Anthem

Clinical UM Guideline

Subject: Radiofrequency Neurolysis and Pulsed Radiofrequency Therapy for Trigeminal Neuralgia
Guideline #: CG-SURG-89 **Publish Date:** 06/28/2023
Status: Reviewed **Last Review Date:** 05/11/2023

Description

This document addresses the use of radiofrequency (RF) neurolysis and pulsed radiofrequency (PRF) therapy for the treatment of trigeminal neuralgia.

Note: Please see the following related document for additional information:

- SURG.00096 Surgical and Ablative Treatments for Chronic Headaches

Clinical Indications

Medically Necessary:

Radiofrequency (RF) neurolysis is considered **medically necessary** for those with trigeminal neuralgia who do not respond to or cannot tolerate medical management, invasive surgery, or other percutaneous treatments.

Not Medically Necessary:

Radiofrequency (RF) neurolysis is considered **not medically necessary** for those with trigeminal neuralgia who do not meet the above criteria.

Pulsed radiofrequency (PRF) therapy as a treatment for trigeminal neuralgia is considered **not medically necessary.**

Coding

The following codes for treatments and procedures applicable to this guideline are included below for informational purposes. Inclusion or exclusion of a procedure, diagnosis or device code(s) does not constitute or imply member coverage or provider reimbursement policy. Please refer to the member's contract benefits in effect at the time of service to determine coverage or non-coverage of these services as it applies to an individual member.

Radiofrequency Neurolysis

When services may be Medically Necessary when criteria are met:

CPT	
61790	Creation of lesion by stereotactic method, percutaneous, by neurolytic agent (eg, alcohol, thermal, electrical, radiofrequency); gasserian ganglion [specified as RF]
61791	Creation of lesion by stereotactic method, percutaneous, by neurolytic agent (eg, alcohol, thermal, electrical, radiofrequency); trigeminal medullary tract [specified as RF]
64600	Destruction by neurolytic agent, trigeminal nerve; supraorbital, infraorbital, mental, or inferior alveolar branch [specified as RF]
64605	Destruction by neurolytic agent, trigeminal nerve; second and third division branches at foramen ovale [specified as RF]
64610	Destruction by neurolytic agent, trigeminal nerve; second and third division branches at foramen ovale under radiologic monitoring [specified as RF]
ICD-10 Procedure	
	For the following codes when specified as radiofrequency neurolysis:
005K0ZZ-005K4ZZ	Destruction of trigeminal nerve [by approach; includes codes 005K0ZZ, 005K3ZZ, 005K4ZZ]
ICD-10 Diagnosis	
G50.0	Trigeminal neuralgia

When services are Not Medically Necessary:
For the procedure codes listed above when criteria are not met or when the code describes a procedure or situation designated in the Clinical Indications section as not medically necessary.

Pulsed Radiofrequency Therapy

When services are Not Medically Necessary:
For the following procedure and diagnosis codes; or when the code describes a procedure designated in the Clinical Indications section as not medically necessary.

CPT	
64999	Unlisted procedure, nervous system [when specified as pulsed radiofrequency therapy]
ICD-10 Diagnosis	
G50.0	Trigeminal neuralgia

Discussion/General Information

Trigeminal neuralgia (TN) is a neurological condition affecting the sensory division of the fifth cranial (trigeminal) nerve. It is characterized by recurrent episodes of severe pain, which is confined to the distribution of one or more of the trigeminal nerve's three branches: the ophthalmic (V1), maxillary (V2), and mandibular (V3) divisions. The sensory root of the trigeminal nerve supplies the

face, teeth, mouth, and nasal cavity. In TN, sudden and excruciating unilateral (one-sided) facial pain arises, following stimulation of specific trigger zones by movement or touch.

The mechanism of TN pain remains unknown. One theory suggests that peripheral injury or disease of the trigeminal nerve increases afferent firing in the nerve, perhaps by ephaptic transmission between afferent unmyelinated axons and partially damaged myelinated axons. Failure of central inhibitory mechanisms may also be involved. Blood vessel and nerve cross compression, aneurysms, chronic meningeal inflammation, tumors, or other lesions may irritate trigeminal nerve roots along the pons. In some cases, no vascular or other lesion is identified, thus rendering the etiology unknown.

In the majority of cases, TN can be medically managed using drug therapy. For those individuals unwilling, unable, or refractory to drug therapy, there are several options in addition to RF neurolysis. These options include, but are not limited to: surgery, gamma knife radiosurgery, or microvascular decompression (AAN, 2008).

