Original Article

TRIGEMINAL NEURALGIA NEUROENDOSCOPIC APPROACH IN THE NEUROVASCULAR DECOMPRESSION LITERATURE REVIEW AND PRESENTATION OF CASES

Franze Osvaldo Antonio
Neurosurgery Service, V. Franchin Clinic, Buenos Aires.
Neurosurgery Service, San Jose Clinic, Buenos Aires.
Neurosurgery Service, Hospital of Infectology FJ Muñiz, Buenos Aires. Argentina.

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SUMMARY

Trigeminal neuralgia is a type of neuropathic pain, with lancinating facial pain paroxysmal often triggered by sensory stimulation in specific areas of the face, called trigger zones, following the distribution of any of its three branches, is generally unilateral although it can be bilateral. They are classified into primary (typical and atypical) and secondary. The typical pain is paroxysmal lancinating with trigger points and responds to carbamazepine. The atypical pain is constant and does not respond adequately to carbamazepine.

The nerve injury is caused in 80% by the compression exerted by the superior cerebellar artery, to a lesser extent by a vein, on other occasions they are arachnoid adhesions or a small posterior fossa.

The diagnosis is fundamentally clinical, imaging studies give us information fundamentally to rule out a secondary cause, only in a few cases neurovascular conflict is found.

The beginning of treatment is always medical: carbamazepine, if tolerated, is the main medication, in addition to other anticonvulsants and / or tricyclic antidepressants.

In the absence of an adequate response, as a coadjuvant measure, percutaneous procedures are performed . Likewise, radiosurgery is a therapy to have before certain situations. Nerve decompression with interposition of a synthetic material it presents a high percentage of long-term pain resolution. The techniques used are mainly two, on the one hand the use of the neurosurgical microscope and on the other the neuroendoscope.

Sixteen operated patients whose response to medical treatment was partial were evaluated. In 6 patients (37.5%) the microsurgical technique was used and in 10 patients (62.5%) the Neuroendoscope technique was performed.

Of the cases presented, the use of the neuroendoscope was more beneficial, because with the microsurgical technique 1 patient suffered facial affectation, and 2 of them had hearing loss attributable to the need for greater retraction and consequently greater nerve cranial traction.

Keywords: Trigeminal neuralgia, neurovascular decompression, neuroendoscopy.

INTRODUCCIÓN

After the definition of trigeminal neuralgia, a detailed description of the pathology taking into account the classification, clinical suspicion, diagnosis, studies essential complementary treatments, initial treatment, as well as the different possibilities therapies such as percutaneous or neurosurgical interventions, providing a guide in diagnosis and treatment.

Sixteen operated patients were evaluated where pre-surgical aspects were taken into account:

duration of symptoms at the time of surgery, laterality, sex, age group and branches of the trigeminal nerve affected. As well as postsurgical aspects: technique used and nerve compression reason. These data were compared with publications after the year 2000 of the Journal Neurosurgery.

The most important steps of the procedure were presented in a case operated by endoscopy.

(Jannetta's technique) in neurovascular decompression, the compression of which was due to artery and vein simultaneously involved.

It is highlighted that neuroendoscopy uses small approaches, avoiding retractions important nerve tissue. In addition to getting a close-up in deep areas and power have different angulations.

OBJECTIVES

Review updates on definition, diagnosis and treatment of this pathology, such as the cause of nerve compression.

Analyze the different data of surgical clinical aspects of 16 operated cases and compare them with those obtained in the bibliographic review.

Propose neuroendoscopy as a useful and valuable tool for decompression nervous.

Present a case operated using the endoscopic technique, detailing the steps with photos most important surgery.

METHODOLOGY

A bibliographic search was carried out in the publications of the Journal Neurosurgery from from 2000 to 2021 on Trigeminal Neuralgia.

We obtained updated data on definition, diagnosis, different types of treatments and pathophysiology. Publications on decompression techniques were also reviewed. Neurovascular using neuroendoscopic and microsurgical technique.

