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Brainstem and diencephalic lesions in Neuromyelitis Optica

Roberta La Piana, Maria Cortés, Donatella Tampieri

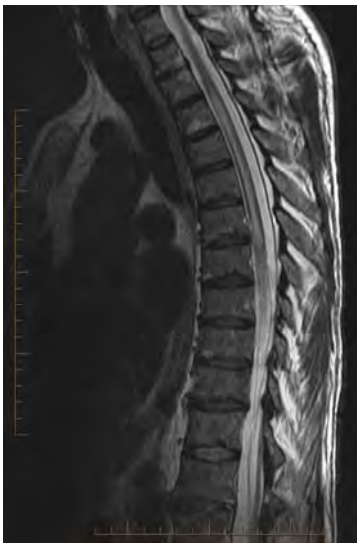
Neuromyelitis optica, also known as Devic's disease, is a demyelinating disease of the central nervous system characterized by specific involvement of the spinal cord and of optic nerves and related to autoantibodies for aquaporin 4 (AQP4).

Neuroimaging has a key role in the diagnosis which resides on the presence of both optic neuritis and acute myelitis together with at least two of the following criteria: a) contiguous spinal cord MRI lesions extending over three vertebral segments; b) brain MRI not meeting the criteria for multiple sclerosis; c) positive IgG autoantibodies for AQP4[1]. The absence of brain abnormalities was originally needed for the diagnosis but the evidence of a significant number of patients (between 40 to 60%[2]) with intracranial findings other than optic neuritis led to the revision of the diagnostic criteria.

Among our cases with atypical myelopathies, we identified two patients with confirmed neuromyelitis optica and peculiar intracranial lesions.

The first patient presented at the age of 66 with transverse myelitis extending all along the thoracic spinal cord (Figure 1). The brain MRI performed at that time showed a symmetric T2 hyperintense-T1 hypointense lesion located in the central region of the midbrain (Figure 2). The lesion was homogeneously enhancing after gadolinium injection. The presence at a subsequent examination of bilateral optic neuritis led to the final diagnosis.

Figure 1: *sagittal T2-weighted image of Patient 1 showing a hyperintense diffuse signal abnormality involving the entire thoracic cord.*



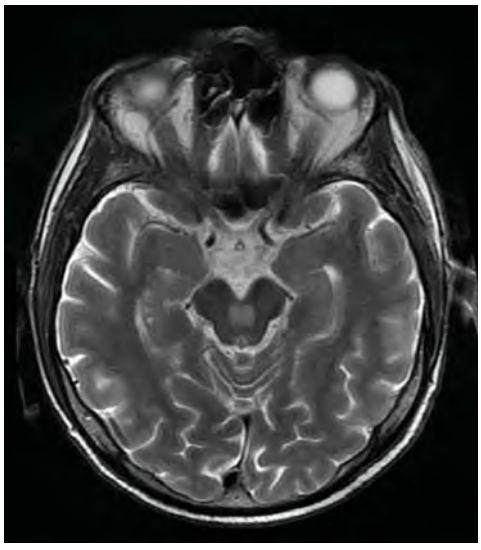


Figure 2: *Axial T2-weighted image of Patient 1 showing a hyperintense lesion involving the midbrain bilaterally.*

The second patient is a 29 year-old woman presenting with optic neuritis and few months later with a diffuse involvement of the cervical and thoracic spinal cord and the conus medullaris (Figure 3). A subsequent brain MRI demonstrated the presence of infra- and supratentorial white matter lesions involving the medulla oblongata, the dentate hili, the midbrain, the hypothalamus and the internal capsule. The lesions were T1 hypointense and T2 hyperintense (Figure 4).

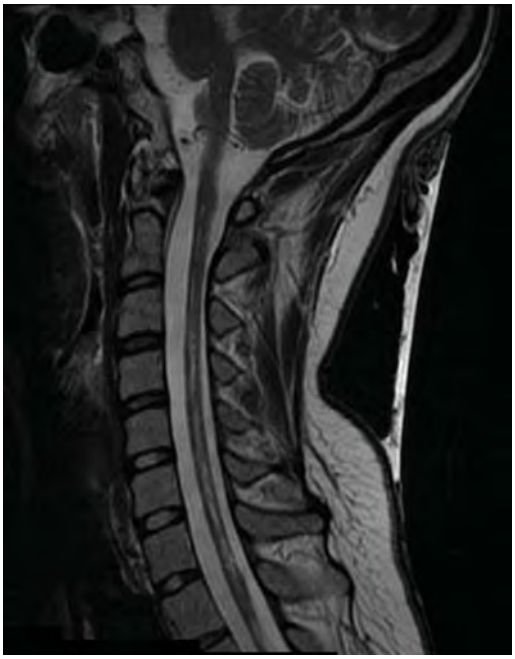


Figure 3: sagittal T2-weighted image of the spinal cord of Patient 2 demonstrating diffuse hyperintense signal abnormalities involving the cervical cord.

