Comparative study between microvascular decompression and radiofrequency for treatment of trigeminal neuralgia

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Abstract

Background: microvascular decompression usually provides prolonged pain relief in trigeminal neuralgia patients. microvascular decompression usually provides prolonged pain relief in trigeminal neuralgia patients and is presumed to promote the remyelination demyelination alone does not offer a complete explanation of trigeminal neuralgia symptomatology. the use of radiofrequency (RF) to lesion the trigeminal nerve is that it may selectively injure/destroy the unmyelinated or poorly myelinated nociceptive nerve fibers and spare the (heavily) myelinated fibers which serve touch, proprioception, and motor function.

Objective: to comparing the results of microvascular decompression and radiofrequency protocols management in order to establish the optimum way for management of trigeminal neuralgia.

Patients and methods: This study was conducted at Sohag El-Helal health insurance, Cairo university hospital and Sohag university hospitals between DEC 2013 and DEC 2015. Patients were divided into two groups, each one includes 15 patients.

Results: there was no statistically significant difference between the two groups regarding to Demographic data, Clinical presentation data, affected nerve division data and Pain evaluation data.

Conclusion: In our study, the pain distribution was, in most of the cases, related to the Lower division of the trigeminal nerve 2nd and 3rd 80%. Pre-operative evaluation for pain in our study use Verbal Description of Pain to evaluate the pain before any intervention. 76.6 % had horrible pain 10\10. According to the score 15 patients underwent percutaneous radiofrequency rithotomy was excellent. (T-0) And 14 patients underwent MVD was excellent .and one was poor. (T-5).

Keyword: *microvascular decompression, radiofrequency.*

INTRODUCTION

There have been many historical descriptions of facial pain over the past several thousand years. Hippocrates (circa 460–377 BC) of ancient Greece is credited with being the first physician to reject superstitions, supernatural beliefs, or divine forces as the cause of illness and has often been called the "Father of Medicine."He greatly advanced the systematic study of clinical medicine, summarized the medical knowledge of previous schools, and advocated practical and ethical physician practice through the Hippocratic Oath and other works. Hippocrates might have encountered TN, but unfortunately his broad characterization of headaches as consisting of "infinite forms," was too vague.1

The same is true of Aretaeus (150 AD) and Galen (circa 129–200 or 216 AD), 2 of the most celebrated ancient Greek physicians. These authors differentiated "heterocrania" (Galen) and "hemicrania" (Aretaeus), terms reflecting unilateral headache, from what they called other head ailments or "kephalalgia".2

In the 11th century an Arab physician, Jurjani, describe a type of facial pain believed to be TN. This entity was "a type of pain which affects the teeth on one side and the whole of the jaw on the side which is painful.3

The first clear description of TN was provided in 1671. The patient was a well-known physician, Johannes Laurentis Bausch of Germany (1605–1665) (Fig. 1), founder and first president of the Imperial Leopoldian Academy of Natural Sciences, who suffered from severe TN for 4 years. The pain prevented him from eating any solid food and he was almost unable to speak. Emaciation gradually occurred and led to death from a stroke in 1665.Bausch's illness was detailed in his eulogy published in the Academy volume covering the year 1671.4

PATIENTS AND METHODS

This study was conducted on patient with variant ages at the time of diagnosis, presenting with trigeminal neuralgia, admitted and managed at the neurosurgical department at Sohag El-Helal health insurance, Cairo university hospital and Sohag university hospitals between DEC 2013 and DEC 2015.

Patients were divided into two groups, each one includes 15 patients. The first group undergoing MVD and the second group undergoing percutaneous radiofrequency (retrogasserian) rhizotomy. Depends on the desire of each patient in selection of operation after full explanation of each type.

All the patients had TN, not sufficiently relieved by medical treatment. In all these patients TN was to some degree reduced by carbamazepine.

Clinical Assessment: History, Examination (General Examination and Neurological Examination), Investigations, Operative Procedures (Radiofrequency trigeminal (retrogasserian) rhizotomy and Microvascular decompression of the trigeminal nerve), Post-operative follow- up and Post-operative complications.

Statistical Methods

The data in this study was analyzed by SPSS version 11.0 statistical package (SPSS Inc., Chicago, IL, USA). Quantitative data were expressed as mean and standard deviation (X+SD). Qualitative data were expressed as number and percentage and analyzed by Fisher Exact test. Level of significance was set as P-value less than 0.05.

RESULTS

Table 1: Demographic data in this study.

