



Percutaneous Trigeminal Thermocoagulation at Amiens-Picardie Teaching Hospital from 2004 to 2015: about 52 Procedures

Alain Jibia*, Christine Desenclos, Michel Lefranc, Louis Chenin and Johann Peltier

Department of Neurosurgery, Amiens-Picardie Teaching Hospital, Avenue Laennec Salouël, Amiens, Cedex 1, France

Abstract

Refractory trigeminal neuralgia may be source of heavy discomfort and disability for patients with pitiful quality of life. Trigeminal thermocoagulation by radiofrequency is helpful to provide a good outcome and better life. To report and assess our experience and to determine outcome of quality of life of patients after a percutaneous trigeminal thermocoagulation. Joint study both retrospective to analyse patients files admitted for a trigeminal thermocoagulation procedure from 2004 till 2015 and a prospective analysis with a questionnaire on quality of life before and after treatment; also use of scales to transcribe data and compare them to literature: *Barrow Neurological Institute Pain Intensity Score (BNI-PS)* and *Facial Numbness Scale (FNS)*, *modified Rankin Scale (mRS)* and *Excellent-Good-Fair-Poor Categorical Scale (EGFP)*. We have registered 52 procedures of 42 patients in 12 years. The sex ratio was 2/3 and the mean age 70 years. The preoperative BNI-PS was of V for 78.57% patients and the postoperative of III for 76.2%. The postoperative BNI-FNS was of I-II for 66.7% cases. Surgical results were excellent in 64.28%, using EGFP. We noticed 64.28% of repeat surgery with an average period of repeat surgery of 3.4 years. Thermocoagulation is useful in elderly more concerned by trigeminal neuralgia. The quality of life is improved up to 88% of patients according to *International Association for Study of Pain*. Trigeminal thermocoagulation may restore best quality of life especially the elderly, its recurrent repetitiveness is helpful for its efficiency.

Keywords

Thermocoagulation, Trigeminal neuralgia, Percutaneous electric nerve stimulation

Introduction

The idiopathic and drug-resistant trigeminal neuralgia is a paroxysmal facial pain which can cause acute and recurrent discomfort and disability. This pain is severe enough to affect the quality of life of each patient suffering from it [1], the latter reporting his painful experience quite often heavy. In addition, recommended first-line therapies (*Carbamazepine* and *Oxcarbazepine*, or *Phenytoin*, *Gabapentin*, *Baclofen*) quickly become useless for those patients, who will finally decline these treatments [2]. Trigeminal neuralgia became refractory after less of efficacy from 80 down to 50% in few years of use of conventional agents by auto-induction [2].

This affection mostly concern elders, justifying the use of non-invasive methods [3], apart from the surgical gold standard approach.

The radiofrequency thermocoagulation of the trigeminal ganglion and root is a percutaneous approach worked out by Wall and Sweet [4]. It is one of the most

used surgical procedure [1] and for over twelve years of common practise in Neurosurgery department of Amiens-Picardie teaching hospital. The several clinic interests of this technique and fewer papers about post-therapeutic quality of life led on this research work.

Objectives

To report and assess our experience and to determine outcome of quality of life of patients after a percutaneous trigeminal thermocoagulation.

***Corresponding author:** Alain Jibia, MD, Department of Neurosurgery, Amiens-Picardie Teaching Hospital, Avenue Laennec Salouël 80054 Amiens, Cedex 1, France, E-mail: alainjibson@gmail.com

Received: September 09, 2017; **Accepted:** January 23, 2018;
Published online: January 25, 2018

Citation: Jibia A, Desenclos C, Lefranc M, et al. (2018) Percutaneous Trigeminal Thermocoagulation at Amiens-Picardie Teaching Hospital from 2004 to 2015: about 52 Procedures. J Neurosurg Res Rev 1(1):14-18

Materials and Methods

We proceeded of a retrospective study of patients files admitted for a trigeminal thermocoagulation procedure from 2004 till 2015, performed by the same surgeon with the same technique. This due to surgeon experience and to most elder patients who may not support a heavy surgery or anaesthesia for a neurovascular decompression. The procedure was of a thermolysis focused on the trigeminal nerve branches affected by a targeted radiofrequency around 65-85 Hertz in 30-45 seconds, after a percutaneous puncture of the foramen ovale with radiologic control and short general anaesthesia. The frequency was modulated to the pain level of the patient.