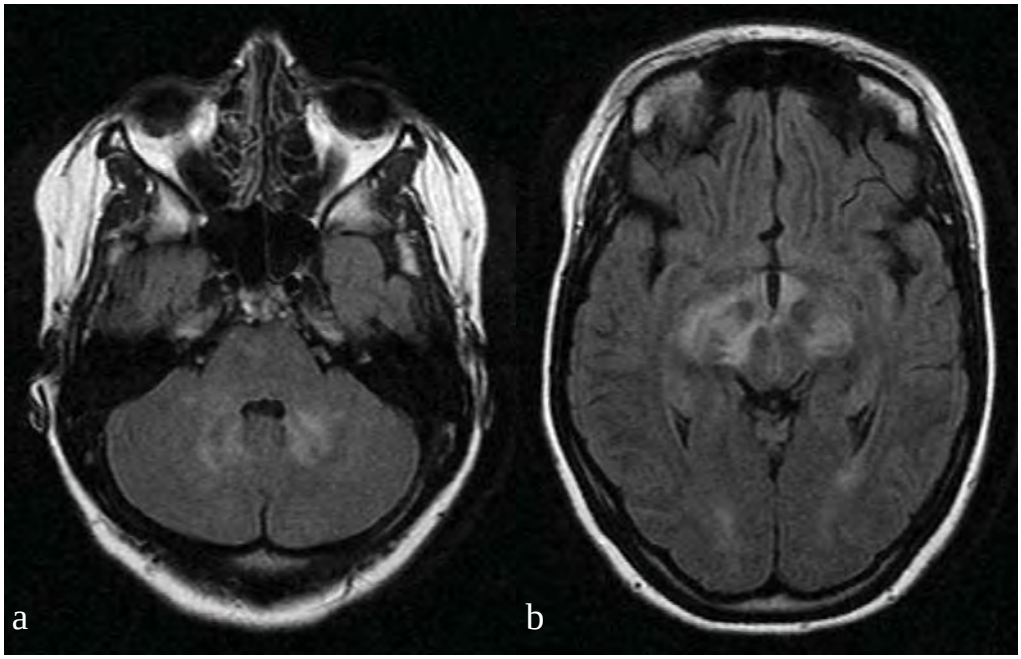


Figure 4: axial FLAIR T2-weighted MR images of Patient 2 showing hyperintense abnormal signal in the dentate hili bilaterally (a), in the midbrain and in the hypothalamus (b).

A third patient has been previously described with neuromyelitis optica at the age of 16 years[6]. The brain MRI performed one year later showed the presence of a symmetric T2 hyperintense signal abnormality involving the hypothalamus.

These intracranial findings were unusual for multiple sclerosis; in particular they were symmetrical, situated along the midline in the diencephalon and brainstem. The particular location – brainstem and hypothalamus – has been described as characteristic of neuromyelitis optica[3-6], due to the elevated expression of AQP4 in these sites[3-5].

Our patients confirmed that intracranial lesions involving the diencephalon and the brainstem are characteristic of neuromyelitis optica. These specific findings can suggest the diagnosis in patients with atypical myelopathy and brain involvement of suspected inflammatory-demyelinating origin.

References

1. Wingerchuck D, Lennon V, Pittock S, Lucchinetti C, Weinshenker B. Revised diagnostic criteria for neuromyelitis optica. Neurology 2006; 66(10):1485-1489

2. Cabrera-Gomez JA, Quevedo-Sotolongo L, Gonzalez-Quevedo A, et al. Brain magnetic resonance imaging findings in relapsing neuromyelitis optica. Multiple Sclerosi 2007;13:186-192

3. Pittock SJ, Lennon VA, Krecke K, Wingerchuck DM, Lucchinetti CF, Weinshenker BG. Brain abnormalities in neuromyelitis optica. Arch Neurol 2006;63:390-396

4. Downer JJ, Leite MI, Carter R, Palace J, Kuker W, Quaghebeur G. Diagnosis of neuromyelitis optica (NMO) spectrum disorders: is MRI obsolete? Neuroradiology 2011; DOI 10.1007/s00234-011-0875-x

5. Li Y, Xie P, Lv F, et al. Brain magnetic resonance imaging abnormalities in neuromyelitis optica. Acta Neurol Scand 2008; 118:218-225

6. Poppe AY, Lapierre Y, Melançon D, et al. Neuromyelitis optica with hypothalamic involvement. Mult Scler 2005; 11(5):617-621

THE NEURO LAUNCHES NEW LOGO AND PUBLIC AWARENESS CAMPAIGN

SANDRA MCPHERSON PHD

The Neuro's new logo and public awareness campaign was made possible by a generous donation of pro-bono creative services from Bos, Montreal's top communications and marketing agency.

The design of the logo draws its inspiration from the shape of the brain as well as organic shapes found in nature. The colours (cool blue and warmer beige) have been chosen to represent intellectual and emotional aspects of the brain. To reflect the spirit of collaboration prevalent at The Neuro, the logo is composed of three overlapping, transparent entities representing the connection between the researchers, clinical staff and patients who coexist within the organization. The bold type used for the name has been designed to form a block in order to convey the strength of The Neuro. The fact that the letters are close together is indicative of the close connections that exist between research, teaching and patient care. Lower case letters underline the approachable, friendly side of The Neuro. And finally, a common graphic approach was applied to enhance the legibility of the name by rendering the "o" in a different colour than the rest of the letters.