	Group 1 (N=15)	Group 2 (N=15)	P-value
Sex:			
Female	**9 (60%)**	**10 (66.7%)**	**0.7**
Male	**6 (40%)**	**5 (33.3%)**	
Age Group:			
25-40y	**3 (20%)**	**2 (13.3%)**	**0.54**
41-60y	**7 (46.7%)**	**5 (33.3%)**	
>60y	**5 (33.3%)**	**8 (53.3%)**	

This table showed that Regarding the sex distribution among 30 cases in this study Table 1, the group (1) had 9 female and 6 male by percentage 60% to 40% female :male 1.5:1 and for group (2) female number was 10 and male was 5 by percentage 66.7% to 33.3% female :male 2:1 .

Regarding the age distribution among 30 cases in this study, the group (1) had 3 patients among age range 25 -40 years old by percentage 20% and 7 patients among age range 41-60 years old by percentage 46.7% and 5 patients older than 60 years old by percentage 33.3% . the group (2) had 2 patients among age range 25 -40 years old by percentage 13.3% and 5 patients among age range 41-60 years old by percentage 33.3% and 8 patients older than 60 years old by percentage 53.3% .

Graphic (1): Age distribution in this study.

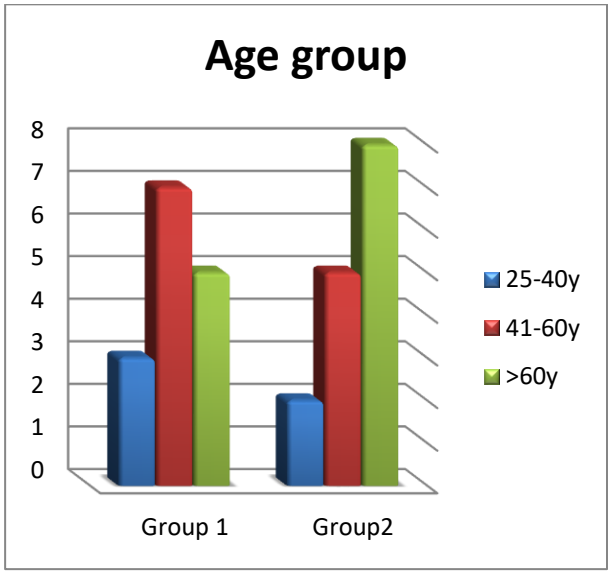


Table 2: Clinical presentation data in this study

	Group 1	Group 2	P-value
Laterality:			
Right	**12(80%)**	**9 (60%)**	**0.23**
Left	**3 (20%)**	**6 (40%)**	

Symptoms Duration: **<5 years** **5-10 years**	**12 (80%)** **3 (20%)**	**11 (73.3%)** **4 (26.7%)**	**0.67**
Clinical presentation: **Typical pain** **Atypical pain**	**12 (80%)** **3 (20%)**	**13 (86.7%)** **2 (13.3%)**	**0.62**

This table showed that In our patients the pain syndrome was characterized by unilateral pain Table2, in group (1) 12 patients had right side pain by percentage 80% and 3 patients had left side pain by percentage 20%. In group (2) 9 patients had right side pain by percentage 60% and 6 patients had left side pain by percentage 40%.

The symptoms duration show 12 patients by percentage 80% had symptoms less than 5 years and 3 patients by percentage 20% more than 5 years up to 10 years suffering in group (1).

In group (2) the symptoms duration show 11 patients by percentage 73.3% had symptoms less than 5 years and 4 patients by percentage 26.4% more than 5 years up to 10 years suffering.

The symptoms often triggered by non-painful stimulation, and with pain-free periods. TN could be provoked by movement (e. g., flexion or rotation of the head, or by stamping the foot on the floor), whereas the pain disappeared when the patient rested in the supine position. Which is known as typical trigeminal neuralgia in group (1) 12 patients by percentage 80% had typical pain and 13 patients by percentage 86.7% in group (2).and 3 patients by percentage 20% in group (1) and 2 patients by percentage 13.3% in group (2) had Atypical pain which characteristic by heavy, aching, stabbing and burning pain .which is often continuous and periods of remission is rare.

Graphic (2): laterality distribution in this study.