RF neurolysis involves the use of heat produced by radio waves, which is percutaneously introduced via electrode placement adjacent to the trigeminal nerve using fluoroscopic guidance. This creates a lesion within the trigeminal nerve, which interrupts the painful sensory nerve impulses. RF neurolysis has the potential risk of neuritis. In addition, histological studies have revealed indiscriminate destruction of both small and large fibers following RF neurolysis. For this reason, PRF has been considered as a non-destructive alternative to standard RF neurolysis in that it applies RF energy with a pulsed time cycle that delivers short bursts of RF current instead of a continuous RF flow. By pulsing the electrical current, the needle remains relatively cool (up to 42 degrees Celsius compared to temperatures of 60-69 degrees Celsius with continuous RF) so that the tissue cools slightly between each burst, reducing the risk of destroying nearby tissue and preventing any long-term damage to the nerve. It is postulated that this disrupts the transmission of impulses across small unmyelinated fibers without destroying them, while larger fibers remain protected by the myelin sheath.

Radiofrequency Neurolysis

A number of clinical studies evaluating the clinical utility of RF neurolysis for TN have been published in the peer-reviewed medical literature. These studies include four prospective, uncontrolled clinical trials (Mathews, 2000; Scrivani, 1999; Taha, 1995; Zakrzewska, 1999) and one retrospective, uncontrolled chart review (Kanpolat, 2001). Three additional retrospective comparative studies examined the efficacy of RF neurolysis, as compared with other established treatment modalities, including microvascular decompression (MVD), balloon microcompression (BMC), glycerol rhizotomy (GR), partial trigeminal rhizotomy (PTR), neurectomy and alcohol block (Oturai, 1996; Taha, 1996). A literature search did not identify any placebo-controlled studies. The major outcome measures were largely subjective and included pain relief, recurrence rates and side effects (such as facial numbness/degree of sensory loss), trigeminal motor dysfunction, and nerve deficits.

In these studies, 83-99% of participants treated with RF neurolysis experienced initial complete pain relief. Taha and Tew (1996) reported initial success rates of 98% for RF ablation and MVD with recurrence rates of 20% and 15% for RF neurolysis and MVD, respectively. RF neurolysis resulted in similar initial success rates as observed with BMC, GR and PTR. Pain recurrence rates were highest for GR (54%), followed by RF neurolysis (20% to 23%), BMC (21%), PTR (18%), and MVD (15%). Initial success rates and recurrence rates were lower for neurectomy and alcohol block (42%) compared to RF neurolysis, with comparable incidence of complications (Oturai, 1996). Repeat procedures increased long-term efficacy in three studies (Kanpolat, 2001; Mathews, 2000; Scrivani, 1999). Long-term safety data from prospective uncontrolled and retrospective clinical studies are available for a time frame of 6 months to 20 years. Although these studies have methodological limitations and variations in study design, the data suggest that RF neurolysis is a relatively effective treatment option for those with TN with few serious, irreversible complications.

Zakrzewska and colleagues (2011) reviewed the literature for RF as compared with MVD treatments. Ablative procedures result in sensory loss, and MVD carries a 0.2-0.4% risk of mortality with a 2-4% chance of ipsilateral hearing loss. However, both procedures provided pain relief: 50% in RF and 70% in MVD over 14 years.

Another meta-analysis of 14 studies compared the clinical utility of three percutaneous treatments for TN; RF, glycerol rhizotomy (GR) and balloon compression (BC); each treatment aims to injure the trigeminal nerve by targeted injury to the nerve fibers. The comparisons of RF versus GR comprised 2518 individuals and showed that RF was associated with a statistically significant higher odds of immediate pain relief (odds ratio [OR]=2.65; 95% confidence interval [CI], 1.29 to 5.44) when compared to GR. The RF group also had a statistically significant higher risk of anesthesia in the trigeminal distribution (OR=4.73; 95% CI, 2.25 to 9.96) and a lower risk for herpes eruption (OR=0.30; 95% CI, 0.17 to 0.56). Compared to BC, RF did not show significant differences between the two groups (n=3183). Authors conclude that RF is as good as, or better than, other widely used percutaneous treatments for TN (Texakalidis, 2019).

