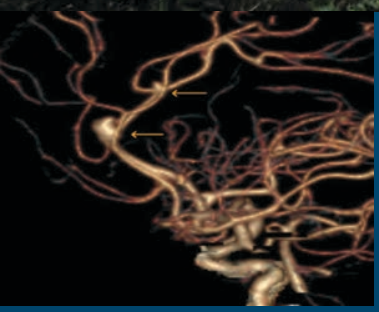
Neurology India

Official Publication of the Neurological Society of India
November-December 2016 / Vol 64 / Issue 6



ISSN 0028-3886
www.neurologyindia.com

Medknow

Wolters Kluwer

Vascular decompression for trigeminal neuralgia - Past, present and future

Sir,

Classical trigeminal neuralgia (TN) comprises a syndrome of chronic neuropathic facial pain, which is frequently excruciating and refractory to conservative treatment.[1] Symptomatic neurovascular conflicts at the nerve root entry zone are thought to be one of the essential etiological factors of the disease. This provided the rationale for operative management of therapy-resistant TN in the past.

The introduction of the operating microscope revolutionized the field of neurosurgery and established microvascular decompression (MVD) for the treatment of TN.[2] Since then, MVD, usually via a retrosigmoid craniotomy, has been the most efficacious surgical procedure for sufficient and lasting symptom control in patients with TN refractory to pharmacological therapy.[3] However, the narrow approach, the vital, complex, and crowded anatomy of the posterior fossa, and the deep and angled working space make neurosurgical treatment difficult, limits adequate visualization of the operative field and identification of neurovascular conflicts, and have frequently led to incomplete nerve decompression and insufficient symptom improvement. The advent of the endoscope gave the neurosurgeons another visualization tool to overcome these limitations and enabled an even less invasive approach than MVD.[4] Since its introduction, neuroendoscopy, whether in the form of endoscope-controlled and endoscope-assisted techniques applied as an adjunct to microsurgery,[4] or a fully endoscopic approach as a stand-alone procedure in Neurosurgery,[5] increasingly became part of the clinical routine in the management of TN. So far, data on direct comparison between the results of conventional MVD and of neuroendoscopic vascular decompression (NVD) of the trigeminal nerve, and detailed discussions of the pros and cons of both techniques is scarce.[6]

By optimal positioning of the patient for craniotomy and sufficient retraction of the cerebellum, clear advantages of stereoscopic MVD comprise anatomical familiarity and better orientation, a more comfortable sitting position and hands free for dissection, a proximal view of the entire operative field, safer passage of instruments, and fewer limitations of instrumentation and surgical freedom. There is also the benefit of potentially better and more rapid perception and appropriate bimanual management of intraoperative difficulties or complications. Important advantages of monoscopic NVD include reduction of the operative access, less cerebellar retraction and lower associated risks of injury, no need for repeated adjustment of the microscope, and insertion, removal, and exchange of instruments, as well as better magnification, visualization, and a panoramic view of the surgical field and neurovascular relationship. At present, the two procedures should not be seen as being in competition, but rather as complementary. The modern neurosurgeon should be familiar with both of them to ensure optimal patient therapy and outcome. Both MVD and NVD can be offered with reasonable chances of success and are associated with low risks. They do, however, require a certain learning curve and cannot replace profound anatomical knowledge and surgical experience and skill. Furthermore, a clear understanding and the appropriate use of both techniques within our neurosurgical armory are essential.

Currently, besides vascular decompression as the neuroprotective and first-line surgical approach, alternative second-line therapeutic options for TN with or without a scalpel are routinely applied. These range from neurolesional percutaneous procedures, such as balloon compression, glycerol rhizotomy,[7] and radiofrequency thermocoagulation,[8] to stereotactic radiosurgical methods, mainly frame-based gamma knife surgery,[9] but also using frameless linear accelerators,[10]

or cyber knife systems,[11] and neuroablative modalities via trigeminal dorsal root entry zone lesioning,[12] or tracto- and nucleotomies.[13] Finally, emerging non-neurodestructive neuromodulatory approaches including invasive surgical[14] and non-invasive transcutaneous[15] neurostimulation of motor cortex, and stimulation of deep brain,[16] spinal cord,[17] trigeminal or sphenopalatine ganglion,[18] and peripheral trigeminal nerve[19] or nerve field[20] complete the present therapeutic spectrum. These new methods, which are also promising both as first- and second-intention and repeat or salvage alternatives, need further evaluation in larger patient populations and in prospective randomized controlled trials.