Sixteen operated patients were analyzed where pre-surgical aspects were taken into account:

time of ailment until the time of surgery (they were divided into two groups before or after five years), lateralization, sex, if I can reach the maximum doses tolerated by the patient of the pharmacological treatment, age and branches of the trigeminal nerve affected. Within the postsurgical aspects: appearance of facial appearance, hearing loss, cerebellar damage, fistula of CSF, infection, recurrence of pain, death, if medication was withdrawn, technique used and cause of compression.

The most important steps of a case operated by neuroendoscopy.

GENERAL DESCRIPTION

Trigeminal neuralgia is a type of neuropathic pain, with lancinating facial pain paroxysmal often triggered by sensory stimulation in specific areas of the face, called trigger zones, following the distribution of any of its three branches, generally unilateral although it can be bilateral. Epidemiological studies have estimated the incidence rate in a range of 11 to 42 cases.

Every 100,000 inhabitants per year, with the majority of patients being between 50 and 60 years.

We can classify them into:

Primary or idiomatic caused by arterial compression in its highest percentage, venous, Arachnoid adhesions or small angulopontocerebellar cistern. In turn this can to be:

- Typical or Type 1:

Where its clinical presentation is paroxysmal, lancinating pain with points that trigger pain before stimuli called trigger, respects the corresponding dermatome and responds to the carbamazepine.

- Atypical or Type 2:

In this case, the pain is constant associated with dysestecias, it does not respond adequately to carbamazepine and involves severe neuropathic pain.

The concept that vessels could compress cranial nerves was introduced by Dandy and Gardner.

Jannetta later expanded this theory of neurovascular compression and I develop the surgical procedure with the microsurgical technique of decompression nervous of the affected nerve.

Compression corresponds 80% to that exerted by the anterosuperior cerebellar artery.

It can also be caused by a persistent trigeminal artery (embryologic), venous compression, arachnoid adhesions, or a small posterior fossa.

The secondary is associated with pathologies such as neoplasms, aneurysms, malformations arteriovenous or post herpetic neuralgia.

The diagnosis is clinical, complementary imaging studies are requested, such as an MRI of the brain with and without contrast and an MRI angiography of intracranial vessels, to rule out a possible secondary pathology, knowing that in few cases we will visualize the neurovascular conflict.

Symptoms elicited in the primary or idiopathic type are due to induced changes due to axonopathies that cause electrical excitability in the afferent axons, generating ectopic impulses and excitation created between neighboring afferent fibers.

In patients with multiple sclerosis, neuralgia is caused by the development of plaques demyelinating in the entry areas of the nerve root and descending tracts.

It must be taken into account that in cases whose involvement includes the first branch of the nerve there may be sympathetic autonomic involvement, on the other hand it is a crucial detail to avoid ablative treatments.

First-line treatment for trigeminal neuralgia is pharmacological, carbamazepine is still a drug approved by the US FDA, The Academy American Neurology and the European Federation of Neurological Societies.

Many times it is necessary to add other drugs.

In the absence of response to drug treatment and continuing with it, we have with different adjuvant techniques that are minimally invasive procedures when Gasser's ganglion: radiofrequency thermolesion, balloon compression, chemical injury with glycerol.

Each one presents precise indications according to the branches affected, the behavior clinical, patient comorbidities, etc.

Nerve decompression provides us with long-term resolute therapy.

The subarachnoid space provides safe corridors to reach the nerve, expose it, and decompress it in a delicate and complete way, with a high rate of presenting good results.

Among the techniques used we have, on the one hand, the use of the microscope neurosurgical whose vision is tubular from outside the skull and on the other hand we have the neuroendoscope procedures.

Neuroendoscopy is a minimally invasive technique that provides access to the cavities intracranial and subarachnoid spaces through small craniectomies / craniotomies or natural cranial orifices avoiding significant retractions of brain tissue.

It gives an internal vision in the foreground and the possibility of using lenses with different angulations.

Undoubtedly, the frequent use of a certain technique gives us a curve of valuable learning for any procedure and therefore the best benefits for the patient suffering from the ailment that is the main objective sought.

