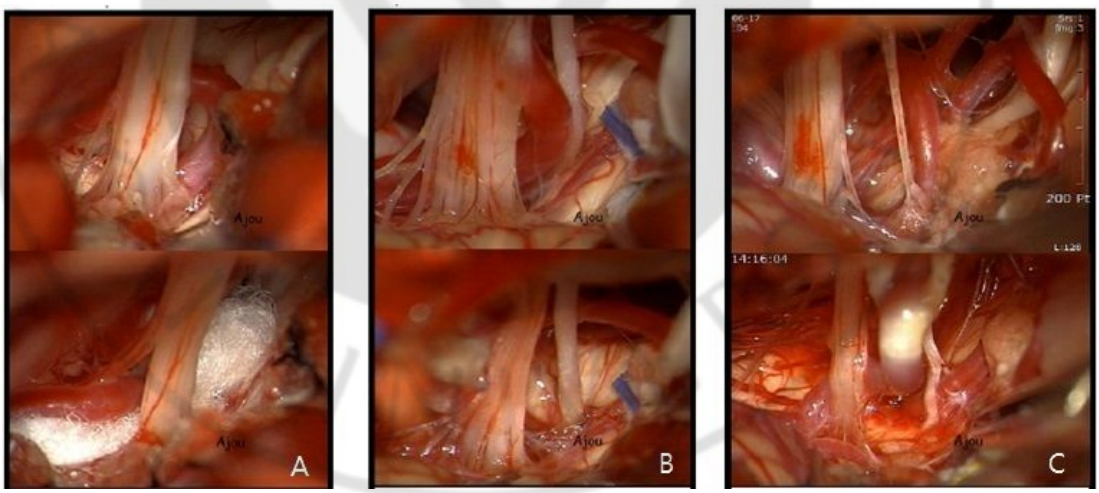


**Fig. 1**. **Techniques used for GPN MVD.** A) Interposition. Teflon felt is placed in between the offending vessel and CN IX, as transposition cannot be performed due to

perforating arteries. B) Transposition with Teflon prosthesis. Offending vessel is displaced from the CN IX and Teflon is placed in between to prevent the offender returning to pre-op status. C) Transposition with sling technique. Vertebral artery is displaced away from the CN IX with stitched Teflon sling technique.

Transposition of the offending vessels to avoid contact with the REZ of glossopharyngeal nerve was the technique of choice. Interpositioning was done only when transposition was considered technically impossible, mostly due to intercepting perforator vessels. Transposed vessel was fixed with a Teflon ball piece and a gelfoam using a bioglue (Tissel glue, Baxter, Austria), but large and tortuous offenders that posed difficulty in transposition at times were fixed using the sling technique. The incorporated sling used in our cases were all hand-made by the surgeon during the operation, consisting of intermingled Teflon threads coated with fibrin glue on top (Fig. 2).

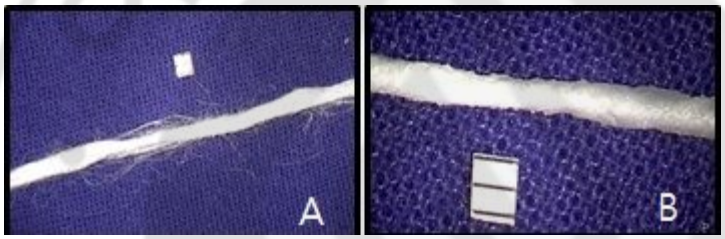


**Fig. 2**. **Hand-made Teflon sling.** A) Before glue application, threads of Teflon is intermingled with saline to form a slim rope. B) After glue application, surface of teflon sling has become smooth and tenser.

# III. RESULT

### *A. Clinical Findings (Table 1)*

22 patients presented with various symptoms, and the most predominant symptoms were throat pain and facial pain in 9 patients each, odynophagia in 4 patients, and 2 patients each in neck pain, voice change, tongue base pain, and jaw pain. Pain was relieved immediately after the operation in all patients, although two patients developed hoarseness, one experienced decreased hearing on the operated side, one had dysphagia, and one patient complained of swallowing difficulty. These symptoms were all transient and spontaneously resolved by post-operative 6 months time. One patient showed purulent rhinorrhea suggestive of CSF rhinorrhea on post-operative day 4, but 3 days of CSF drainage with lumbar drainage catheter resolved the problem by the day of discharge without any sign of recurrence. There was no mortality, and so far the patients are either completely pain-free or with minimal symptoms that are well-controlled with medications. (Table 2)

