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ENDOSCOPIC ASSISTED MICRONEUROSURGERY FOR GASSERIAN PORTION OF TRIGEMINAL NEUROMA

Two cases

Luiz Carlos Mendes Faleiro[1], Rodrigo Moreira Faleiro[2], Luiz Fernando Vilar Barroso[3], Daniel Andrade Gripp[3]

ABSTRACT - We report two cases of trigeminal neuroma that were operated on by the neurosurgery team at Felício Rocho Hospital, Belo Horizonte, Minas Gerais State, Brazil. Endoscopic assisted microsurgery was the technique used to approach the gasserian region tumor with good results.

KEY WORDS: trigeminal schwannoma, posterior fossa tumors, endoscopic brain surgery, microneurosurgery.

Microneurocirurgia assistida por endoscópio para abordagem da porção gasseriana do neurinoma do trigêmeo: relato de dois casos

RESUMO - Descrevemos dois casos de neurinoma do trigêmeo operados no Serviço de Neurocirurgia do Hospital Felício Rocho, Belo Horizonte, Estado de Minas Gerais, Brasil. Utilizamos com sucesso a microcirurgia assistida por endoscopia para abordagem de tumores da porção gasseriana .

PALAVRAS-CHAVE: schwanoma trigeminal, tumores de fossa posterior, neurocirurgia endoscópica, microneurocirurgia.

Trigeminal neuroma (TN) was described in 1849 by Smith and it was first surgically treated by Frazier[1]. It is also known as schwannoma or neurilemona. TN is a rare tumor, corresponding to 0.1-0.4% of intracranial tumors and 1-8% of neuromas. After vestibular neuroma, it is the most common intracranial neuroma. Prevalence is higher in the forth and fifth decades. Most are histologically benign (schwannoma or neurofibroma)[2,3]. Few malignant cases have been described in the literature[3]. It may present in association with other cranial nerves neuromas like in neurofibromatosis. TN may be located in the subdural space (cerebellar-pontine angle), interdural (lateral wall of cavernous sinus), epidural or extracranial space (orbit and pterigopalatyne fossa)[2]. Most common clinical presentation is sensory deficit in corresponding side of the face, for months to years. Lancinating pain or paresthesias may also occur. Other related symptoms are headache, hemifacial spasm, hearing deficits, focal seizures, hemiparesis, intracranial hypertension, otalgya, cerebellar signs and gait disturbance[1,4]. Oculomotor, trochlear and abducens nerves may also be affected[4].

Many other entities at the cerebellar-pontine angle and Meckel's cave region are to be differentiated: metastases, lymphomas, bony tumors (chordoma and chondrosarcoma) and meningiomas. Meningioma is the main differential diagnosis when at the Meckel's cave location[3]. Imaging methods are useful in differentiating between lesions at the cerebellar-pontine angle and Meckel's cave region. On magnetic resonance imaging (MRI), neurinoma presents as hypointense (low weight) on T1 and hyperintense (hard weight) on T2. Contrast enhancement is not common. Hyperostosis and intratumoral calcifications are most common in meningiomas[4].

[1]Adjuvant teacher of Medical School, Minas Gerais Federal University, MG, Brazil. Neurosurgeon of Felício Rocho Hospital, Belo Horizonte, MG, Brazil (FRH); [2]Adjuvant Teacher of Biological Sciences Institute, Minas Gerais Federal University, MG, Brazil. Neurosurgeon of FRH; [3]Neurosurgery Resident FRH.

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Dr. Rodrigo Moreira Faleiro - Rua Caraça 518 / 301 - 20220-260 Belo Horizonte MG - Brasil. E-mail: rfaleiro@brfree.com.br

TN is classified according to its location: (1) at the posterior fossa (P), (2) at the middle fossa including the Gasser ganglion (M), (3) supra infratentorial (SIT) (dumbbell-shape) and (4) at the periphery (E)[2,4]. Supra-infratentorial TN (SIT) is equally distributed among posterior and middle cranial fossa. Combined approaches are usually required to accomplish its total resection with opening of the lateral wall of the cavernous sinus (associated morbidity)[5]. On those patients with SIT-TN whose extra ocular movements and hearing capacity are preserved, a less invasive approach is needed.