Pulsed Radiofrequency Therapy

Erdine and colleagues (2007) reported the results of a trial of 40 participants with TN who were randomized to receive either PRF or conventional RF. Measurements of pain improved in those treated with conventional RF, but in only 2 of 20 who received PRF. The authors concluded that PRF therapy was not an effective treatment for TN.

Li and colleagues (2012) reported a prospective randomized controlled study (RCT) of 60 subjects with TN to compare treatment with continuous RF (CRF) or PRF combined with CRF to the Gasserian ganglion (GG). Subjects were randomized into three groups receiving either 75°C CRF for 120s (seconds) to 180s (SCRF group), 75°C CRF for 240s to 300s (LCRF group), or 42°C PRF for 10 minutes followed by 75°C CRF for 120s to 180s (PCRF group). Participants were assessed for pain intensity, quality of life (QOL), and intensity of facial dysesthesia at baseline, at 7 days, and at 3, 6, and 12 months after the procedure. The efficacy in pain relief was most significant 7 days after treatment, and there were no significant differences between groups. After 12 months, greater than 70% of those in each group had complete pain relief, and the QOL in all three groups had increased significantly compared to baseline. The authors concluded that PRF combined with CRF can achieve comparable pain relief to those who receive CRF alone; however, shorter exposure of CRF could result in less destruction of the target tissue. Although the outcomes of this study are promising, larger studies with longer follow-up are needed to validate the clinical efficacy of treatment using RF combined with PRF.

Chua and colleagues (2012) conducted a retrospective review of 36 individuals treated for TN with PRF. The researchers conducted telephonic follow-up interviews for 34 participants. From the retrospective review of the documented clinical results of all 34 individuals, the percentages of those who showed excellent pain relief (greater than or equal to 80% pain relief) at 2, 6, and 12 months were 73.5% (25/34), 61.8% (21/34), and 55.9% (19/34), respectively; those with satisfactory pain relief (50-80% pain relief) at 2, 6, and 12 months were 14.7% (5/34), 17.6% (6/34), and 17.6% (6/34), respectively; and those showing less than satisfactory pain relief (less than 50% pain relief) at 2, 6, and 12 months were 11.8% (4/34), 20.6% (7/34), and 23.5% (8/34), respectively. No complications were reported, and no subjects required hospitalization. The authors acknowledged that more research is required to qualify PRF for TN as an accepted treatment modality.

The use of pulsed radiofrequency (PRF) for the treatment of TN, either as a sole treatment or combined with RF, is controversial. Studies supporting the benefit of PRF for TN consist of small studies, case studies, or retrospective reviews (Liao, 2017; Thapa, 2015;

Zhao, 2015). While some studies have reported potential benefit with PRF therapy under specific circumstances (Yao, 2016), further large randomized studies are needed to evaluate efficacy in the clinical setting.

Sridharan and Sivaramakrishnan (2017) performed a meta-analysis to compare the efficacy of various interventions for refractory TN. For radiofrequency-related interventions, the authors included four RCTs (n=196). The authors found that continuous radiofrequency (alone or in combination with pulsed radiofrequency) was more effective than pulsed radiofrequency alone, including high voltage pulsed radiofrequency. However, the authors noted that the quality of evidence was low, and high-quality trials are needed to generalize the findings.

In 2019, Wu and colleagues published a systematic review and meta-analysis on the efficacy and safety of RF ablation for the treatment of trigeminal neuralgia. The authors included 34 studies (n=3558) on CRF, PRF and combined CRF and pulsed radiofrequency (CCPRF). A total of 79.4% of the studies were considered low quality. They concluded that CCPRF has the potential to have clinical utility, but further RCTs are needed before any recommendations can be made.

In 2023, Mansano and colleagues conducted an RCT which enrolled 30 participants with classical trigeminal neuralgia who had failed to respond to drug treatment. Participants were randomized 1:1 into one of two groups, a thermal RF or a control group. Following sensory and motor stimulation, the group received RF at 75°C for 60 seconds. The primary outcomes were the Numerical Rating Scale (NRS), the 36-Item Short-Form Health Survey questionnaire, and anticonvulsant dose. After 1 month, the mean NRS score decreased from 9.2 to 0.7 in the RF group and from 8.9 to 5.8 in the sham group, this reduction was measurable within 1 day of the procedure and remained significant throughout the first month. After 1 month, participants were permitted to change groups, 1 participant from the RF group and 12 from the control group crossed-over, after which time the pain reduction was similar between the groups. The SF-36 scores demonstrated improvement in the first 30 days following the procedure, these differences diminished for the remaining 11 months of the study's follow-up period after cross-over was permitted. Similarly, there was a significant reduction in the use of anticonvulsants within the first 30 days following RF, whereas the remaining 11 months showed no statistical difference. Authors conclude that, "these results support using radiofrequency nerve ablation as at treatment for refractory trigeminal neuralgia."