**Table 1**. Pre-op and post-op result of enrolled 22 patients

| | n | Sex | Age | Clinical manifestation | | | Vascular compression | | Surgical outcome | | Decompression |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | symptoms | side | Duration | Offender | site | Outcome | Complication | method |
| 1 | M | 59 | Throatache, voice change | Lt | 1yr | PICA | REZ (IX) | | Excellent | No | Interposit with Teflon |
| 2 | M | 38 | tongue pain | Rt | 5mo | PICA | REZ (IX) and distal | | Excellent | No | Interposit with Teflon |
| 3 | M | 38 | facial pain, neck pain | Lt | 5yrs | VA, PICA | REZ (IX,X) and distal | | Excellent | No | Interposit with Teflon |
| 4 | M | 32 | Jaw pain | Lt | 5mo | PICA | REZ (IX,X) | | Excellent | No | Interposit with Teflon |
| 5 | F | 60 | otalgia, throatache | Rt | 5yrs | Small vsls | REZ(IX) and distal | | Excellent | no | Interposit with Teflon |
| 6 | M | 65 | pain, jaw | Rt | 5yrs | PICA | REZ(IX,X) | | Excellent | No | Interposit with Teflon |
| 7 | F | 60 | throatache, otalgia | Rt | 2yrs | N-S | No definite offender | | Excellent | No | - |
| 8 | F | 53 | throat, | Lt | 5yrs | PICA | REZ (IX) and distal | | Excellent | No | Transposit with T-glue |
| 9 | F | 60 | facial pain, otalgia | Rt | 19mo | PICA | Distal IX and VII | | Excellent | CSF rhinorrhea | Transposit with T-glue |
| 10 | M | 72 | tongue base | Lt | 2yrs | PICA | REZ (IX) | | Excellent | No | Transposit with T-glue |
| 11 | M | 48 | facial pain, tongue pain | Lt | 7yrs | PICA | REZ (IX,X) and distal | | Excellent | Trans. dysphagia | Transposit with T-glue |
| 12 | M | 63 | facial pain | Lt | 3yrs | PICA | REZ (IX,X) and distal | | Excellent | No | Transposit with T-glue |
| 13 | M | 38 | throatache, otalgia | Lt | 5mo | PICA | Distal X and IX | | Excellent | No | Transposit with T-glue |
| 14 | F | 43 | odynophagia | Rt | 4yrs | PICA | Distal IX | | Excellent | No | Transposit with T-glue |
| 15 | F | 56 | odynophagia, otalgia | Lt | 2mo | VA, PICA | REZ (IX) and distal | | Excellent | No | Transposit with T-glue |
| 16 | M | 36 | pain, | Lt | 2mo | PICA | REZ (X) and distal | | Excellent | Trans. dry cough | Transposit with sling |
| 17 | M | 54 | Ear, face, swallow pain | Lt | 1yr | PICA | REZ (IX) | | Excellent | hearing ↓ | Transposit with sling |
| 18 | M | 70 | throatache | Lt | 8yrs | PICA | REZ(X) | | Excellent | No | Transposit with sling |
| 19 | M | 53 | otalgia, neck pain | Lt | 7yrs | PICA | REZ (IX,X) | | Excellent | No | Transposit with sling |
| 20 | M | 64 | facial pain, throatache | Lt | 11yrs | PICA | REZ(IX,X) for PICA | | Excellent | no | Transposit with sling |
| 21 | F | 46 | facial pain | Lt | 2yrs | PICA | REZ(X) | | Excellent | Trans. hoarseness | Transposit with sling |
| 22 | M | 47 | throatache | Lt | 3mo | PICA | REZ(IX, X) | | excellent | no | Transposit with sling |

**Table 2**. Post-operative complications in the 22 GPN patients

| Neurologic deficit | Immediate post-op. |
|---|---|
| Dysphagia, transient | 1/22 (4.6%) |
| Hoarseness, for 6 months | 2/22 (9.1%) |
| Facial paresis | 0/22 (0%) |
| Decreased hearing | 1/22 (4.6%) |
| Swallowing difficulty, for 2 months | 1/22 (4.6%) |
| CSF leakage | 1/22 (4.6%) |
| Total | 5/22 (22.7%) |

### *B. Radiological Findings*

Preoperative MRI scan was performed to find the offending vessel and to figure out the anatomical status of the sinuses, cerebellum, and cranial nerves. Offending vessels were predicted preoperatively, and all pre-operative MRIs corresponded with intra-operative findings. None of the patients enrolled in the study showed definite space-occupying lesion around the cranial nerves. For all the patients had amelioration of preoperative symptoms, no postoperative MRI was taken.