A prospective analysis was secondary done through a personal questionnaire sent to patients homes or filled by them during a recent admission, as well as a consent form letter signed by some others to dispel any ethic doubt. In addition to the standard numerical pain scale, clinical items resulting from this questionnaire expressing quality of life before and after procedure were therefore selected: Facial numbness/dysesthesia, pain, primary needs (*eat, drink, laugh, sleep*), autonomy/socio-professional habits (*Annexe*). The experience of the trigeminal neuralgia was related by patients in their own words in this questionnaire, and collected similarly as in the *Mac Gill Pain Questionnaire* [5]. Some scales were used to analyse and transcript those quality of life factors: *Barrow Neurological Institute Pain Intensity Score (BNI-PIS)* and *Facial Numbness Scale (BNI-FNS)*, *modified Rankin Scale (mRS)*, and *Excellent-Good-Fair-Poor Categorical Scale (EGFP-CS)*, *Quality-Adjusted Life Year (QALY)*. Finally data were compared to the literature.

Results

Fifty-six (56) procedures were registered in 12 years that is 4.6 per year, representing a cohort of 42 patients brought together. They were 26 females and 16 males (*sex ratio = 2/3*). The mean age was 70 years with extremes of 40 and 88. The mean of preoperative pain scale was 9.6/10 compared to 2.2/10 of mean postoperative, with variable stages of preoperative discomfort or disability (**Table 1**).

The magnetic resonance imaging (MRI) was done in all cases. None morphologic lesion was found in 38 cases (90.47%) suggesting the idiopathic form of the trigeminal neuralgia.

Expressions used by patients to describe their daily life before surgery were: *"It is unliveable"*, *"It is suicidal"*, *"I am like a vegetable"*, *"I am as electrocuted"*, *"I cry all the time"*, *"I cannot well speak, laugh, eat or drink"*... BNI-PIS helped to transcribe these different items: V (severe pain, no relief) for almost 4/5 patients (78.57%) and IV (pain not adequately

controlled with medication) for (21.43%). The postoperative semiology was as: *"reviviscence"*, *"revival"*, *"goodness"*, *"deliverance"*. The postoperative BNI-PIS was III (some pain, adequately controlled with medication) (76.2%), II (occasional pain not requiring medication) (14.28%) and 9.52% not specified. We also used BNI-FNS: I-II (No or Not bothersome facial numbness) (66.7%), III (somewhat bothersome facial numbness) (23.8%) and 9.52% non-specified.

Table 1: Clinical preoperative features.

| Clinical items | | Size | Percentage (%) |
|--------------------------------------|---------------|------|----------------|
| Laterality | Left | 18 | 42.85 |
| | Right | 21 | 50 |
| | Bilateral | 3 | 7.14 |
| | V2V3 | 22 | 52.38 |
| | V2V1 | 3 | 7.14 |
| Topography | V2 | 11 | 26.2 |
| | V3 | 6 | 14.28 |
| | > 10 | 5 | 11.9 |
| | 10 | 11 | 26.2 |
| Pain scale (<i>on crisis</i>) | 9 | 13 | 30.95 |
| | 8 | 6 | 14.28 |
| | Non Specified | 7 | 16.66 |
| | 6 | 17 | 40.47 |
| Pain scale (<i>out of crisis</i>) | 5 | 10 | 23.8 |
| | ≤ 4 | 6 | 14.28 |
| | Non Specified | 9 | 21.42 |
| Number of specific drugs used before | 1* | 9 | 21.42 |
| | 2 | 21 | 50 |
| | ≥ 3 | 12 | 28.57 |

*Few patients were intolerant to specific drugs as Carbamazepine and the neuralgia were refractory to the substituent drug.