Systematic reviews and meta-analyses continue to support the efficacy of RF ablation as a treatment for trigeminal neuralgia with mixed conclusions regarding the efficacy of PRF therapy (Garcia-Isidoro; 2021; Orhurhu, 2020; Texakalidis, 2021; Zhang, 2022).

Definitions

Neurolysis: The release of a nerve sheath by cutting it longitudinally; the operative breaking up of neural adhesions.

Neuralgia: An intense burning or stabbing pain that extends along one or more nerve pathways caused by irritation or nerve damage from systemic disease, inflammation, infection, and compression or physical irritation of a nerve.

References

Peer Reviewed Publications:

1. Chua NHL, Halim W, Beems T, Vissers KCP. Pulsed radiofrequency treatment for trigeminal neuralgia. Anesth Pain. 2012; 1(4):257-261.
2. Erdine S, Ozyalcin NS, Cimen A, et al. Comparison of pulsed radiofrequency with conventional radiofrequency in the treatment of idiopathic trigeminal neuralgia. Eur J Pain. 2007; 11(3):309-313.
3. Garcia-Isidoro S, Castellanos-Sanchez VO, Iglesias-Lopez E, Perpiña-Martinez S. Invasive and non-invasive electrical neuromodulation in trigeminal nerve neuralgia: A systematic review and meta-analysis. Curr Neuropharmacol. 2021;19(3):320-333.
4. Hitchon PW, Holland M, Noeller J, et al. Options in treating trigeminal neuralgia: Experience with 195 patients. Clin Neurol Neurosurg. 2016; 149:166-170.
5. Kanpolat Y, Savas A, Bekar A, Berk C. Percutaneous controlled radiofrequency trigeminal rhizotomy for the treatment of idiopathic trigeminal neuralgias: 25 year experience with 1,600 patients. Neurosurgery. 2001; 48(3):524-534.
6. Li X, Ni J, Yang L, et al. A prospective study of Gasserian ganglion pulsed radiofrequency combined with continuous radiofrequency for the treatment of trigeminal neuralgia. J Clin Neurosci. 2012; 19(6):824-828.
7. Mathews ES, Scrivani SJ. Percutaneous stereotactic radiofrequency thermal rhizotomy for the treatment of trigeminal neuralgia. Mt Sinai J Med. 2000; 67(4):288-299.
8. Mansano AM, Frederico TN, Valentin REB, et al. Percutaneous Radiofrequency ablation for trigeminal neuralgia management: a randomized, double-blinded, sham-controlled clinical trial. Pain Med. 2023; 24(3):234-243.
9. Orhurhu V, Khan F, Quispe RC, et al. Use of radiofrequency ablation for the management of facial pain: A systematic review. Pain Physician. 2020; 23(6): E559-E580.
10. Oturai AB, Jensen K, Eriksen J, Madsen F. Neurosurgery for trigeminal neuralgia: comparison of alcohol block, neurectomy and radiofrequency coagulation. Clin J Pain. 1996; 12(4):311-315.
11. Scrivani SJ, Keith DA, Mathews ES, Kaban LB. Percutaneous stereotactic differential radiofrequency thermal rhizotomy for the treatment of trigeminal neuralgia. J Oral Maxillofac Surg. 1999; 57(2):104-111.
12. Sridharan K, Sivaramakrishnan G. Interventions for refractory trigeminal neuralgia: a Bayesian mixed treatment comparison network meta-analysis of randomized controlled clinical trials. Clin Drug Investig. 2017; 37(9):819-831.
13. Taha JM, Tew JM Jr. Comparison of surgical treatments for trigeminal neuralgia: reevaluation of radiofrequency rhizotomy. Neurosurgery. 1996; 38(5):865-871.
14. Taha JM, Tew JM Jr, Buncher CR. A prospective 15-year follow-up of 154 consecutive patients with trigeminal neuralgia treated by percutaneous stereotactic radiofrequency thermal rhizotomy. J Neurosurg. 1995; 83(6):989-993.
15. Texakalidis P, Xenos D, Karras CL, Rosenow JM. Percutaneous surgical approaches in multiple sclerosis-related trigeminal neuralgia: A systematic review and meta-analysis. World Neurosurg. 2021; 146:342-350.
16. Texakalidis P, Xenos D, Tora MS, et al. Comparative safety and efficacy of percutaneous approaches for the treatment of trigeminal neuralgia: A systematic review and meta-analysis. Clin Neurol Neurosurg. 2019; 182:112-122.
17. Thapa D, Ahuja V, Dass C, Verma P. Management of refractory trigeminal neuralgia using extended duration pulsed radiofrequency application. Pain Physician. 2015; 18(3):E433-E435.
18. Wu H, Zhou J, Chen J, et al. Therapeutic efficacy and safety of radiofrequency ablation for the treatment of trigeminal neuralgia: a systematic review and meta-analysis. J Pain Res. 2019; 12:423-441.
19. Yao P, Hong T, Zhu YQ, et al. Efficacy and safety of continuous radiofrequency thermocoagulation plus pulsed radiofrequency for treatment of V1 trigeminal neuralgia: A prospective cohort study. Medicine (Baltimore). 2016; 95(44):e5247.
20. Zakrzewska JM, Jassim S, Bulman JS. A prospective longitudinal study on patients with trigeminal neuralgia who underwent radiofrequency thermocoagulation of the Gasserian ganglion. Pain. 1999; 79(1):51-58.
21. Zakrzewska JM, McMillan R. Trigeminal neuralgia: the diagnosis and management of this excruciating and poorly understood facial pain. Postgrad Med J. 2011; 87(1028):410-416.
22. Zhang X, Zhao H, Tang Y, et al. Comparison of the efficacy of reoperation, percutaneous radiofrequency thermocoagulation