Radiosurgery with Gamma Knife is a non-invasive option for particular cases, with acceptable rates of pain relief, however pain recurs frequently. In such cases consider repeating the procedure offering similar efficacy but with a rate of major toxicity.

After radiosurgery, decompression surgery is not contraindicated, although the risks of complications are higher compared to situations where the surgery was performed without prior radiotherapy.

Presurgical and postsurgical aspects of 16 patients operated with neuralgia were analyzed trigeminal patients who did not respond to medical treatment at maximum tolerated doses.

Three of them underwent percutaneous treatment with symptomatic relief for a time no longer than two years.

Patients with an evolution of more than 5 years presented associated hyperesthesia on the affected branches.

In the postoperative period, 200 mg of carbamazepine was prescribed every 12 hours to all patients. Two years after surgery, the medication was discontinued, without recurrence of pain.

PRESURGICAL ASPECTS:

Table 1. Duration of symptoms

Duración de los síntomas	N. of patients	Percentage
Less than 5 years	4	25%
Longer than 5 years	12	75%

Table 2. Laterality

Lateralidad	N. of patients	Percentage
Right	10	62,5%
Left	6	37,5%

Table 3. Sex

Sex	N. of patients	Percentage
Male	8	50%
Female	8	50%

Table 4. Age group

Age group	N. of patients	Percentage
30 - 39 years	3	18,75%
40 - 49 years	6	37,5%
50 - 59 years	7	43,75%

Tabla 5. Affected Branches

Affected Branches	N. of patients	Percentage
V1-V2-V3	2	12,5%
V2-V3	10	62,6%
V1-V2	2	12,5%
V3	2	12,5%

POST-SURGICAL ASPECTS:

The 16 operated patients did not present cerebellar lesion, cerebrospinal fluid fistula, post-surgical infections, recurrence of pain or death.

Neurovascular compression could be verified in all despite not being evidenced in the complementary preoperative imaging studies.

After two years, the medication was progressively discontinued.

The complications that arose were: one of the patients presented facial paresis that it partially reverted with rehabilitation and two had hearing loss that did not resolve.

Are complications occurred in patients with the use of the surgical microscope attributed to greater cerebellar retraction.

Tabla 2.1. Surgical technique

Surgical technique	N. of patients	Percentage
Microsurgical	6	37,5%
Neuroendoscopic	10	62,5%

Tabla 2.2. Motivo de compresión

Motivo de compresión	N. of patients	Percentage
Artery	13	81,25%
Vein	2	12,5%
Artery and Vein	1	6,25%

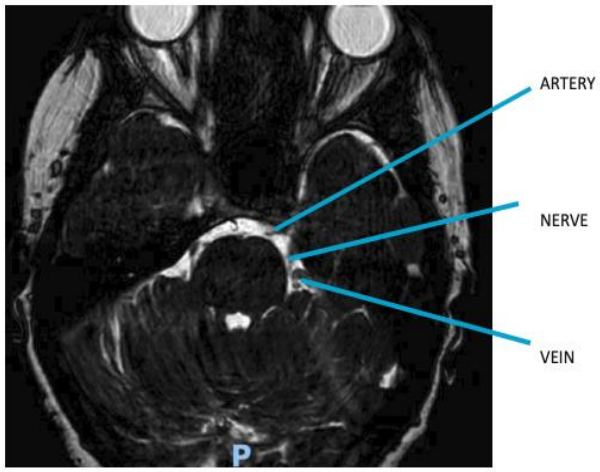
PRESENTATION OF A CASE OPERATED USING THE NEUROENDOSCOPIC TECHNIQUE:

59-year-old male patient, whose history of neuralgia of the trigeminal is 10 years, it presents involvement of the left V2 and V3 branches.

Continuous lancinating pain and trigger points, hyperesthesia in affected branches.

Did not respond to pharmacological treatment at maximum doses tolerated by the patient, polymedicated.

Indication of Neuroendoscopic Nerve Decompression Surgical Conduct.