Table 2: Groups of patients as quality of life.

| Quality of life scales | | Sizes | Percentages (%) |
|------------------------|---------------|-------|-----------------|
| Preoperative BNI-PIS | V | 33 | 78.57 |
| | IV | 9 | 21.43 |
| Postoperative BNI-PIS | I | 6 | 14.28 |
| | II | 21 | 50 |
| | III | 11 | 26.2 |
| | IV | 1 | 2.38 |
| | Non-Specified | 3 | 7.14 |
| Postoperative BNI-FNS | I | 18 | 42.85 |
| | II | 12 | 28.57 |
| | III | 8 | 19.04 |
| | IV | 1 | 2.38 |
| | Non-Specified | 3 | 7.14 |
| mRS | 0 | 9 | 21.42 |
| | 1 | 11 | 26.2 |
| | 2 | 15 | 35.7 |
| | 3 | 6 | 14.28 |
| | 4 | 1 | 2.38 |
| EGFP-Scale | Excellent | 27 | 64.28% |
| | Good | 7 | 16.7 |
| | Fair | 5 | 11.9 |
| | Poor | 1 | 2.38 |

The mRS was of complete autonomy (mRS 0-1) for 47.6% of patients and good autonomy (mRS 2-3) for 35.7%. Using EGFP scale, our results were gauged excellent in 64.28%, good-fair (satisfactory) in 28.57%, poor in 2.38% and unspecified in 4.76% (Table 2).

A significant relief of pain after cure was obtained immediately in 83.3% of average cases and of 16.7% few days later.

The average delay before cure was of 5.12 years. The average hospital stay was 5.7 days during our study. The mean follow-up was of 5.6 years. Few complications all non-infectious were registered (16.6%): Facial hypaesthesia (2), painless-anaesthesia of face (1), chewing weakness (1) and facial numbness (3).

In twelve years we registered 27 repeat procedures (almost 2.25 per year) for 17 patients in all. That is 64.28% of repeat surgery with 15 repeated at least 2 times (35.71%) (Figure 1). The mean pain-free period corresponded to the average time of repeat surgery which was 3.4 years. Patients were shifted to the radiosurgery department from the third or fourth recurrence (16.7%).

One patient (2.38%) was considered treatment failure due to persistence of painful paroxysms after surgery and repeat surgery. No operative or postoperative mortality were registered during the period of study.

Discussion

Our demographic data corroborate the literature, in fact the refractory trigeminal neuralgia occurs after 50-years-old in 3 to 5 patients per year for hundred thousand inhabitants with a slight female predominance [4,6,7]. Oppositely Jin, et al. founded a clear female predominance (*sex-ratio* = 4/11) in a recent study in Seoul [8].

The pain topography is part of the semiologic tetrad of essential trigeminal neuralgia. According to some au-

thors, pain appears more often on the right side [6,9]. In our study, we observed a relative fairness of sides (21/18); that is of 39 unilateral forms (92.85%) and 3 bilateral others (7.14%); quite similar as noticed by Jin, et al. (5.6% of bilateral forms and 94% of unilateral forms) [8]. Thereof found however 5.6% of V_2V_3 associated location of pain [8], rate much lower than our results (52.38%) (Table 1), either for Tang, et al. in Beijing who founded 32.8% [7].

This percutaneous trigeminal approach is a procedure which has the benefit of simplicity and fewer side effects [6,9], providing effective pain relief as the two other percutaneous procedures for trigeminal neuralgia (*Glycerol Rhizotomy, Balloon Compression*) [10]. Thus it is especially useful in elder patients, population more often concerned by trigeminal neuralgia, and whom initial medical status is particular, as noticed in our practise since a dozen of years. One of its several advantages is the possibility to be performed in emergency in painful stroke. Active collaboration of the patient during the procedure guarantees its rightness, except that for efficiency, this method needs to be repetitive. For Zakrzewska JM, et al. other interests are avoidance of endotracheal anaesthesia, short hospitalization, successful short-term results and low morbidity rates [1].