when microvascular decompression of trigeminal neuralgia is invalid. J Craniofac Surg. 2016; 27(7):e688-e690.
23. Zhang X, Peng L, Liu D. Radiofrequency therapies for trigeminal neuralgia: a systematic review and updated meta-analysis. Pain Physician. 2022; 25(9):E1327-E1337.
24. Zhao WX, Wang Q, He MW, et al. Radiofrequency thermocoagulation combined with pulsed radiofrequency helps relieve postoperative complications of trigeminal neuralgia. Genet Mol Res. 2015; 14(3):7616-7623.

Government Agency, Medical Society, and Other Authoritative Publications:

1. Gronseth G, Cruccu G, Alksne J, et al. Practice parameter: the diagnostic evaluation and treatment of trigeminal neuralgia (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology and the European Federation of Neurological Societies. Neurology. 2008; 71(15):1183-1190. Reaffirmed May 22, 2021. Available at: http://www.neurology.org/content/71/15/1183.long. Accessed on March 23, 2023.
2. Zakrzewska JM, Akram H. Neurosurgical interventions for the treatment of classical trigeminal neuralgia. Cochrane Database Syst Rev. 2011;(9):CD007312.

Websites for Additional Information

1. Facial Pain Association. Trigeminal Neuralgia? Available at: www.facepain.org/understanding-facial-pain/diagnosis/trigeminal-neuralgia/. Accessed on March 23, 2023.
2. National Institute of Neurological Disorders and Stroke (NINDS). Trigeminal neuralgia information page. Available at: https://www.ninds.nih.gov/Disorders/All-Disorders/Trigeminal-Neuralgia-Information-Page. Accessed on March 23, 2023.

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The use of specific product names is illustrative only. It is not intended to be a recommendation of one product over another, and is not intended to represent a complete listing of all products available.

History

Status	Date	Action
Reviewed	05/11/2023	Medical Policy & Technology Assessment Committee (MPTAC) review. Updated References and Websites sections.
Reviewed	05/12/2022	MPTAC review. References, and Websites sections updated.
Revised	05/13/2021	MPTAC review. Clarified MN statement. Discussion/General Information, References, and Websites sections updated. Reformatted Coding section.
Reviewed	05/14/2020	MPTAC review. Discussion/General Information, References, and Websites sections updated.
Reviewed	06/06/2019	MPTAC review. Discussion/General Information, References, and Websites sections updated.
New	07/26/2018	MPTAC review. Initial document development. Moved content of SURG.00090 Radiofrequency Neurolysis and Pulsed Radiofrequency Therapy for Trigeminal Neuralgia to new clinical utilization management guideline document with the same title.