The public awareness developed by Bos is designed to raise awareness for The Neuro and the role of neuroscience in our lives. In-kind donations of creative talent and advertising space have made this local and national campaign possible.

Television
Astral, Global, CTV Montreal, Télé-Québec, Radio Canada, RDS et Canal Savoir

Magazines
St Joseph Communications:
Toronto Life, Ottawa Magazine and Canadian Family
Transcontinental:
Coup de pouce, Les Affaires, Vita et Décormag

Abribus/ads on bus shelters:
Affichage Lumibus (CBS Affichage)

Extravagant Pilocytic Astrocytoma in the Posterior Fossa

Abdulrahman Alturki, Benoit Goulet, Marie-Christine Guiot and John Richardson

A 29 years old University student presented to the hospital with a one year history of writing difficulties and noticed decrease in his balance (especially while passing in doorways) and some trouble speaking. He did not complain of headache and otherwise was neurologically intact. He spoke to a friend who is a neurology resident at the Neuro who booked him for an elective MRI of the brain, which showed a large posterior fossa cystic lesion.

We were surprised by the size of the lesion, causing so little deficits (fig 1).

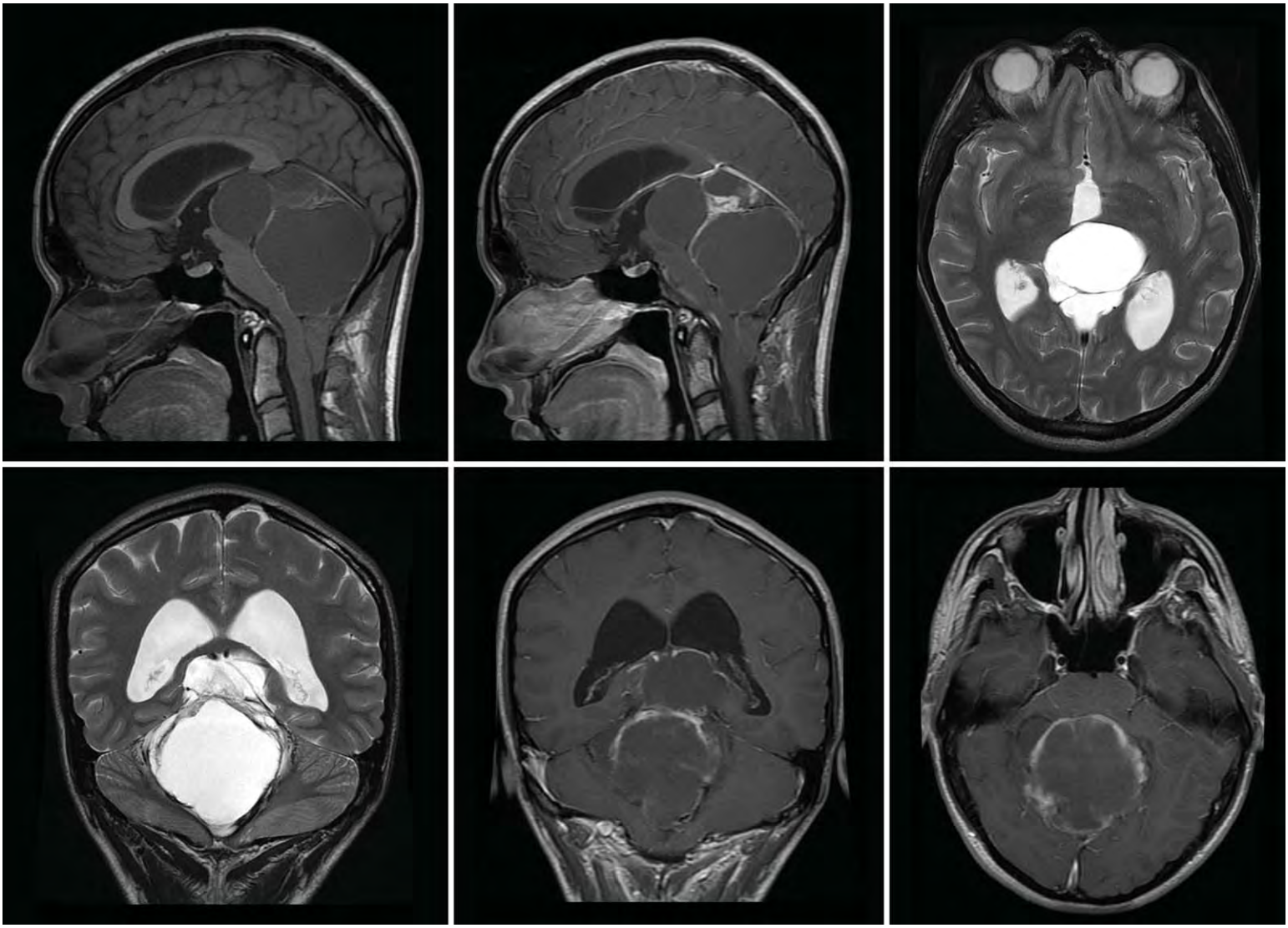
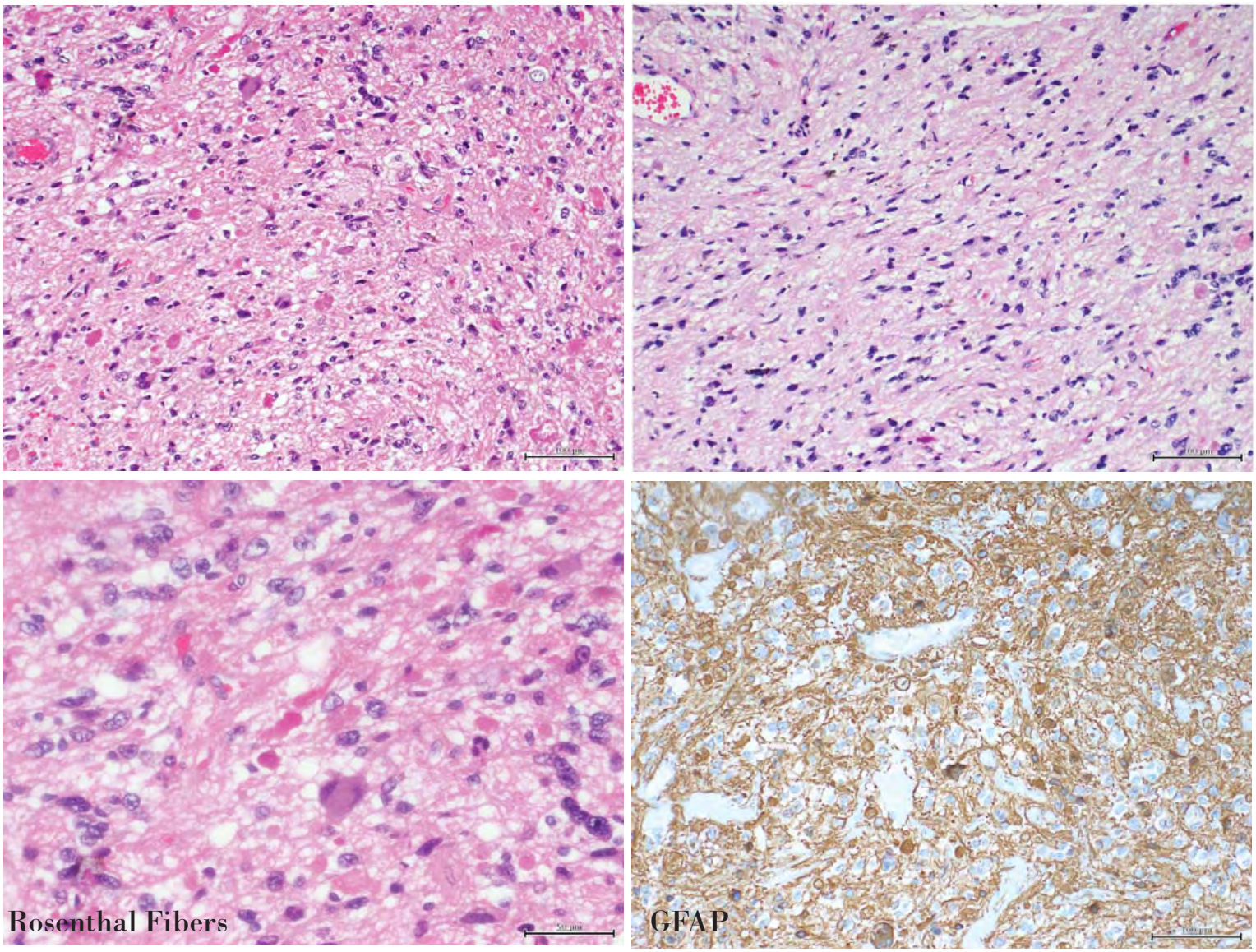