### *C. Operative Results*

In 5 of the patients (41.6%), offending vessel was compressing only the root entry zone, 3 of them on the glossopharyngeal REZ and 2 of them on both the glossopharyngeal and vagal REZ. Both the REZ and distal portion of the nerve was found to be compressed in 7 cases (58.4%), although the site of compression did not show any significant difference in clinical manifestation or surgical outcomes. (Table 3)

**Table 3**. Distribution of compression points in the 22 GPN patients

| Compression point | No. of pts |
|---|---|
| REZ only | 10/22 (45.5%) |
| - Glossopharyngeal REZ | 3 |
| - Glossopharyngeal and vagal REZ | 5 |
| - Vagal REZ | 2 |
| REZ and distal nerve | 8/22 (36.4%) |
| Distal only | 3/22 (13.6%) |
| N-S | 1/22 (4.6%) |

10 patients (82%) had a single-vessel offender, all PICA, and 2 patients (17%) had a multiple-vessel offender, both PICA and Vertebral artery. (Table 4) Remaining 1 patient did not have specific offender for decompression, and last 1 patient had small perforating vessels as candidate for offender. Analysis of the treatment outcome based on complication was performed, and based on Kaplan-Meier analysis, Pearson's chi square test was used to compare complication rate between the single-vessel offender group and multiple-vessel offender group. There was no statistically significant difference in complication rate between the two matched groups (P=0.3113, Log Rank)

There was no statistically significant difference in complication rate between genders (p=0.6093), nor was there significant difference between the group of patients over 60 years old and those under 60 years old (p=0.0904)

**Table 4**. Distribution of offending vessels in the 22 GPN patients

| Vessel | | No. of patients ** |
|---|---|---|
| Single arteries | | 18/22 (81.8%) |
| | PICA | 18/22 |
| | AICA | 0/22 |
| | VA | 0/22 |
| Multiple arteries | | 2/22 (9.1%) |
| | PICA and VA | 2/22 |
| Vein alone | | 0/22 (0%) |
| Others | | 2/22 (9.1%) |
| | Small vessels | 1/22(4.6%) |
| | No specific offender | 1/22(4.6%) |

8 of the patients (66.6%) underwent decompression via transposition with Teflon prosthesis and fibrin glue as the treatment of choice in the MVD, although some patients had to undergo decompression otherwise. 2 patients with perforators posed difficulty in transposition of the offending vessel that interposition technique was used with Teflon prosthesis and fibrin glue. 2 patients presented with very tortuous offending vessel that conventional transposition did not seem likely to provide enough decompression thus the sling technique was incorporated. (Table 5) The materials and methods used for sling technique vary, each with its unique advantages, but in our cases we have decided to use a hand-made glue-coated Teflon sling, made during the operation by the surgeon.

**Table 5**. Operation technique used in the 22 GPN patients

| Method | No. of pts |
|---|---|
| Transposition | 15/22 (68.2%) |
| - with T-glue | 8/22 (36.4%) |
| - with sling | 7/22 (31.8%) |
| Interposition with T-glue | 6/22 (27.3%) |
| Other | 1/22 (4.6%) |

# IV. DISCUSSION

GPN is similar to trigeminal neuralgia in its clinical course and manifestations, although it is more intractable to conventional treatments (Horowitz, 2004). Vascular compression of the nerve root entry zone or is thought to induce demyelination and consequent ephaptic transmission, causative of the symptomatic cranial rhizopathy.

The glossopharyngeal neuralgia induces classical symptoms of paroxysmal unilateral lancinating pain radiating to the ear, neck, and jaw, which can be triggered by movement such as swallowing, yawning, eating and talking. (Ozveren, 2003) Other symptoms include unpleasant sensation, palatal myoclonus, convulsions, syncope, and even cardiac arrest, associated with hemodynamic instability resulting from reflexive autonomic outflow (Ozenci, 2003). This is considered to be in connection with artificial synapses from the glossopharyngeal nerve communicating at the junction of the Hering nerve (Carotid sinus nerve) and the Jacobson nerve (Esaki et al, 2007) Differential diagnosis include Multiple sclerosis, CPA tumor, and Eagle's syndrome, (Ozenci, 2003) where the glossopharyngeal nerve is compressed by an elongated styloid process (>25mm) or calcification of the stylohyoid ligament, although this occurs in only about 4-10% of asymptomatic subjects, and can be treated by stylectomy (Pearce, 2006).