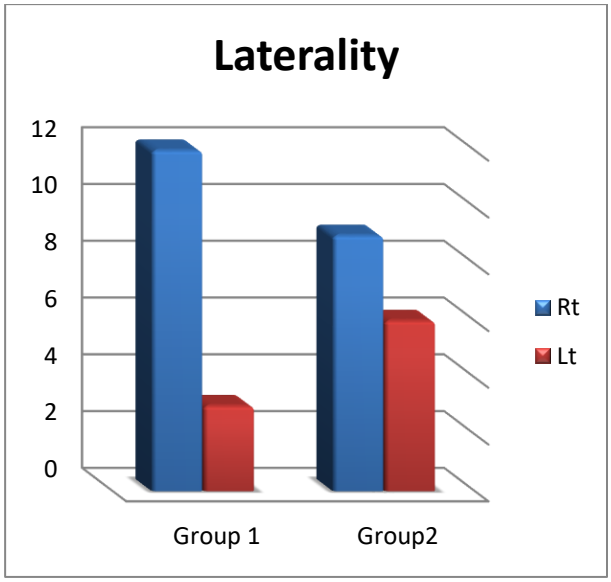


Table 3: Affected nerve division data in this study.

Affected nerve division:	**Group 1**	**Group 2**	**P-value**
1st **2st+3nd** **1st+2nd+3rd**	**2 (14.3)** **11 (73.3)** **2 (14.3)**	**1 (6.7)** **13 (86.7)** **1 (6.7)**	**0.66**

This table showed that In our patients the pain distribution was, in most of the cases, related

to the Lower division of the trigeminal nerve 2nd and 3rd. In (group 1) we found 11 patients 73.3% and in (group2) we found 13 patients 86.7%. In (group 1) 2 patients 14.3% had pain distribution related to 1st nerve division and 2 patients 14.3% had pain distribution related to all nerve divisions. in (group2) only 1patients 6.7% related to 1st nerve division and also1patients 6.7% related to the three nerve divisions.

Pre-operative evaluation for pain in our study use Verbal Description of Pain to evaluate the pain before any intervention.

Graphic (6): Affected nerve division distribution in this study.

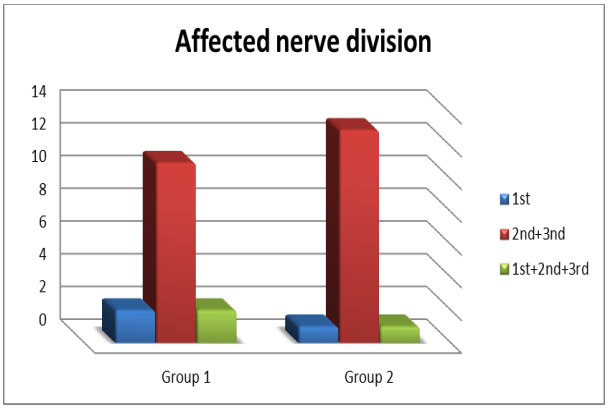


Table (4): Pain evaluation data in this study.

	Group 1	Group 2	P-value
Before surgery:			
Horrible	**10 (66.7)**	**13 (86.7)**	**0.39**
excruciating	**5 (33.3)**	**2 (13.3)**	
Postoperative:			
100% relief	**13 (86.7)**	**14 (93.3)**	
90% relief	**1 (6.7)**	**1 (6.7)**	**0.98**
Norelief	**1 (6.7)**	**0**	
One day follow up:			
No pain	**14 (93.3)**	**15 (100)**	**0.99**
excruciating	**1 (6.7)**	**0**	
18months follow up:			
No pain	**13 (86.7)**	**14 (93.3)**	
Discomforting	**1 (6.7)**	**0**	**0.98**
excruciating	**1 (6.7)**	**1 (6.7)**	

This table showed that One day follow up: 14 patients were free of pain 93.3% and1 patient has no relief 6.7% and has excruciating pain 9\10 according to VAS after MVD. While 15 patients were free of pain after percutaneous radiofrequency100%.

18 months follow up results was 13 patients were free of pain 86.7% after MVD while 14 patients were free of pain after percutaneous radiofrequency 93.3% .1 patient has discomfort 6.7% in MVD and 1 patient has recurrent 6.7% excruciating pain after percutaneous radiofrequency and the patients MRI show trigeminal nerve shwanoma. 1 patient has no relief 6.7% after MVD and we didn't found any compression intraoperative in this patient.

The relation between Pain evaluation data and outcome of patients in our study was statistically insignificant P> 0.05.

CASES PRESENTATION

Case 1: A 60 year-old man was referred with a 10 year history of right-sided facial pain. The pain, which was described as 'stabbing', was

in the cheek. It had been occasional but had now increased in frequency such that he was experiencing several episodes a day.

The pain was triggered by anything that touched the face and when he ate or brushed his teeth.

The severity was such that he could not eat or talk normally. The intensity of her pain was 9/10, according to the visual analog scale (VAS).Carbamazepine 600 mg/daily wasn't controlling the pain. He tried alcohol injection which leads to increase the pain.