Figure 1: Multi-planer MRI T2WI and T1WI pre and post contrast injection prior to surgery, showing a large midline mainly cystic lesion in the posterior fossa.

The patient was immediately admitted. An external ventricular drain (EVD) was inserted and the intracranial pressure found to be normal. Posterior fossa surgery was performed. A lesion containing yellowish fluid was resected through infratentorial supracerebellar approach (fig 2). The pathology revealed a pilocytic astrocytoma (WHO grade1).



Benign looking astrocytoma. GFAP positive. Presence of Rosenthal Fibers.

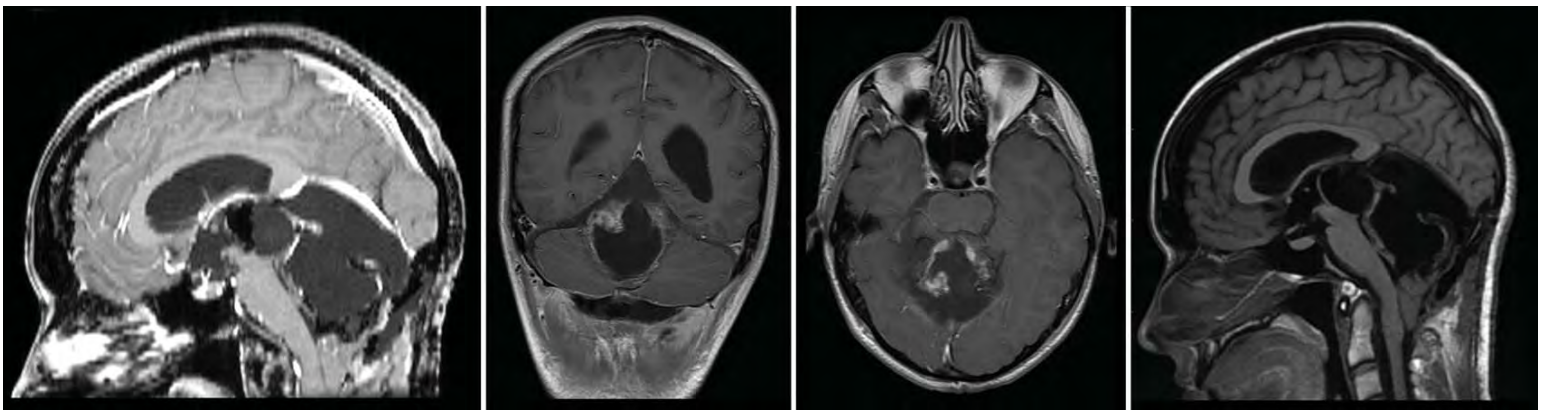


Figure 2: Multi-planer MRI T1WI pre and post contrast injection after the first surgery.

Knowing the diagnosis prompted the surgical team to re-visit the tumor area and resect the residual enhancement seen on the immediate postoperative MRI (fig 2).

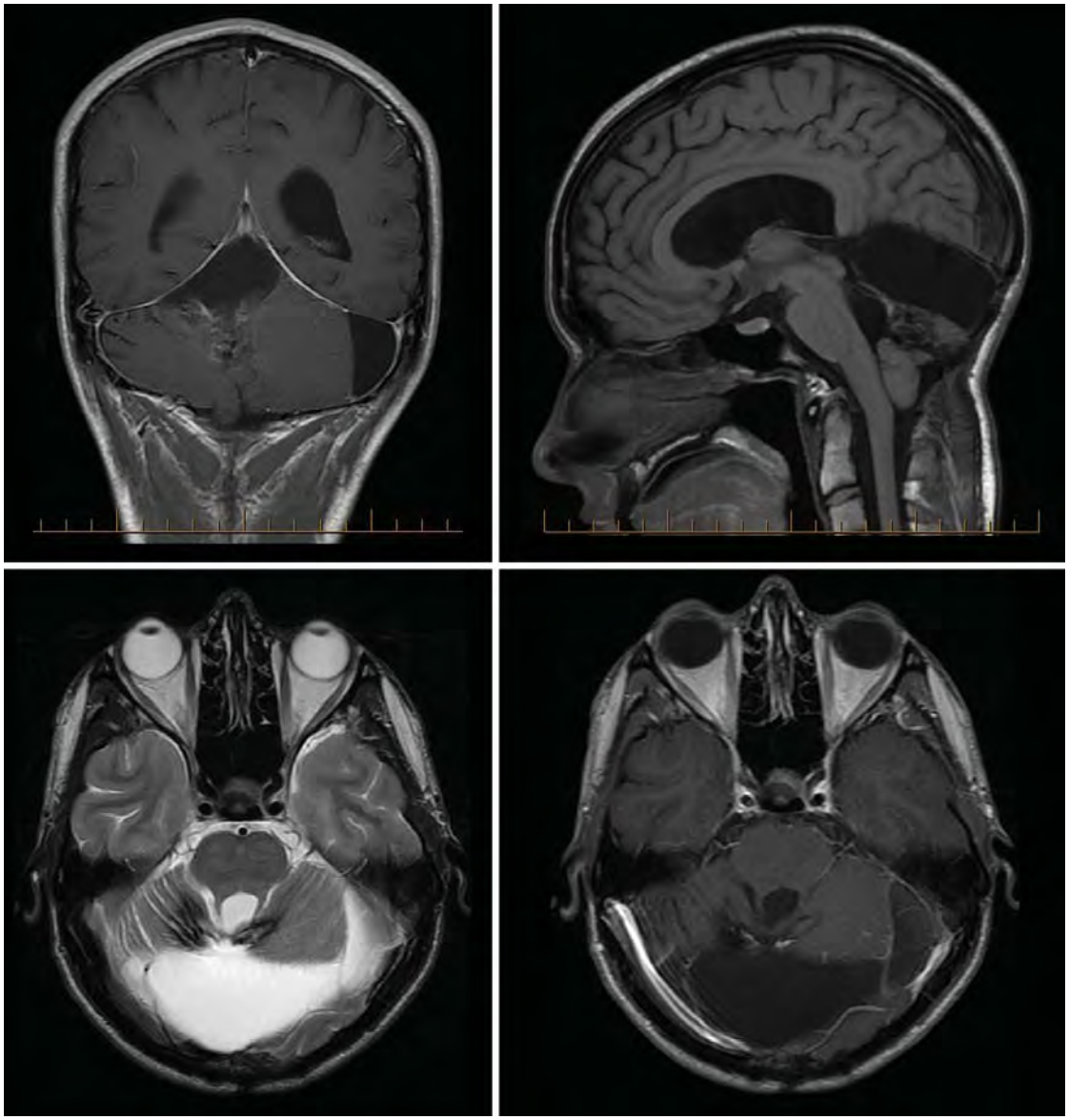


Figure 3: Multi-planer MRI T2WI and T1WI pre and post contrast injection after the second surgery.