The procedure was repeated once, twice or thrice times during the study and patients were therefore addressed to radiosurgery after 3 repeated procedures (16.7%). Fouad W in Alexandria shifted 28.5% of patients to other surgery modalities after one year of follow-up [10]. Nearly 85% of patients were repeated during radiofrequency thermocoagulation in a recent ten years study at Beijing [11]; it was of 64.28% in our study (Figure 1).

The cure must be performed when appeared paroxysmal period in drug-refractory context. During the study re-occurrence of pain after cure were sometimes due to bilateral topography of neuralgia (3 cases, 7.14%). The

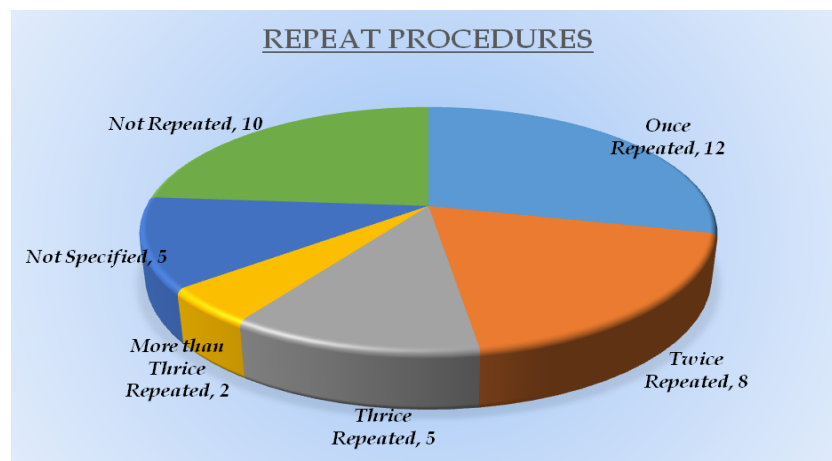


Figure 1: Repeat procedures.

pain relief of patients is generally obtained in the following hours of procedure. Their outcome and/or recovery are assessed several years later. Furthermore in the idiopathic trigeminal neuralgia, it is noticed lower skin temperatures on the affected side trigeminal divisions due to vasoconstriction, which raise in parallel with the pain relief up to equal those of the unaffected side [12].

Percutaneous radiofrequency thermocoagulation allows pain control up to 97% promptly and to 58% at 5 years, also it is of a somatotopic nerve mapping and selective division lesioning [10]. According to the International Association for Study of Pain (IASP) the evolvement of thermocoagulation by radiofrequency is about 68 to 85% after 1 year, 54 to 64% after 3 years and at least 50% after 5 years [13]. Frequent side effects are also evaluated as painful anaesthesia, dysesthesia, sensory loss, corneal numbness with a risk of keratitis. The quality of life is also improved up to 88% of patients [13,14]. Our results were of 64.2% after 5 years with globally 83.3% of autonomous patients in terms of quality of life. On the contrary, Abdennebi B, et al. found 67.1% of excellent results at 1 year and 62% of pain free patients after 16 years, on a 901 patient's series in a percutaneous procedure of retro-gasserian balloon compression [15].

During the study, all patients described a worst quality of life with annoyance and burnout, much more seen in elder persons. Almost four fifth of patients were with no pain relief before surgery and the fifth with pain not adequately controlled with medication (Table 1). Most of them noticed also a significant postoperative course as of life or physical factors (Table 2). The post-treatment evaluation of quality of life of patients suffering from refractory trigeminal neuralgia must base itself on quality of pain and its triggering mode, two of the four clinical elements of diagnosis [4]. Nevertheless physical morbidity and recurrence rates remain insufficient to gauge outcome of patients [1]. This assessment requires also good preoperative selection of patients eligible to radiofrequency thermocoagulation, as it exists an obligate proportionality between long term efficacy of this technique and presence of side effects [4]. In fact, best therapeutic results are obtained with idiopathic neuralgia form [4,8]. The relative long delay before cure (5.12 years) and the 64.28% of repeat surgery noticed in our study corroborate this analysis.