Subsequent generations of neuro- and radiosurgeons, together with novel technical and clinical innovations, will further optimize these procedures and their combinations, implement completely new methods, and finally help in deciding whether functional neurosurgery and radiosurgery will replace microsurgery as the standard approach, and what might be the best indication and optimal technique for the tailored and individual management of TN in the future.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Markus F. Oertel

Department of Neurosurgery, Inselspital, Bern University Hospital University of Bern, Bern, Switzerland

E-mail: markus.oertel@insel.ch

References

1. Maarbjerg S, Gozalov A, Olesen J, Bendtsen L. Trigeminal neuralgia - A prospective systematic study of clinical characteristics in 158 patients. Headache 2014;54:1574-82.
2. Jannetta PJ. Arterial compression of the trigeminal nerve at the pons in patients with trigeminal neuralgia. J Neurosurg 1967;107:216-19.
3. Barker FG II, Jannetta PJ, Bissonette DJ, Larkins MV, Jho HD. The long-term outcome of microvascular decompression for trigeminal neuralgia. N Engl J Med 1996;334:1077-83.
4. Magnan J, Chays A, Caces F, Lepetre C, Cohen JM, Belus JF, *et al.* Contribution of endoscopy of the cerebellopontine angle by retrosigmoid approach. Neuroma and vasculo-nervous compression. Ann Otolaryngol Chir Cervicofac 1993;110:259-65.
5. Jarrahy R, Eby JB, Cha ST, Shahinian HK. Fully endoscopic vascular decompression of the trigeminal nerve. Minim Invasive Neurosurg 2002;45:32-5.
6. Kabil MS, Eby JB, Shahinian HK. Endoscopic vascular decompression versus microvascular decompression of the trigeminal nerve. Minim Invasive Neurosurg 2005;48:207-12.
7. Kodeeswaran M, Ramesh V G, Saravanan N, Udesh R. Percutaneous retrogasserian glycerol rhizotomy for trigeminal neuralgia: A simple, safe, cost-effective procedure. Neurol India 2015;63:889-94
8. Noorani I, Lodge A, Vajramani G, Sparrow O. Comparing percutaneous treatments of trigeminal neuralgia: 19 years of experience in a single centre. Stereotact Funct Neurosurg 2016;94:75-85.
9. Régis J, Tuleasca C, Resseguier N, Carron R, Donnet A, Gaudart J, *et al*. Long-term safety and efficacy of Gamma Knife surgery in classical trigeminal neuralgia: A 497-patient historical cohort study. J Neurosurg 2016;124:1079-87.
10. Varela-Lema L, Lopez-Garcia M, Maceira-Rozas M, Munoz-Garzon V. Linear accelerator stereotactic radiosurgery for trigeminal neuralgia. Pain Physician 2015;18:15-27.
11. Singh R, Davis J, Sharma S. Stereotactic radiosurgery for trigeminal neuralgia: A retrospective multi-institutional examination of treatment outcomes. Cureus 2016;8:e554.
12. Sandwell SE, El-Naggar AO. Nucleus caudalis dorsal root entry zone lesioning for the treatment of anesthesia dolorosa. J Neurosurg 2013;118:534-8.
13. Ibrahim TF, Garst JR, Burkett DJ, Toia GV, Braca JA 3rd, Hill JP, *et al*. Microsurgical pontine descending tractotomy in cases of intractable trigeminal neuralgia. Neurosurgery 2015;11:518-29.
14. Buchanan RJ, Darrow D, Monsivais D, Nadasdy Z, Gjini K. Motor cortex stimulation for neuropathic pain syndromes: A case series experience. Neuro Report 2014;25:715-7.
15. Hodaj H, Alibeu JP, Payen JF, Lefaucheur JP. Treatment of chronic facial pain including cluster headache by repetitive transcranial magnetic stimulation of the motor cortex with maintenance sessions: A naturalistic study. Brain Stimul 2015;8:801-7.
16. Leone M, Proietti Cecchini A. Deep brain stimulation in headache. Cephalalgia 2015 Dec 7. pii: 0333102415607176.
17. Chivukula S, Tempel ZJ, Weiner GM, Gande AV, Chen CJ, Ding D, *et al*. Cervical and cervicomedullary spinal cord stimulation for chronic pain: Efficacy and outcomes. Clin Neurol Neurosurg 2014;127:33-41.
18. William A, Azad TD, Brecher E, Cherry T, Bernstein I, Bruce DM, *et al*. Trigeminal and sphenopalatine ganglion stimulation for intractable craniofacial pain-case series and literature review. Acta Neurochir (Wien) 2016;158:513-20.
19. Fontaine D, Bozzolo E, Chivoret N, Paquis P, Lanteri-Minet M. Salvage treatment of trigeminal neuralgia by occipital nerve stimulation. Cephalalgia 2014;34:307-10.
20. Klein J, Sandi-Gahun S, Schackert G, Juratli TA. Peripheral nerve field stimulation for trigeminal neuralgia, trigeminal neuropathic pain, and persistent idiopathic facial pain. Cephalalgia 2016;36:445-53.

Access this article online	
Website: www.neurologyindia.com	**Quick Response Code**
DOI: 10.4103/0028-3886.193814	

How to cite this article: Oertel MF. Vascular decompression for trigeminal neuralgia - Past, present and future. Neurol India 2016;64:1390-1.