Pure Neuroendoscopic Resection of Cystic Cerebellar Tumors

Alexandre Varella Giannetti[1,2], Michel Dantas Rocha[1], Rafael Stein Rosseto[1], Hugo Abi-Sáber Rodrigues Pedrosa[1]

Key words
- Astrocytoma
- Cerebellar tumor
- Hemangioblastoma
- Neuroendoscopy

Abbreviation
MRI: Magnetic resonance imaging

From the [1]Department of Surgery, School of Medicine, and [2]Service of Neurosurgery, Hospital das Clínicas, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil

To whom correspondence should be addressed: Alexandre Varella Giannetti, M.D., Ph.D. [E-mail: agjg@terra.com.br]

Citation: World Neurosurg. (2015) 84, 3:867.e7-867.e11. http://dx.doi.org/10.1016/j.wneu.2015.04.029

Journal homepage: www.WORLDNEUROSURGERY.org

Available online: www.sciencedirect.com

BACKGROUND: **We describe the resection of cerebellar cystic tumors using pure neuroendoscopy. This technique consists of performing all of the procedures under an endoscopic view, with the instruments introduced into the operative field coaxially to the endoscope through a trocar.**

CASE DESCRIPTION: **Three cases of cerebellar cystic lesions (two pilocytic astrocytomas and one hemangioblastoma) were approached using the pure neuroendoscopic technique. Under general anesthesia and prone positioning, a suboccipital burr hole was created. The endoscope was introduced into the tumor cavity, and a reddish nodule was identified. The monopolar electrode was used to coagulate and dissect the surrounding nodular tissue. Grasping forceps were used to remove the nodule. There were no complications related to tumor removal, and the patients recovered from their symptoms. The follow-up images showed reduction of the cavity with no contrast enhancement.**

CONCLUSION: **The pure neuroendoscopic technique was shown to be minimally invasive and a successful and secure method to treat cystic cerebellar tumors.**

Cerebellar cystic tumors are rare, benign lesions, the treatment of which is surgical. Classically, these tumors have been removed by suboccipital craniotomy and a microsurgical technique. Despite a high success rate, this procedure has some risk of morbidity (2, 4, 7, 14, 15).

Over the past 20 years, neuroendoscopy has evolved, allowing for the management of diseases of the central nervous system in a less invasive manner. The technique can be divided into endoscope-controlled and endoscope-assisted microneurosurgery, in which microsurgical instruments are inserted parallel to the endoscope, or pure endoscopic neurosurgery, in which optics and instruments are introduced into the operative field through a trocar (6). Currently, tumors can be biopsied or resected by the pure neuroendoscopic technique, particularly those located in the ventricular system, but only rarely intraparenchymal lesions (1, 12).

The purpose of this work was to describe the technique and results of the resection of three cases of cystic cerebellar tumors, performed under the principle of pure neuroendoscopy.

SURGICAL TECHINIQUE AND CASE REPORTS

Surgical Technique

The surgical procedures were performed under general anesthesia, with the patients in a prone position and the head flexed and supported by a horseshoe head holder. Neuronavigation system was not used, and the approach trajectory was planned to enter the tumor cavity by puncturing the wall on the opposite side of the nodule as distant as possible from the nodule. A longitudinal incision and subjacent burr hole were created. The dura mater was incised, and a 2.7-mm, outer-diameter and 0° rigid-rod-lens endoscope (Karl Storz, Germany) was introduced into the tumor. Inside the lesion cavity, under endoscopic viewing, a reddish nodular lesion could be identified. Monopolar cautery was use to coagulate and dissect the nodular surrounding tissue. The nodule was held with forceps and removed, along with the neuroendoscope. Hemostasis was reviewed, and the dura mater was covered with absorbable hemostat. Bone dust filled the burr hole, and the muscle and skin were sutured in different layers. The patients were extubated at the end of the procedure and remained in intensive care unit for one night.

Case 1

A 19-year-old female patient reported gait ataxia and cervico-occipital pain over the previous 2 months. On neurologic examination, there was ataxia of the left upper extremity and Romberg's sign was positive. Magnetic resonance imaging (MRI) showed a 4.5-cm cystic lesion with a small enhanced nodule in the left cerebellar hemisphere. The nodule was immediately below the tentorium, a few millimeters from the transverse sinus (**Figure 1A-C**). In August 2008, the patient was operated on using the neuroendoscopic technique described earlier. The postoperative period was uneventful, and she was discharged on the second day. Seventy months after the surgery, she is asymptomatic and has no deficits. The actual MRI showed a 1-cm cystic image on the left cerebellar hemisphere without mass effect or contrast