The patient did well afterwards and was back to his normal life.

Pilocytic astrocytoma of the adult is a rare tumor with a similar clinical behavior to that of the child/ adolescent. Surgical resection is the treatment of choice where feasible. In cases amenable to complete resection, the prognosis is usually very good.

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Transependymal CSF Flow in Hydrocephalus Some facts and images

Denis Melançon

Some patients with hydrocephalus present with transependymal flow and some others don't, some patients demonstrate flow through the frontal horns, and some don't, some will show flow along the temporal and occipital horns.

In some instances, the absence of flow does not mean that hydrocephalus is not significant.

Transependymal flow seems to occur where the brain compliance is maximal. And it is usual at the frontal horns where exists the ependymitis granularis, a loose tissue area..

Perivascular spaces in the brain are everywhere, but more or less opened, according to developmental variants. They could be used as an exit of CSF out of of ventricles under tension. But, as one paper has recently suggested, they rather seem to be used as a pathway to resorb CSF from the subarachnoid spaces, as an add-on to Pacchionian granulations.

The images shown in this bulletin show some of the aspects of transependymal flow of ventricular CSF on MRI. These are preliminary observations, more coming in future issues.

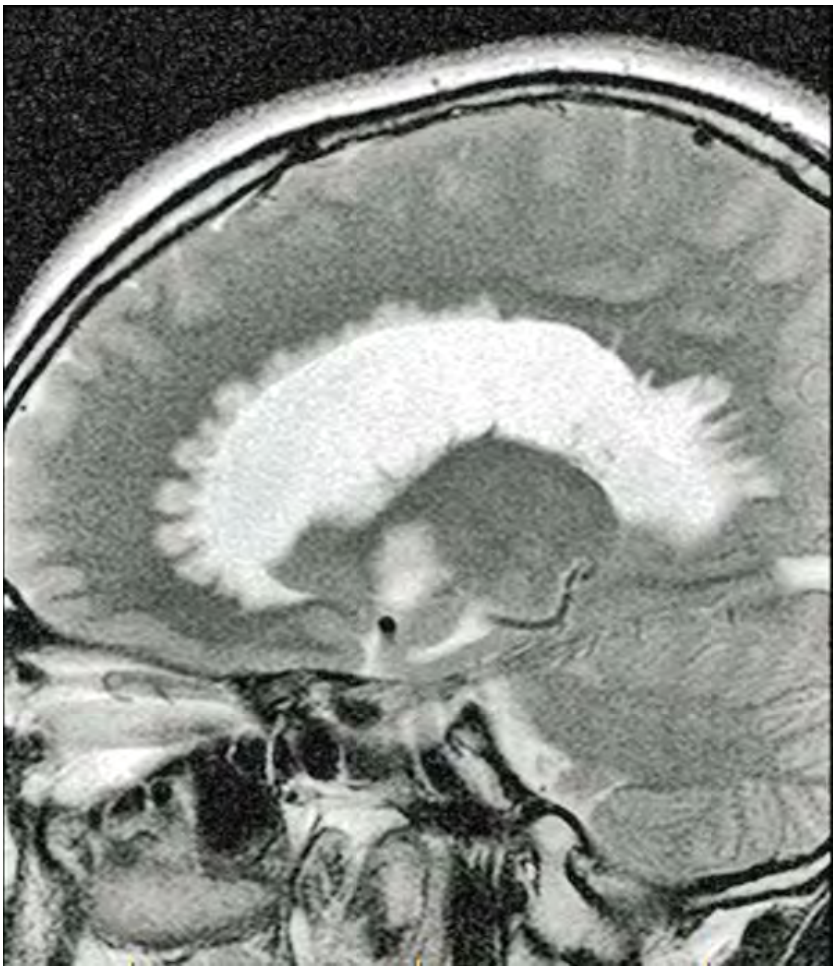

Fig 1, Sagittal T2 Gradient echo interpreted first as probable demyelinating lesions, subsequently seen as transependymal CSF flow in hydrocephalus