Two cases of SIT-TN in which endoscopic assisted microsurgery allowed good resection of the lesion without further deficits are presented.

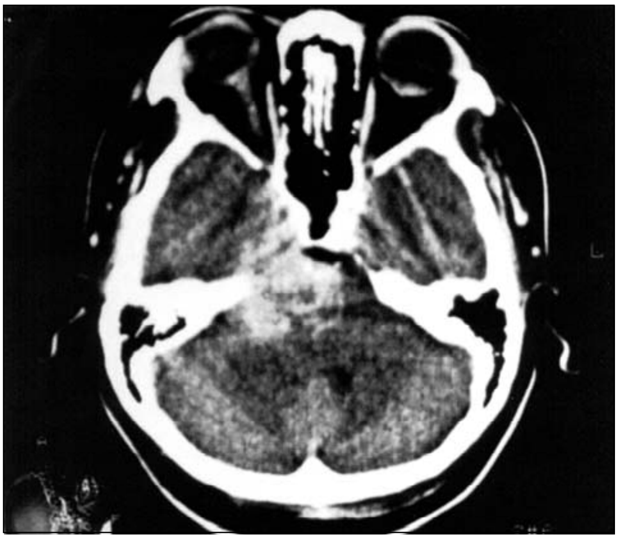

Fig 1. Cerebral tomography with right trigeminal nerve lesion.

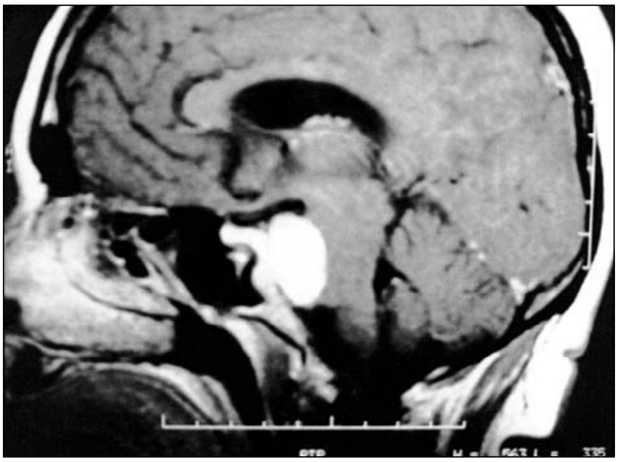

Fig 2. New MRI with a lesion in Meckel's cave and posterior fossa.

Fig 3. Endoscopic and microneurosurgical instruments.

CASES

Case 1 – Woman aged 48 presented at our hospital in 1999, with right frontal region paresthesias, which later progressed to right hemiface. She than began to notice headache, disequilibrium and diplopia. She had been previously diagnosed with systemic arterial hypertension. At examination, she was alert, oriented and had a normal speech. Fundoscopic examination revealed redded optic discs with moderately shaded borders. Extra ocular movements were normal; a right jaw shift, abolished right cornean reflex, normal index-nose test, and an ataxic gait with a wide open base was noted. Computer tomography (CT) and MRI revealed a supra-infratentorial lesion at the right trigeminal nerve location (Fig 1). On July 1999, Dolenc's extradural approach with incomplete removal of intragasserian portion of the neuroma was performed. On August 1999, a transpetrosal approach to remove posterior fossa lesion was added (Fig 3). A diagnosis of TN with sub-total removal was made. On post-operative period, she presented with hypoesthesia an the right side of the face. A CT scan on 2000 revealed a small residual lesion at the Gasser ganglion location. On 2003, patient returns presenting pain on the right side of the face and a new MRI scan revealed a lesion in Meckel's cave and posterior fossa (Fig 2). Endoscopic assisted microsurgery (EAM) was proposed to remove tumor recurrence. After resection under microscopic vision at the posterior fossa, the endoscope was applied to remove the gasserian portion, with the help of micro-curettes and micro-forceps, under direct endoscopic vision. The use of the microscope alone would not allow direct visualization of this part of the tumor.