Treatment modalities for GPN include medications, mostly anticonvulsants such as carbamazepine, gabapentine and baclofen (Moretti, 2002), which inhibit pain through reduction of ephaptic transmission by increasing the threshold for cross-stimulation of large-diameter proprioceptive fibers. Percutaneous alcohol block, ganglion block, extracranial resection of nerve, gamma knife, and thermal rhizotomy (Rushton, 1981) are other considered options but with rather low satisfactory outcome compared to the MVD (Esaki et al, 2007) MVD is the most invasive treatment for the glossopharyngeal neuralgia, including various potential complications of hearing loss, tinnitus, dizziness, disturbance in balance or coordination, early or delayed CSF leakage, facial weakness or paralysis, intracranial hemorrhage, vascular injuries and postoperative headache (Dajian Li, 2010).

Despite these take-backs, MVD is suggested as the most effective procedure to treat typical medically intractable GPN (Dajian, 2010).

GPN was first described by Weinsburg in 1910 (Kondo, 1998). Dandy had first

postulated that nerve grooved or bent by the artery is the cause of 'tic douloureux', and in 1977 Laha and Jannetta first reported favorable results of the MVD for GPN (Yomo, 2009) and postulated that compression must be at the root entry zone of the cranial nerve to cause symptoms. (Janetta PJ, 1979) Ever since, MVD has become an accepted treatment for cranial rhizopathies. Ridder et al concluded in their experience of five MVDs that decompression of CNS segment and not the REZ resulted in a marked long-term improvement of the symptoms (Ridder, 2002), consistent with suggestion of Leclercq et al that compression can occur at any point along the cranial nerve, not only at the root entry zone. (Ridder, 2002) However, due to its low incidence, effectiveness and safety of MVD on glossopharyngeal neuralgia have not much been reported in the papers compared to other cranial rhizopathies that not all neurosurgeons consider MVD as the first treatment option for GPN patients.

Approach to lesions involving low cranial nerves, such as CN VII, IX and X, require lateral approach to the foramen magnum and the well-hidden jugular foramen (Dalan, 2010). The far lateral approach, the transcondylar approach and extreme lateral approach are well-known lateral approach (Matsushima, 2010). The surgical procedure of MVD for GPN are known to contain difficult aspects compared to hemifacial spasm and trigeminal neuralgia (Matsushima, 2010), for it is relatively small and greater retraction of the cerebellar hemisphere is usually required for proper exploration of the root exit zones of the glossopharyngeal and vagus nerves. (Kondo, 1998). Kondo et al has advocated incorporation of the transcondylar fossa approach rather than conventional lateral suboccipital approach for the mentioned reason. However, through reporting post-op treatment outcomes of GPN patients in our institution by the means of lateral suboccipital approach, we sought to inform safety and effectiveness of the MVD for the treatment of GPN.

Largest study on microvascular decompression of GPN to date is the study by Patel et al, reported in 2002. 217 patients were enrolled in the study with mean follow-up duration of 4 years, with immediate successful post-op outcome in 145 (67%) of patients and in 121 (58%) over the long-term follow-up, with 13 patients deceased (5.8%) and permanent cranial nerve palsy in 62 patients (28.5%), a rather high complication rate. The next largest study was that by Sampson et all in 2004, with 47 patient enrolled in the study for follow-up duration of 10.5-17.5 years, with immediate successful outcome in 46 patients (96%) and 96.5% in the long-term. Permanent cranial nerve palsy was observed in 5 of the long-term

followed 22 patients (17.2%), with no mortality, Study by Ferroli et all had shown a relatively good outcome, with 31 patient incorporatd in the study with good immediate post-op outcome in all the patients and good outcome in 28 patients (90.3%) over the long term. There was no morality, and except for 10 patients (32.2%) who developed transient cranial nerve palsy, there was no permanent deficit observed. These various studies have all used different type of approach and technique for the decompression, thus we postulated that no certain approach can guarantee definitely better outcome in the microvascular decompression.

In Kim's series (Kim JP, 2008), 87 Hemifacial spasm patients who underwent MVD were retrospectively analyzed, and the causative vessels were only either vertebral artery or basilar artery. Accessible offending vessels were repositioned with Teflon, and over 6 months follow-up, poor outcome was noted in 6 patients, 3 patients due to failure to define REZ, 2 patients due to insufficient decompression, and 1 patient due to slippage of Teflon. All three causes are consistent with the fact that decompression of the culprit vessel had failed, and this seems a key fact in achieving higher success rate with MVD. Our series had better outcomes compared to these other studies. This may be due to the selection bias coming from relatively small pool of patients, or patients in other institution may have had longer duration of symptoms preoperatively, a factor known to negatively contribute to treatment-intractable GNs, but not all studies have referred to this. But I believe our relatively higher success rate may be associated with enough decompression, one factor we have tried to focus on the most. Other studies have mostly incorporated the transposition technique or interposition without regards to the offender vessel status, and may be some offender may not have undergone decompression enough that induced recurrence in some cases.

