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COMPARATIVE ASSESSMENT OF TRIGEMINAL-NEURALGIA MICROSCOPIC VASCULAR DECOMPRESSION AND ENDOSCOPIC VASCULAR DECOMPRESSION: AN OBSERVATIONAL ANALYSIS

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Abstract
Background: Trigeminal neuralgia (TN) within the distribution of one or more branches of the trigeminal nerve is characterized as sudden, extreme, brief, stabbing and persistent pain. Micro-vascular decompression (MVD) in trigeminal neuralgia is a well-accepted and highly successful surgical procedure (TN).
Aims & objectives: To compare and evaluate microscopic vascular decompression and endoscopic vascular decompression for trigeminal-neuralgia.
Materials and Methods: The current research was performed on patients diagnosed with medically refractory trigeminal neuralgia in the Department of Neurosurgery at a tertiary healthcare facility over a span of 2 years. For the study, 60 patients were recruited, 44 and 22 of whom underwent micro-vascular decompression (MVD) and endoscopic micro-vascular decompression (EMVD). Parameters such as age, gender, chief complaints, symptom length, side and number of branches involved were reported before the surgery. A traditional retro-sigmoid technique was used to treat patients with trigeminal neuralgia by surgical exploration. Patients were tracked for one to three months after the operation. The results were graded into four groups: outstanding, nice, fair, and bad. Various complications and symptoms have also been documented.
Results: Among 82 percent of subjects in EMVD, excellent results were reported, while only 59 percent of subjects in the MVD category were reported. Just 5% of subjects in the MVD category with statistically insignificant differences revealed weak performance.
Conclusion: From the results of the current analysis, it can be concluded that endoscopic micro-vascular decompression is a safe, feasible and efficient trigeminal neuralgia treatment technique.
Keywords: Trigeminal-neuralgia, Micro-vascular decompression, endoscopic micro-vascular decompression

Introduction

Trigeminal neuralgia (TN) within the distribution of one or more branches of the trigeminal nerve is characterized as sudden, extreme, brief, stabbing and persistent pain. Micro-vascular decompression (MVD) in trigeminal neuralgia is a well-accepted and highly successful surgical procedure (TN)[1,2]. But often, when the supra-meatal tubercle is prominent and when the culprit vessel lies anterior to the nerve, the microscope can fail to detect the compressing vessel at the root entry zone or distally[3]. Over the years, the MVD method has been improved by the incorporation with the endoscope in so-called endoscopic micro-vascular decompression to prevent these drawbacks. In order to enable the identification and dissection of neuro-vascular conflict (NVC) in such patients, regular drilling of the prominent supra-meatal tubercle, cerebellar-fissure dissection and supra-cerebellar route may be needed. Such additional bone and fissure dissection drilling procedures could be avoided when the endoscope is used, i.e. EMVD's (endoscopic micro-vascular decompression). Some benefits of TN are found by the endoscope, such as better visualization of the entire path of trigeminal nervous and vascular culprits, which could be missed only by microscope use in a large percentage of patients[4,5]. A significant benefit of endoscopic surgery is better visualization without brain retraction. The endoscope also helps to better delineate decompression completeness. The endoscope can be used specifically for the entire procedure or as an additional aid to the TN microscope[6,7]. While literature on the above-mentioned procedures regarding their efficacy in TN is available, there is scarce literature on the comparison of the two techniques[8]. Therefore, microscopic vascular decompression and endoscopic vascular decompression for trigeminal neuralgia were contrasted and evaluated in the current report.

Materials and Methods

The current research was performed among patients diagnosed with medically refractory trigeminal neuralgia in the Department of Neurosurgery at a tertiary health care

facility over a period of two years. Patients were seen for preoperative assessment in the neuro-surgery OPD. This research was accepted by the ethics committee of our institute. All the patients received informed permission. For the research, 60 patients were recruited, of whom 44 and 22 had MVD and EMVD, respectively. The decision to conduct a microscopic and solely endoscopic procedure was based on both the surgeon's comfort and the availability of facilities. Pre-operational parameters such as age, gender, chief grievances, symptom length, hand, and number of branches involved were reported. In accordance with the World Medical Association's Code of Ethics, the work mentioned has been carried out.

Surgical Technique

A traditional retro-sigmoid technique was used to treat patients with trigeminal neuralgia by surgical exploration. In the lateral decubitus or supine position, the patients were positioned with their head angled as far away as their neck mobility allowed. A 1 to 2 cm retro-sigmoid craniectomy was performed only lower than the junction of the transverse and sigmoid sinuses under general endo-tracheal anesthesia. The dura was opened against the sinus, and mirrored. The trigeminal nerve was detected using traditional micro-neurosurgical techniques by gently retracting the cerebellum, releasing cerebrospinal fluid from the basal cisterns, and lysing the arachnoidal bands. A handheld 30-degree rigid endoscope was inserted into the cerebello-pontine angle after the nerve was examined as thoroughly as possible with the microscope to improve the view of the surgeon. The endoscope was advanced toward the trigeminal nerve in a straight line, keeping the endoscope shaft stabilized against the craniotomy edge or the venous sinus. The endoscope was rotated to the degree that the wrist of the surgeon required the root entry zone to be examined. A comprehensive view of the entire trigeminal nerve was obtained by pointing the 30-degree endoscope laterally, medial, superiorly, or inferiorly. The endoscope was balanced to obtain each view by rotating the rod lens and camera to hold the image upright and the view vector ideal. If the compressing vessel was seen better or only with the endoscope, it was observed and MVD under endoscopic control was performed. By inserting a tiny Gel foam patch firmly between the root entry zone of the nerve and the offending vessel, MVD was achieved. Where possible, under strain, the patch was folded in half so that it forced the vessel away from the nerve.