Case 2 – On 2002, a 66-year-old woman presented to us with pain on the right side of the face for the last few months. Neurological examination was considered normal. A MRI revealed a partially cystic, partially solid lesion at the right cerebellar-pontine angle and gasserian region (Fig 4A and 4B). A trigeminal neurinoma was suspected; patient began to take carbamazepine and surgery was proposed. On January 2003, a retrosigmoid approach and posterior fossa exploration was undertaken, with partial removal of the TN. A week later, exploration of the same region, with the use of the endoscope, micro forceps and micro curettes, for removal of the gasserian portion of the TN was attempt-

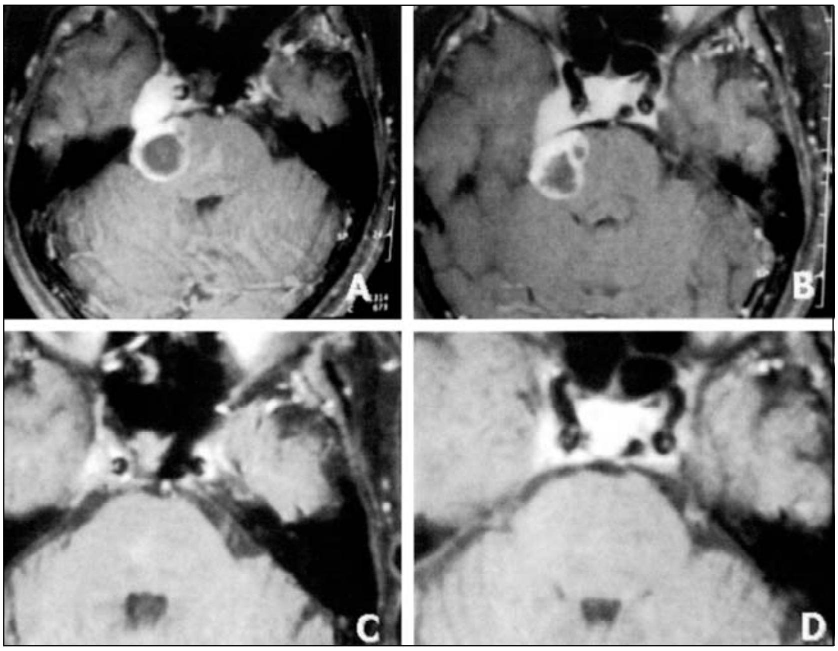

Fig 4. (A) and (B) pre operative MRI scan with cerebellar pontine-angle lesion. (C) and (D) post operative MRI view without lesion.

ed. As with in case 1, endoscope was important in the complete removal of the lesion. On post-operative period, patient presented with hyperesthesia on the right trigeminal nerve territory. On February 2003, the patient returned with MRI showing complete removal of the TN (Fig 4C and 4D). She still suffered from hyperesthesia at the face, despite using carbamazepine 200 mg a day. On December 2003, a new MRI was considered normal. Nowadays there is still mild numbness on the face.

DISCUSSION

Yoshida et al.[2], have classified 27 cases of TN according to its location (Table 1). The M type includes tumors of the middle fossa originating on the Gasser ganglion or its branches on to the lateral wall of the cavernous sinus. P type tumors include those on the posterior fossa with origin on the root of the TN; type E tumors are those with origin on the extracranial portion of the TN. Type MP includes those dumbbell-shaped tumors located equally both in the middle and posterior cranial fossa. Type ME is dumbbell-shaped located in the middle fossa and extracranial compartment; type MPE is tumors in the posterior and middle fossa and also in the extracranial compartment[2,3].

Yoshida et al.[2] reviewed 251 cases of TN from 1985 to 1999 and the post-operative complication most commonly observed was facial hypoesthesia (70%). Cerebellar disturbances, abducens nerve palsy, intratumoral hemorrhage or subarachnoid hemorrhage were less frequent.