This study is about a postoperative quality of life after radiofrequency thermocoagulation, one more within few papers about. It is of a real interest, it assesses around twelve years of experience especially the outcome of patients. The plural semiology of refractory trigeminal neuralgia and difficulties inherent in a retrospective study limited the analysis. Thus, a codification of the painful felt of patients before and after surgery may lead to a useful prognostic classification.

Conclusion

The trigeminal radiofrequency thermocoagulation remains an alternative choice to refractory trigeminal neuralgia. It may lead to meaningful results such as to restore best quality of life especially the elderly, although its recurrent repetitiveness is helpful for its efficiency.

However and thus as it is of chronic painful patients, psychosocial factors must be included in outcome assessments of patients to ensure for this technique an over lasting time.

Acknowledgments

To both departments of Neurosurgery and Imaging of Amiens-Picardie Teaching Hospital.

Disclosure

The authors report no conflict of interest concerning the materials and methods used in this study or the findings specified in this paper.

References

1. Zakrzewska JM, Jassim S, Bulman JS (1999) A prospective, longitudinal study on patients with trigeminal neuralgia who underwent radiofrequency thermocoagulation of the Gasserian ganglion. *Pain* 79: 51-58.
2. Sridharan K, Sivaramakrishnan G (2017) Interventions for refractory trigeminal neuralgia: A Bayesian mixed treatment comparison network meta-analysis of randomized controlled clinical trials. *Clin Drug Investig* 37: 819-831.
3. Verdié JC (2003) Mise au point : Les traitements non médicamenteux de la névralgie trigéminal. *Le Courrier de l'Algologie* 4: 120-122.
4. Sindou M, Keravel Y (2009) Algorithms for neurosurgical treatment of trigeminal neuralgia. *Neurochirurgie* 55: 223-225.
5. Ortner CM, Turk DC, Theodore BR, et al. (2014) The short-form McGill pain questionnaire-revised to evaluate persistent pain and surgery-related symptoms in healthy women undergoing a planned cesarean delivery. *Reg Anesth Pain Med* 39: 478-486.
6. Al Khudhairi D (2006) Thermocoagulation of trigeminal neuralgia by radiofrequency-effectiveness and results. *Middle East J Anaesthesiol* 18: 717-723.
7. Tang YZ, Wu BS, Yang LQ, et al. (2015) The long-term effective rate of different branches of idiopathic trigeminal neuralgia after single radiofrequency thermocoagulation: A cohort study. *Medicine (Baltimore)* 94: e1994.
8. Jin HS, Shin JY, Kim YC, et al. (2015) Predictive factors associated with success and failure for radiofrequency thermocoagulation in patients with trigeminal neuralgia. *Pain Physician* 18: 537-545.
9. Meglio M, Cioni B (1989) Percutaneous procedures for trigeminal neuralgia: microcompression versus radiofrequency thermocoagulation. Personal experience. *Pain* 38: 9-16.
10. Fouad W (2011) Management of trigeminal neuralgia by radiofrequency thermocoagulation. *Alexandria J Med* 47: 79-86.

11. Cheng JS, Lim DA, Chang EF, et al. (2014) A review of percutaneous treatments for trigeminal neuralgia. *Neurosurgery* 10: 25-33.
12. Tang YZ, Jin D, Li XY, et al. (2014) Repeated CT-guided percutaneous radiofrequency thermocoagulation for recurrent trigeminal neuralgia. *Eur Neurol* 72: 54-59.
13. (2013) Névralgiétrigéminal Année Mondiale contre la douleur oro-faciale. International Association for Study of Pain 1-4.
14. Hampf G, Bowsher D, Wells C, et al. (1990) Sensory and autonomic measurements in idiopathic trigeminal neuralgia before and after radiofrequency thermocoagulation: differentiation from some other causes of facial pain. *Pain* 40: 241-248.
15. Abdennebi B, Guenane L (2014) Technical considerations and outcome assessment in retrogasserian balloon compression for treatment of trigeminal neuralgia. Series of 901 patients. *Surg Neurol Int* 5: 118.