Photo (1): photo to the patient after insertion of the canula (permission taken).

Photo (2): radiofrequency generator show thermal ablation 70°.

Case 2: A 58-year-old woman presents with left-sided facial pain described as a shocking sensation that shoots from her ear to her jaw. The first episode occurred without warning 4 years ago. She had several episodes at that time, but the pain went away without intervention. It returned several months later, lasting seconds to a few minutes at a time, then subsiding completely. It can be triggered by eating, talking, and touching her cheek. She was prescribed carbamazepine, which initially eliminated her symptoms. In the last few months, however, she has had more frequent episodes despite increasing the dose. She is now unable to talk without triggering the pain.

Photo (3): MRI show lf trigeminal n. showannoma.

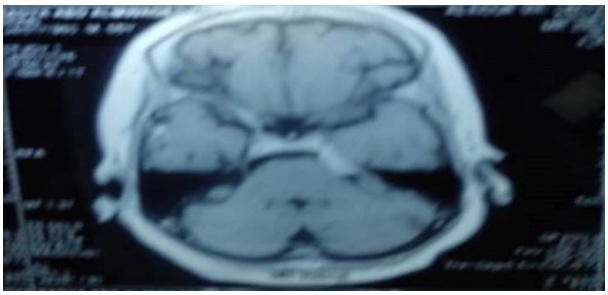
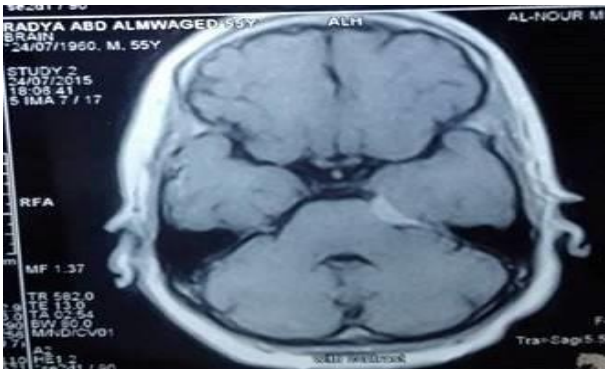


Photo (4): MRI show lf trigeminal n. showannoma with contrast.



DISCUSSION

Our survey was undertaken to study the clinical features of trigeminal neuralgia in Egyptian population. Demographic data of 30 patients treated at the Neurosurgical Department of at Sohag El-Helal health insurance, Cairo university hospitals and Sohag university hospital.

Trigeminal neuralgia presented predominantly in females 63%. Female: male 1.7:1 Right-sided involvement occurred at a greater frequency 70%, and the peak age at onset was

between the forth and the sixth decades of life. The mean average 53 years old.

According to H. Sletteb and P. K. Eide.5 a prospective study of 25 patients with trigeminal neuralgia (TN), examined 13 female and 12 male. Female: male was 1.08:1. Affected side (right/left) was 18/7 by percentage 72% and the mean age was 53 years old.

While in Katusic S, et al.6 the overall crude incidence rate of trigeminal neuralgia per 100,000 populations in Rochester, Minnesota, for 1945 through 1984 was 4.3 for both sexes combined. The age-adjusted (to total 1980 US population) rate for women (5.9) was significantly higher than that for men (3.4). Data based on evidence in the medical records suggest that trigeminal neuralgia is a rather rare and unpredictable disease.

As regards clinical presentations:

In this study, Clinical diagnosis of TN was confirmed by history and examination. A detailed description of the neuralgia was obtained to define its typical (i.e. only paroxystic) or atypical (i.e. association with a background of continuous pain). This description corresponds to the International Classification of Headache Disorders definition. Patient with typical pain was 80% and who with Atypical was 20%. Manifestations of trigeminal neuralgia last less than 5 years before any intervention by percentage 76.6% and more than 5 years up to 10 years by 23.3% the mean was 7 years.

While in, L. Dahle.7 Duration of symptoms (years) <5 was 16 patients and from 5-10 years was I8 patients and from 11-20 years 20 patients and >20 3patients and all the 57 patient had typical pain.

Another researcher, Chloe Dumot.8 revealed that All patients with classical TN, whether typical or associated with a background of continuous pain (i.e. atypical), referred from January 2005 to April 2013, patient with typical pain was 80% from 313 patients.

In our study, the pain distribution was, in most of the cases, related to the Lower division of the trigeminal nerve 2nd and 3rd. division 24 patients 80% is considered that. Three of the patients had 1st division10% and the other 3 patients had pain related to the three trigeminal division 10%.