RMN DE CEREBRO PRE QX

SURGICAL TECHNIQUE:

Patient in prone position, with head rotated to the left. Retrosigmoid, craniectomy measuring approximately 3 by 2 cm, dural opening, admitted with the neuroendoscope and minimal retraction, by the anterolateral aspect of the cerebellar hemisphere left following the superior border, respecting the neurovascular structures.

Coagulation and cut of the emissary vein that drains into the petrosal venous sinus to prevent tearing and bleeding.

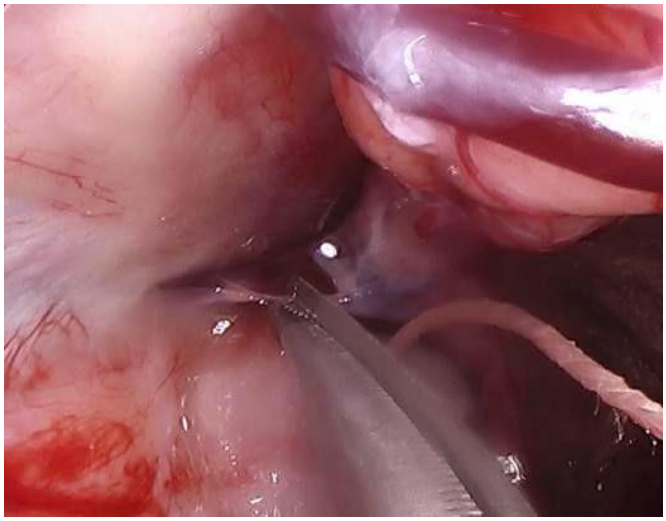


Image 1: Coagulation and section of the emissary vein that drains into the sinus venous petrosal.

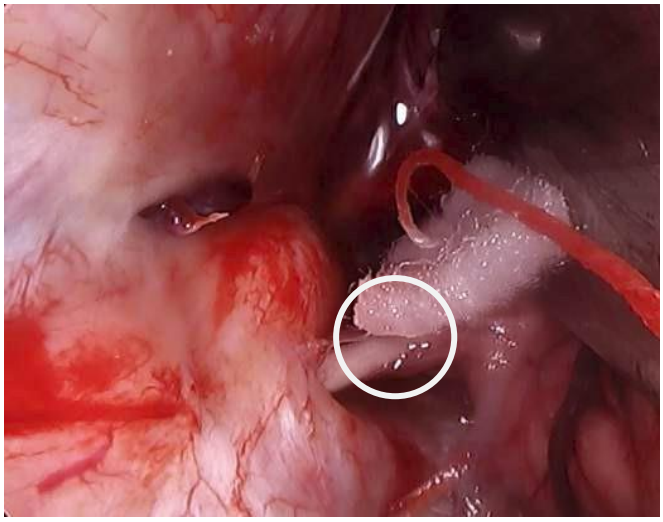


Image 2: Location and repair avoiding traction of the VIII and VII cranial nerves.

Image 3: Dissection of the arachnoid tissue reaching the V

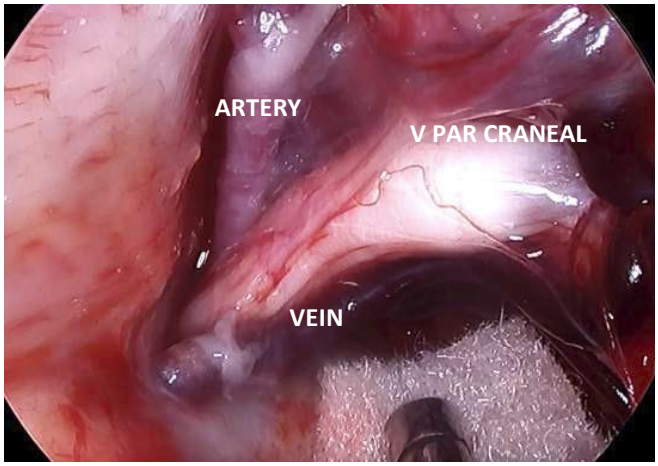


Imagen 4: Beginning of the release of the V pair of arachnoid tissue, exposing in this case the artery and the vein that compresses the nerve