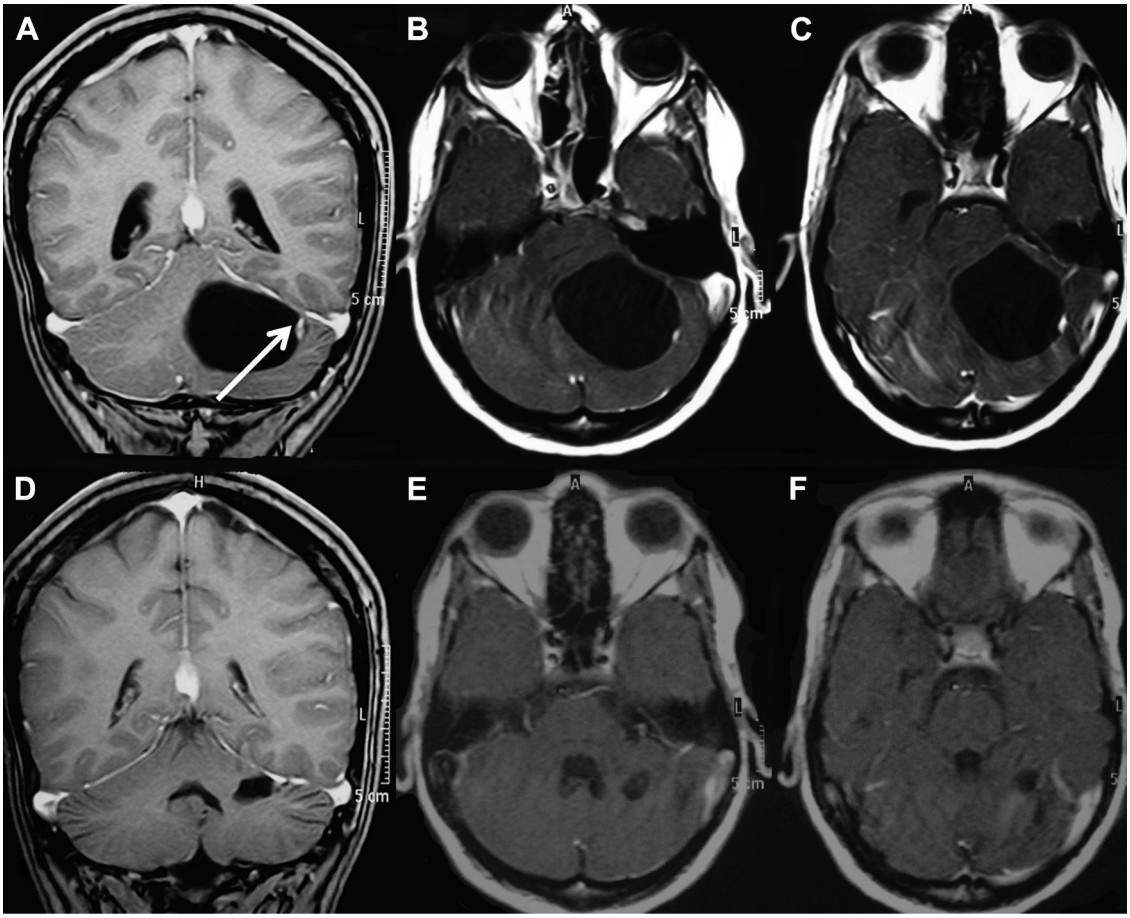

Figure 1. T1-weighted with gadolinium magnetic resonance image of patient 1. *Upper row*: preoperative images showing a large cystic lesion with a small, enhanced nodule just below the tentorium on coronal (**A**) and axial (**B** and **C**) cuts. The fourth ventricle is totally collapsed. The *arrow* shows the approach trajectory *Lower row*: postoperative images showing a small residual cerebellar cavity on coronal (**D**) and axial (**E** and **F**) cuts. The fourth ventricle returned to its normal shape and position.

enhancement (Figure 1D-F). The histopathological examination revealed pylocytic astrocytoma.

Case 2

A 59-year-old woman was brought to the emergency ward on 19 February, 2012. Her relatives reported a 1-year history of decreased spontaneous activities and reaction to environmental stimuli. More recently, she had become disoriented and had stopped walking. On physical examination, she was lethargic and confused. There were no cranial nerve abnormalities. She could barely raise the four extremities and was not able to stand or walk. An urgent computed tomography scan was obtained and showed a large left cerebellar lesion and an important triventricular hydrocephalus. Endoscopic third ventriculostomy was performed immediately to release the intracranial hypertension. The postoperative suite was marked by arousal and recovery of the mental status, but left hemiparesis was noted. A postoperative MRI showed mild ventricular reduction and a hyperintense, right paramedian pontine area on flair and T2-weighted images, with restriction to water diffusion on specific sequences (Figure 2A). A large cystic lesion occupying the vermis and the left cerebellar hemisphere was noted, with an enhanced nodule in its posterior wall (Figure 2B and C). The fourth ventricle was collapsed. The pontine image was considered an infarction related in some manner to the third ventriculostomy despite no abnormalities being observed during the surgical procedure. Three weeks after the first surgery, the patient was submitted to neuroendoscopic resection of the cerebellar tumor (Figure 2D). The patient recovered partially and went home a few days later. Twenty-eight months after the surgery, she has mood instability, normal mental status, and no cranial nerve deficits, but left hemiparesis remains, although the patient is sufficiently independent to walk. The actual MRI showed a small cerebellar cyst, without contrast enhancement or mass effect, and a hypointense pontine lesion on T1-weighted imaging (Figure 2E and F). The histopathological examination disclosed pilocytic astrocytoma.

Case 3

A 29-year-old woman with a known diagnosis of von Hippel-Lindau disease and previous surgeries for resection of right cerebellar and spinal cord hemangioblastomas was