Verbal Description of Pain is our test to evaluate the pain before any intervention 23 patients 76.6 % had horrible pain 10\10. And 7 patients 23.3 % had excruciating pain 9\10. And all of them recorded that no pain after period of rest.

According to H. Sletteb and P. K. Eide.5 the result was horrible in 4 patients and excruciating pain in 21patients. and result at rest no pain in 21 patients ,1 has discomforting, 1 has distressing, 1 has horrible and 1 has excruciating from 25 patients according to Verbal Description of Pain. The pain distribution was, in most of the cases, related to the Lower division of the trigeminal nerve 2nd and 3 rd.

In our study, we compare between the most famous interventions for trigeminal neuralgia treatment 15 patients had microvascular decompression surgery 50% and the another 15 patients undergo percutaneous trigeminal rhizotomy 50% after full discussion with the patient about the different type of treatment , all patients were informed about the procedure and its possible complications, and written informed consent was obtained.

Operative Findings in MVD, The trigeminal root was compressed by the superior cerebellar artery in 11 patients 73.3% and in 3 patients 20% by a vein, was in close contact with the nerve root. No compressing vessels were found in one patient 6.7%.

And in L. Dahle.7 vascular compression of the trigeminal root entry zone was seen in 54

cases. Compression by an arterial loop alone was noted most frequently (28/54). Less frequent were mixed arterial/ venous compression (16/54) and pure venous implication (10/54). In three cases no vascular problem was found. In two of these a fibrous adhesion constricted the nerve tightly, whereas no obvious pathology was observed in the one remaining case.

In our study, 13 patients were free of pain 86.7% after MVD while 14 patients were free of pain after percutaneous radiofrequency 93.3% .1 patient has discomfort 6.7% in both MVD and percutaneous radiofrequency . 1 patient has no relief 6.7% after MVD.

Hospital length of stay (LOS) Median LOS in MVD was 5 days (range 3-7days). Patients after percutaneous radiofrequency were discharged at the same day.

Complications with (microvascular decompression): No serious complications happened. Except one has bacterial meningitis.

Two cases (13.3%) experienced numbness and reduced sensation in the face. Six cases (40%) had postoperative nausea and dizziness for 2-3 days postoperatively.

Complications after percutaneous radiofrequency just hypothesia and reduced by time.

In our study we use a new standardized scoring system using consistent criteria to document treatment results of MVD and percutaneous radiofrequency rithotomy (the score is discussed before).

According to the score 15 patients underwent percutaneous radiofrequency rithotomy was excellent.(T-0) And 14 patients underwent MVD was excellent .and one was poor .(T-5)

While in Tronnier Volker M.9 Two hundred twenty-five patients who underwent MVD and 206 patients who underwent radiofrequency could be analyzed retrospectively in detail. Overall, there was a 50% risk for recurrence of pain 2 years after percutaneous radiofrequency rhizotomy. Conversely, 64% of patients who underwent MVD remained completely pain free 20 years postoperatively. Patients without sensory impairment after MVD were pain free significantly longer than patients who experienced postoperative hypesthesia or partial rhizotomy.

And in Zakrzewska.10 Response rates were 90% (220 of 245) of MVD and 88% (53 of 60) of PSR patients. Groups were comparable with respect to age, sex, duration of symptoms, mean duration of follow-up, and recurrence rates. Overall satisfaction with their current situation was 89% in MVD and 72% in PSR patients. Unsatisfied with the outcome were 4% of MVD and 20% of PSR patients, and this is a significant difference ($P < 0.01$). Satisfaction with outcome was higher in those undergoing this as a primary procedure. In the primary group, satisfaction was dependent on recurrence and complication/side effects status (each $P < 0.01$), but this was not the case in the non-primary group. Patients expressed a desire for earlier posterior fossa surgery in 73% of MVD and 58% of PSR patients, and this was highest in the primary group. The final outcome was considered to be better than expected in 80% of MVD and 54% of PSR patients, but 22% of the PSR group ($P < 0.01$) thought they were worse off.

CONCLUSION

In our study, the pain distribution was, in most of the cases, related to the Lower division of the trigeminal nerve 2nd and 3rd 80%.

Pre-operative evaluation for pain in our study use Verbal Description of Pain to evaluate the pain before any intervention. 76.6 % had horrible pain 10\10.

According to the score 15 patients underwent percutaneous radiofrequency rithotomy was excellent. (T-0) And 14 patients underwent MVD was excellent .and one was poor. (T-5).

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