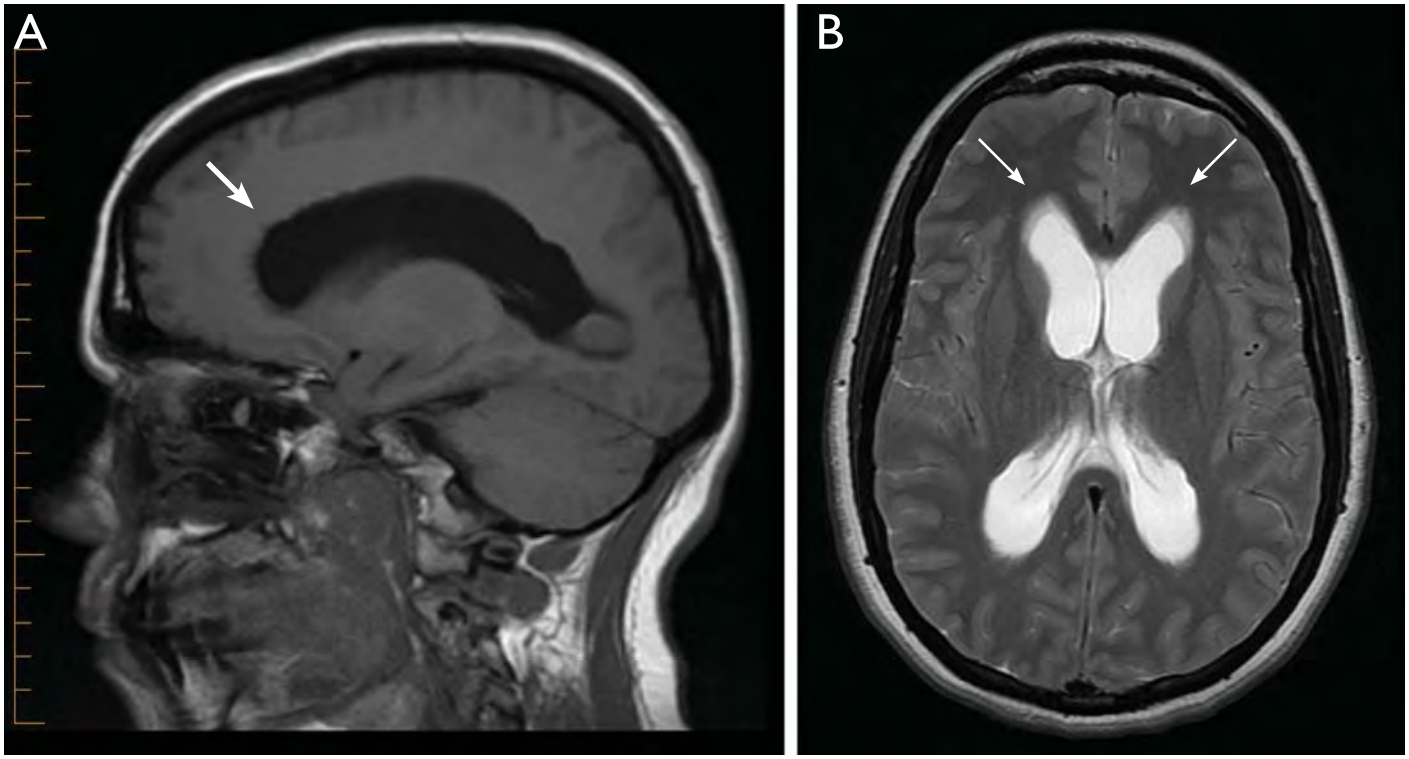

Fig. 2a: Sagittal T1 image showing small digitiform hypointensities (arrow) at margin of the frontal horn representing the CSF flowing in between the callosal fibers

Fig. 2b: Axial T2 hyperintensity is ill defined at margin of frontal horns.(arrows)

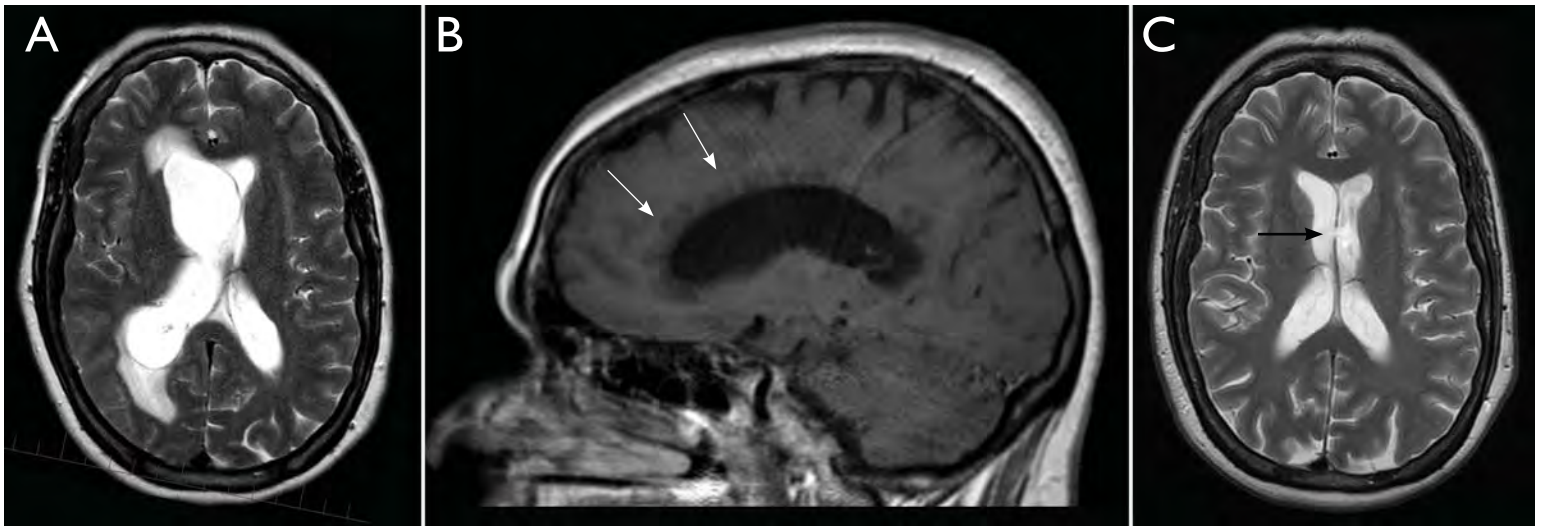

Fig. 3a: Axial T2 showing right lateral ventricle hydrocephalus with transependymal flow of CSF at the frontal horn and along the occipital horn where the optic radiations are well seen.