The endoscope was carefully placed into the posterior fossa during endoscopic MVD alongside a small blunt suction or a small dissector that was kept in front of the endoscope so that it remained in view at all times, preventing potential unseen conflicts with sensitive neurovascular structures. The drainage of cerebrospinal fluid usually made it possible for the non-dominant hand to work for short periods without the assistance of suction. One-handed dissection and manipulation were conducted with the endoscope in the non-dominant hand, as well as patch positioning with the operating instrument in the dominant hand. The appropriateness of decompression was confirmed and noted by the endoscope. Closure, wherever possible, was completed by standard techniques, including watertight dural closure.

Outcomes Recorded: One and three months after surgery, patients were tracked. The findings were divided into four groups: excellent (patients had no pain, had no medication, and had no persistent side effects), decent (patients had no pain but had mild non-disabling surgical complications), average (pain was well managed with medication), and bad (pain was well controlled with medication) (patients had persistent neuralgia or no pain, but persistent debilitating side effects). Different complications and degrees of symptom relief have also been recorded.

Analysis of statistics: Under the supervision of the statistician, data thus collected was tabulated in an excel sheet. In statistical analysis, the means and standard deviations of the measurements per category were used (SPSS 22.00 for windows).

Results

In the present sample, in the MVD and EMVD classes, 45% and 73% of the subjects were male, respectively. The mean age of the subjects was 52.12 years in the MVD group, while the mean age was 56.24 years in the EMVD group.

Table 1: Demographic characteristics among the study groups

	Male		Female		Age (in years)	
Groups	N	%	N	%	Mean	SD
MVD (N=44)	20	45 %	24	55 %	52.12	14.36
EMVD (N=22)	16	73 %	6	27 %	56.24	8.46

More pain was registered on the right side in both the MVD and EMVD classes. The mean period of symptoms was 38.26 and 39.64 months, respectively, in the MVD and EMVD categories.

Table 2: Chief complaints and duration of symptoms among the study groups

	MVD (N=44)		EMVD (N=22)	
Parameters	N	%	N	%
Complaint				
Pain on right side	24	55 %	14	64 %
Pain on left side	20	45 %	8	36 %
	Mean	SD	Mean	SD
Duration (in months)	38.26	8.28	39.64	9.28

Among 82 percent of subjects in EMVD, excellent results were reported, while only 59 percent of subjects in the MVD category were reported. Just 5% of the subjects in the MVD group revealed poor performance. When the findings were statistically compared between the MVD and EMVD classes, p>0.05 was found to be statistically insignificant.

Table 3: Comparison of outcome among the study groups

	MVD (N=44)		EMVD (N=22)	
Parameters	N	%	N	%
Excellent	26	59 %	18	82 %
Good	10	22 %	2	9 %
Fair	6	14 %	2	9 %
Poor	2	5 %	0	0 %

Discussion

In skull base, spine, and cranial surgery, endoscopy is usually employed. It is also helpful for different types of pathologies, such as congenital lesions, evacuation of hematomas, excisions of tumors, and infectious pathologies. In our research, endoscopic techniques for TN were found to be secure; similar observations were made by other authors[9,10]. As other authors have also noted, the endoscopic procedure was very successful with good outcome rates in our research[11,12]. In the present study, excellent results were reported by 82% of subjects in the EMVD group, while only 59% of subjects in the MVD group reported excellent results. Just 5% of the subjects in the MVD group revealed poor performance. In their research, Casey H. Halpern et al[13] revealed that completely endoscopic MVD supports this approach's safety, efficacy, and potential benefits for a wide range of neurovascular syndromes. Although the superiority of the entirely endoscopic technique is not shown, they do not notice any statistically significant difference compared to the microscopic method[14,15]. It should be noted that, despite the relatively short period of time following the endoscope's introduction into routine practice, no difference was noticed. They also assume that the use of the endoscope is effective and at least as efficient for micro-vascular decompression as a microscopic technique. Our series did not have any mortality; similar findings were also made in other recorded series. However, the use of the endoscope in the posterior fossa gives skull base surgeons additional advantages. Using the view from the camera, as the surgeon becomes accustomed to the technique of operating with the endoscope, the prospect of operating with angled scopes opens up, which may allow safe access to structures not previously seen with the standard operating microscope[16,17]. We conclude that it is more likely that expanded retro-sigmoid approaches to more challenging brain areas will become more likely. The current research sample consists of a limited and short follow-up period. The impact that the addition of endoscopy would have on long-term clinical results in larger series is too early to assess. However, endoscopy was a valuable adjunct in our preliminary experience, both when sufficient decompression was thought to have been done and when no compression with the microscope alone was visible, as was seen in 4 of the cases in our series. Therefore, in all situations, regardless of whether the compressive vessel is found during microscopic exploration, it should be considered a useful adjunct.

Conclusion

From the results of the current analysis, it can be concluded that endoscopic micro-vascular decompression is a safe, feasible and efficient TGN remedy. The transformation from traditional microscopic surgery to a completely endoscopic technique is summarized in our experience, demonstrating the simplicity and protection of integrating this method as a solo instrument into operation. The next step in the expanding age of minimally invasive endoscopic neurosurgery is to extend this experience from neurovascular syndromes to cerebello-pontine angle tumors.

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