Suboccipital retrosigmoid approach to the posterior fossa is one of the most used approaches in neurosurgery and allows a good exposure of the neurovascular structures, microscopically. When a lesion is present inside the cavernous sinus, a combined approach is necessary. Approach to the posterior fossa has its associated morbidity: cerebellar edema and infraction, hearing loss, facial palsy, cerebro-spinal fluid leak[5].

Endoscopic assisted microsurgery (EAM) may simplify surgical approach to those lesions, and tumor removal, allowing low morbidity. EAM has been given a lob of attention recently[6-10]. Its indications and limits are still not yet well defined. It allows less invasive surgery and lower associated morbidity, goals of any surgical treatment. Advances in imaging methods have contributed to improve diagnosis and surgical planning[10].

Table 1. Classification of TN for localization[2].

Type	Cases	%
M	4	14.8
P	5	18.5
E	1	3.7
MP	10	37
ME	5	18.5
MPE	2	7.4
Total	27	100

The utilization of the endoscope to assist in identification of structures in the posterior fossa is not a recent procedure, although with few reports on the literature[5-9]. O'Donoghue and O'Flynn[8] described endoscopic anatomy of the cerebellar-pontine angle in 1993. In 1999, Magnan and Sanna published an atlas with detailed surgical anatomy of the cranial nerves of the base of the skull[9]. The endoscope has also been used in neurovascular decompressions at the posterior fossa, minimizing retraction of structures and widening lateral angle of vision[5,6].

Endoscopic procedures have been classified according to its role on the neurosurgical procedure[10]. They are: pure endoscopic neurosurgery (NE), endoscopic assisted micro neurosurgery (EAM), endoscopic controled microneurosurgery (ECM), and endoscopic inspection (EI). NE uses the endoscope exclusively and surgical instruments inside it, having a single cranial hole as entry site. EAM is a microneurosurgery procedure visually assisted by the endoscope. ECM uses microneurosurgery instruments but not the microscope itself and vision is provided by the endoscope. EI may be used in any surgical procedure to inspection only[10]. EAM improves light and definition besides allowing better lateral view of areas next to the main structures. Endoscope allows a less traumatic procedure, better light and better view of places that the microscope would not be to reach[5,6]. Also it makes possible inspection of bony orifices without tissue removal or retraction[5,11-13].

EAM's characteristic is to combine the advantages of microneurosurgery and endoscopic surgery[10]. Complex maneuvering is made through the microscope, and the endoscope allows identification of inaccessible regions[5,6], improving surgical outcomes.

The main disadvantages of the endoscope are related to the excessive amount of heading in the surgical field disturbing vision and lack of three-dimensional view and cranial nerve injury risk[6]. King et al.[6] reported 10 patients with trigeminal neuralgia aged 16 through 67 (16 male and 3 female) in the period of 1997 through 2000 in which EAM had been used. All patients presented with total improvement or satisfactory improvement of symptomatology without associated morbidity. Jarrahy et al.[7] used EAM to treat 21 patients suffering from trigeminal neuralgia. The endoscope was used to study the neurovascular complex, with 52 neurovascular conflicts being identified. In 14 patients (27%), that would not have been possible without the assistance of the endoscope. Perneczky et al.[10] followed 36 patients through a period of 44 months who were operated on by EAM in the treatment of intracranial cysts (arachnoid and intraventricular cysts). As a result, 20% rates of success, 25% inalterated and 5% worst were achieved. There was a diminished cerebellar retraction and intracranial neuropathies with the risk of CSF leak lowered from 9% to 0%. Al-Mefty et al.[3] reviewed 25 cases of TN between 1989 and 2000, with 76% of the cases being of the dumbbell-shapped tumor. They report difficulties in dealing with those tumors because of the lack of good visualization of the cavernous sinus.

There were no reports of EAM being used in the treatment of the Gasser portion of the trigeminal neuroma in the literature reviewed.

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