In Kim's series, the relatively massive and tortuous character of offending vessel may have been the cause of complete decompression failure. In cases where offending vessel could not be displaced with conventional techniques, the vascular transposition using a sling retraction was originally developed by Fukushima, and a variety of sling retraction techniques have subsequently been reported using aneurysm clips, Gore-tex tape , or fascia strips. (Masuoka, 2011) But we decided to use this glue-coated Teflon sling, not used in previous studies, for following reasons. The teflon had the advantage of being relatively light-weighted as to cause no additional compression to the operated site, physiologic as to

cause less inflammation to the parenchyme, not so sharp as to prevent injury to the surrounding neuro-vasculatures, and the glue was expected to induce adhesion with contacted parenchyma to make sure sling could stay in its place. I so far have experienced no recurrence in patients who have undergone microvascular decompression via our sling technique, that along with outcome, that I believe this is a good method and technique for decompression in cranial rhizopathy.

# V. CONCLUSION

Glossophryngeal neuralgia can be safely and affectively treated with microvascular decompression, therefore surgical method should be considered in medically intractable Glossopharyngeal neuralgia patients without much delay, for prolonged symptom can contribute to relatively low treatment outcome rate.

The MVD success rate may depend not on the surgical approach type, but on adequate transposition of the offender. Fibrin glue-coated Teflon sling is useful to achieve a successful outcome. Further long-term studies are needed with this sling technique applied to more cases, to confirm its beneficial effect on the success rate of the GPN MVD.

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## - 국문 요약 -

# 설인신경통 미세혈관 감압수술에서 피브린아교를 덧칠한 테플론 슬링을 사용한 원인 질환 치환술의 역할에 대한 고찰

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**배경:** 설인신경이 자극되어 발생하는 설인신경통은 씹거나 삼키는 등의 간단한 일상행동에 의해서도 강력한 통증을 유발할 수 있기 때문에 치료하지 않으면 환자의 일상생활영위에 큰 악영향을 끼칠 수 있다. 하지만 설인신경통은 다른 신경통에 비해 특히 더 약물치료에 반응하지 않아 치료가 어려워 효과적인 치료방법으로 수술적 치료가 대두되고는 한다. 설인신경통의 미세감압술은 효과가 좋은것으로 알려져 있으나 병의 빈도가 낮아 이에 대한 연구가 상대적으로 적은 관계로 미세감압술이 다른 치료방법에 비해 그 안전성과 효과성이 확실히 입증돼있지는 않다. 또한 수술 이후 재발하는 경우가 보고되고 있다.

**목적:** 설인신경통 환자에서 새로운 슬링기술을 이용한 미세감압술을 시행하여 얻은 좋은 결과의 보고와 문헌의 보고.

**연구 디자인:** 같은 진단아래 1명의 의사에세 같은 수술을 시행받은 환자들의 후향적 연구

**연구 대상 및 방법:** 단일기관에서 1996년부터 2012년에 걸쳐 설인신경통을 진단받고 미세감압술을 시행받은 22명의 환자를 대상으로 후향적 연구를 시행하였다. 수술은 한명의 숙련된 의사에 의해 시행되었으며, 측부 후두하근을 통한 후유양

돌기 개두술을 시행하였다. 감압을 위해 대다수인 8명 (36.4%)이 아교를 이용한 전치술을 시행받았으며, 7명 (31.8%) 이 굴절이 심한 혈관을 갖고있어 슬링을 이용한 전치술을 시행받았고, 전치술이 불가능했던 나머지 환자들은 삽입중재술을 시행하였다.

**결과:** 수술 전 있던 증후들은 수술 직후 모든환자에서 호전되었으며, 현재까지 추적관찰 중 재발한 환자는 없다. 수술 후 합병증은 22명중 5명에서 발생했으나 모두 일시적이었고, 수술과 관련된 사망은 없었다.

**결론:** 설인신경통은 미세감압술로 안전하고 효과적으로 치료 될 수 있으며, 충분한 감압이 이 수술에서 효과적인 결과를 도출해내는 데 가장 중요한 인자로 생각된다. 피브린아교를 덧칠한 테플론 슬링은 기존의 방식으로는 충분한 감압이 이루어지지 않을 사례에서 원활하고 확실한 전치술을 시행하게 도와 좋은 치료성적에 기여하는 것으로 생각된다.

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**핵심어:** 미세감압술, 설인신경통, 테플론, 슬링