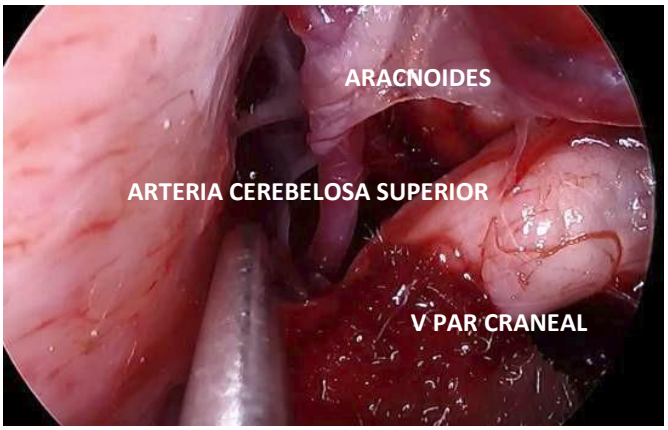


Imagen 5: Arterial component release.

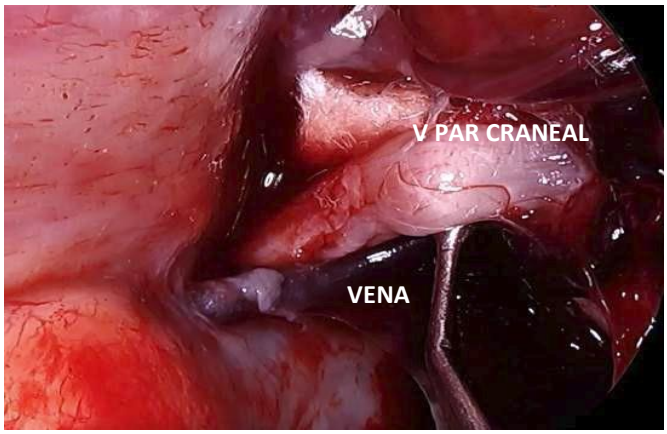


Imagen 6: Interposition between artery and nerve with Teflon patch.

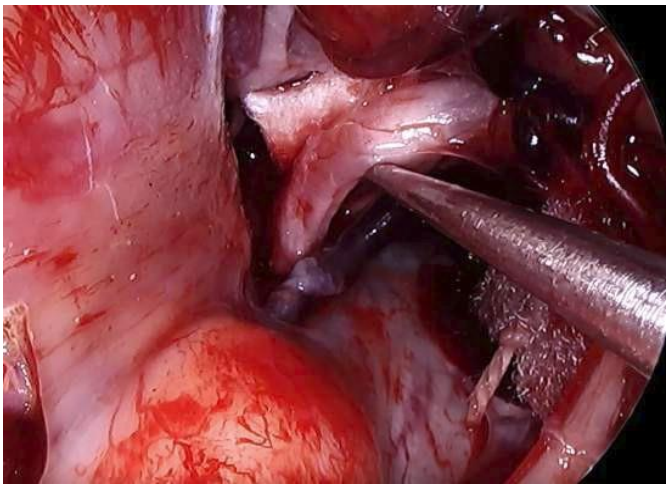


Imagen 7: Release of venous component.

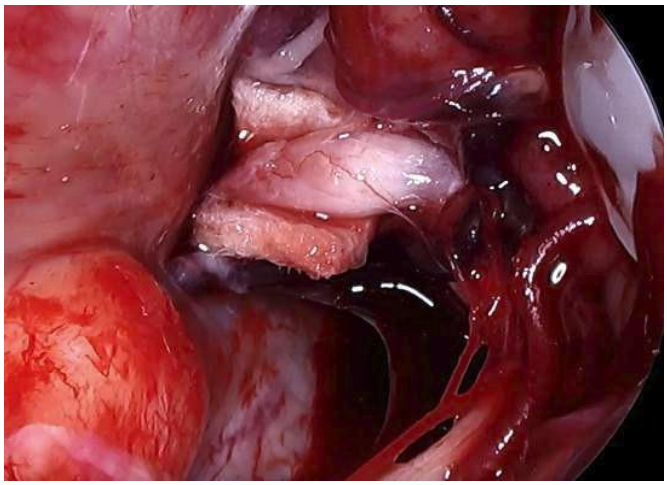


Imagen 8: Interposition between vein and V cranial nerve with Teflon patch.