Fig. 3b: Sagittal T1 showing the fluid exiting in between the callosal fibers (arrows)

Fig. 3c: Axial T2 showing return to normal of ventricle size and surrounding brain intensity following fenestration of the septum pellucidum (arrow)

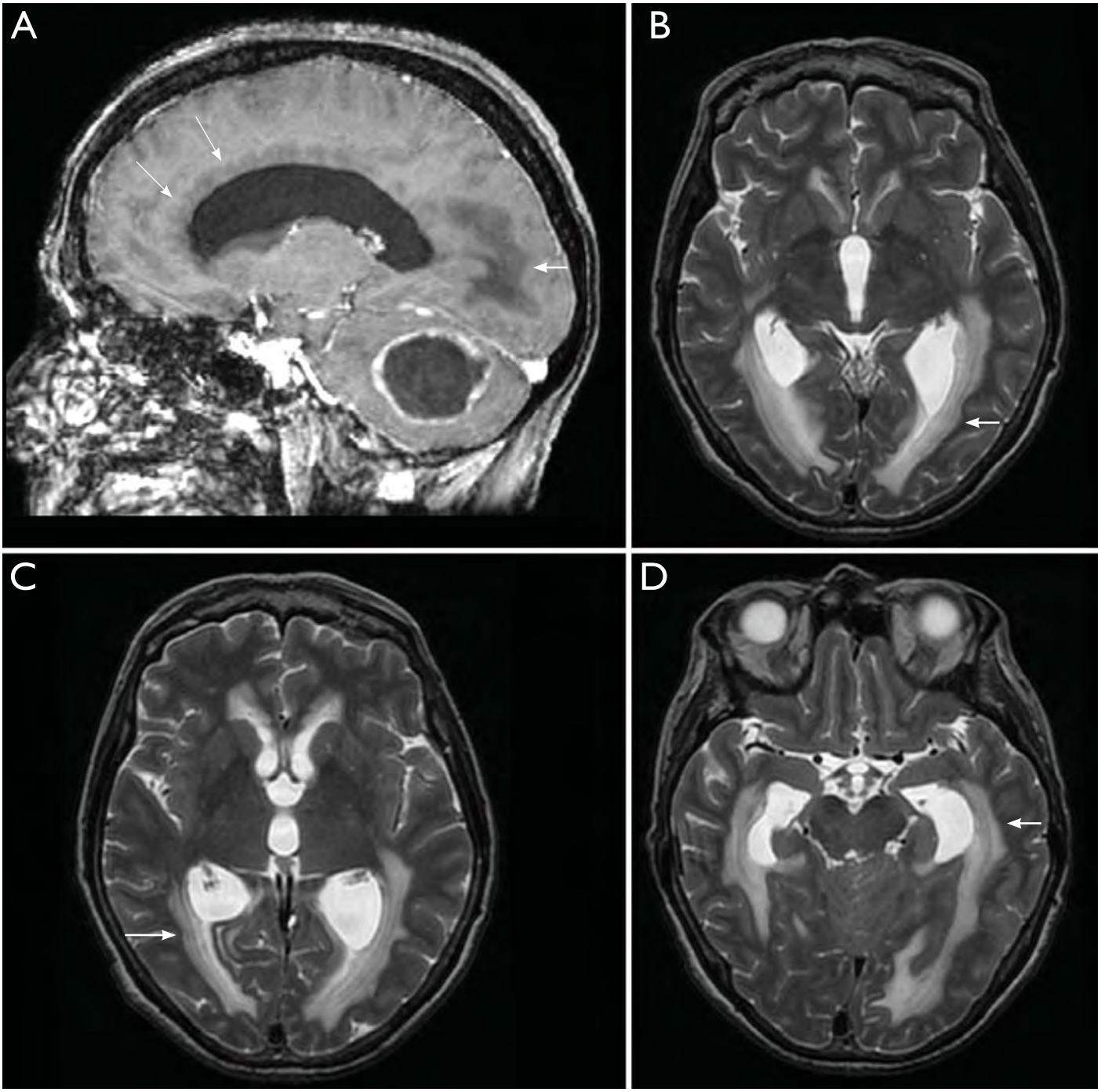

Fig. 4a: Sagittal T1 with Gado shows large digitiform hypointensities along frontal horn the CSF flowing in between the callosal fibers. (arrows)

A cystic metastasis is present in the cerebellum causing the hydrocephalus

Fig. 4b and c: Axial T2 images showing significant diffuse hyperintensity along the margin of temporal and occipital horns

No digitiform pattern as there are no callosal radiations, the tapetum is seen as a thin band mesial to the spread apart optic radiations.

Fig. 4d: Anteriorly along the temporal horns, the tapetum is outlined, the inferior association bundle lying lateral to it.