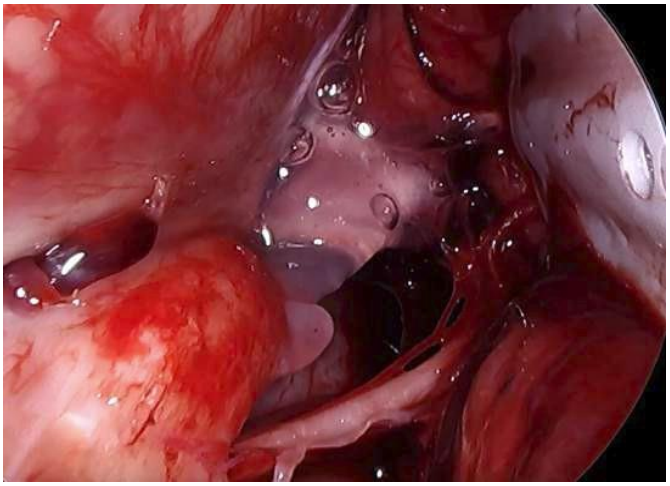


Imagen 9: Verification that the nerve is totally liberated and separated from vascular structures, prior to biological glue is placed.

The patient had a good evolution, waking up from the anesthesia without pain. Were not observed complications. In the postoperative period, 200 mg of carbamazepine was administered every 12 hours, after two years the medication is progressively discontinued. There was no recurrence.

RESULTS

Trigeminal neuralgia is a type of neuropathic pain that affects the facial region of the type lancinating paroxysmal often triggered by sensory input.

The pathophysiology of pain generation is due to afferent fiber axonopathies generating ectopic impulses caused by chronic compression generally neurovascular.

The diagnosis is clinical, complementary imaging studies such as MRI of brain with and without contrast and MRI Angiography of intracranial vessels, are necessary to rule out secondary pathology such as neoplasms, vascular malformations, among others. The Neurovascular conflict is visualized in a low percentage.

The first-line treatment is always pharmacological if possible with carbamazepine, Faced with the inadequate response to medical treatment, we have percutan techniques minimally invasive whose therapeutic response is variable.

Neurosurgical procedures for nerve decompression neurosis have shown very good long-term results.

Taking into account the 16 cases presented, 75% of the patients underwent surgery after within 5 years of starting symptoms. It is most common between the ages of 50 and 60. The right side and the combination of branches V2-V3 were the most affected.

Post-surgical complications such as hemifacial paresis that progressively improved and Hearing loss was attributed to cerebellar retraction to improve the field of vision with the use of the surgical microscope. Therefore, the benefit with the use of the neuroendoscope.

81.25% neurovascular compression was due to the superior cerebellar artery.

After a 2-year post-surgical period, the medication was discontinued and the patients did not reported recurrences of pain.

In the clinical case presented, compression is mixed both arterial and venous.

CONCLUSIONS

Because primary trigeminal neuralgia corresponds to neuropathic pain with axonal injury due to chronic compression, the diagnosis should be considered to start treatment without delay.

In a percentage greater than 80%, the affectation is arterial compression.

Consider that the diagnosis is clinical and confirmation is not necessary through imaging studies, although they provide us with important data to rule out secondary pathology.

The initial treatment should always be pharmacological, in the first instance it should consider carbamazepine.

Percutaneous adjuvant treatments are useful with variable response and they should continue the medication.

Neurosurgical treatment is a safe procedure and provides benefits to long term.

The use of the neuroendoscope allows to use small approaches, less retraction cerebellar nerve avoiding the traction of cranial nerves so as not to injure them, visualization internal foreground and the possibility of using different viewing angles.

Training provides us with a very valuable learning curve for the benefit of the patient achieving better results.

CONFLICTS OF INTEREST

The Author manifests none.

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