



Short communication

Autonomic dysfunction elicited by a medulla oblongata injury after fourth ventricle tumor surgery in a pediatric patient



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ABSTRACT

We report the case of a 9-year-old male patient with a recurrent fourth ventricle anaplastic ependymoma who developed severe arterial hypertension and blood pressure lability during and after surgery. A punctual bilateral lesion located within mid dorsal medulla oblongata caused by both infiltration and surgical resection was observed in postoperative MRI. Three years later, the patient remained neurologically stable but the family referred the presence of a chronic tachycardia as well as palpitations and sweating with flushing episodes related to environmental stress. On autonomic evaluation, an increase in sympathetic outflow with tachycardia together with orthostatic hypotension caused by baroreceptor reflex dysfunction was observed. We postulate that a bilateral injury to both nuclei of the solitary tract may have caused central dysautonomia.

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1. Introduction

Central autonomic control nuclei and pathways are mainly integrated within the brainstem, especially in the medulla oblongata. Lesions within these structures can lead to a central dysautonomia.

Several authors have described the main cardiorespiratory responses to brainstem autonomic nuclei electrical or chemical stimulation or lesion in experimental animals (Schmitt and Laubie, 1979; Colombari et al.; 2001; Dampney and Horiuchi, 2003). On the other hand, there are a few studies on the role of specific brainstem autonomic nuclei in humans (Janetta et al., 1985; Geiger et al., 1998; Makino et al., 1999). It still remains very difficult to reach the diagnosis of a specific focal brainstem lesion and its subsequent autonomic dysfunction. The complexity of the anatomy of the brainstem and the central autonomic network (CAN) (Benarroch, 2014a) may explain this notably difficulty.

Surgery into or over the brainstem for tumor resection is often performed in the daily practice of neurosurgeons, but we are not familiar with the possible autonomic complications that patients can develop. Autonomic complications due to brainstem lesions or tumor surgery

are rarely reported. The literature is limited to very few case reports and short case series (Hsu et al., 1984; Rhodes and Wightman, 2000; Wörner et al., 2002; Gómez-Esteban et al., 2009).

We report a case of a 9-year-old patient who developed a severe arterial hypertension after a fourth ventricle tumor surgery. Three years later, autonomic tests revealed a sympathetic overactivity with orthostatic hypotension caused by baroreflex failure. Finally, we discuss the possible origin of this dysautonomia and a literature review is included.

2. Case report

A 9-years-old male patient underwent a second surgery of a recurrence of a fourth ventricle anaplastic ependymoma. First surgery was performed two years before without neurological complications. During the second surgery, anesthesiologists reported an acute severe arterial hypertensive crisis, up to 240 mm Hg/180 mm Hg of systolic/diastolic blood pressure (BP). Intensive antihypertensive intravenous therapy (esmolol) was required to control it. A subtotal resection of the tumor was achieved. Postoperatively, he remained neurologically stable without intracranial outcomes but he needed treatment with nitroglycerine for controlling arterial hypertension (160/100 mm Hg). After few days he was discharged with normal BP and no significant neurological deficits.

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Two months later, the patient was admitted to the hospital with nocturnal inspiration stridor, sleep apnea, dyspnea and dysphagia. In Magnetic resonance images (MRI), another tumor recurrence was observed with infiltration of the medulla oblongata (fig. 1). He underwent a new surgery and total resection was achieved. Severe bradycardia and hypertension was reported during surgery. In the early postoperative time, arterial hypertension was registered (137/99 mm Hg) and weaning was not achieved because of the development of laryngeal stridor and severe apnea, being finally diagnosed of a hypopharynx dynamic obstruction caused by motor incoordination of supraglottic structures with a possibly central origin. Therefore, tracheostomy was performed. In his early days at ICU, it was reported an important lability of BP control with peaks of 170/100 mm Hg and tachycardia of 140 beats per minute (bpm) followed by hypersudoration. These crisis were treated with propranolol, hydralazine and clonidine, and were followed by

daily episodes of hypotension with mean arterial pressure (MAP) of 75/35 mm Hg, despite the withdrawal of antihypertensive treatment. The 24 h pattern of BP consisted of progressive increases of PA during the day reaching a maximum at night. A central respiratory dysfunction with crisis of apnea and hyperventilation was also diagnosed, so tracheostomy needed to be maintained. After several weeks, the patient was discharged from the hospital with moderate tetraparesis, hypopnea-apnea and swallowing dysfunction that still required tracheostomy and gastrostomy. He still presented blood pressure control lability and tachycardia, which required clonidine and propranolol to its control.

Three years after the last surgery, the patient remained neurologically stable, with favorable recovery of phonation, swallowing and a partial recovery of tetraparesis. Tracheostomy and gastrostomy were still maintained. The MRI did not show any recurrence of the ependymoma (Fig. 1). Regarding to the autonomic function, he continued with daily

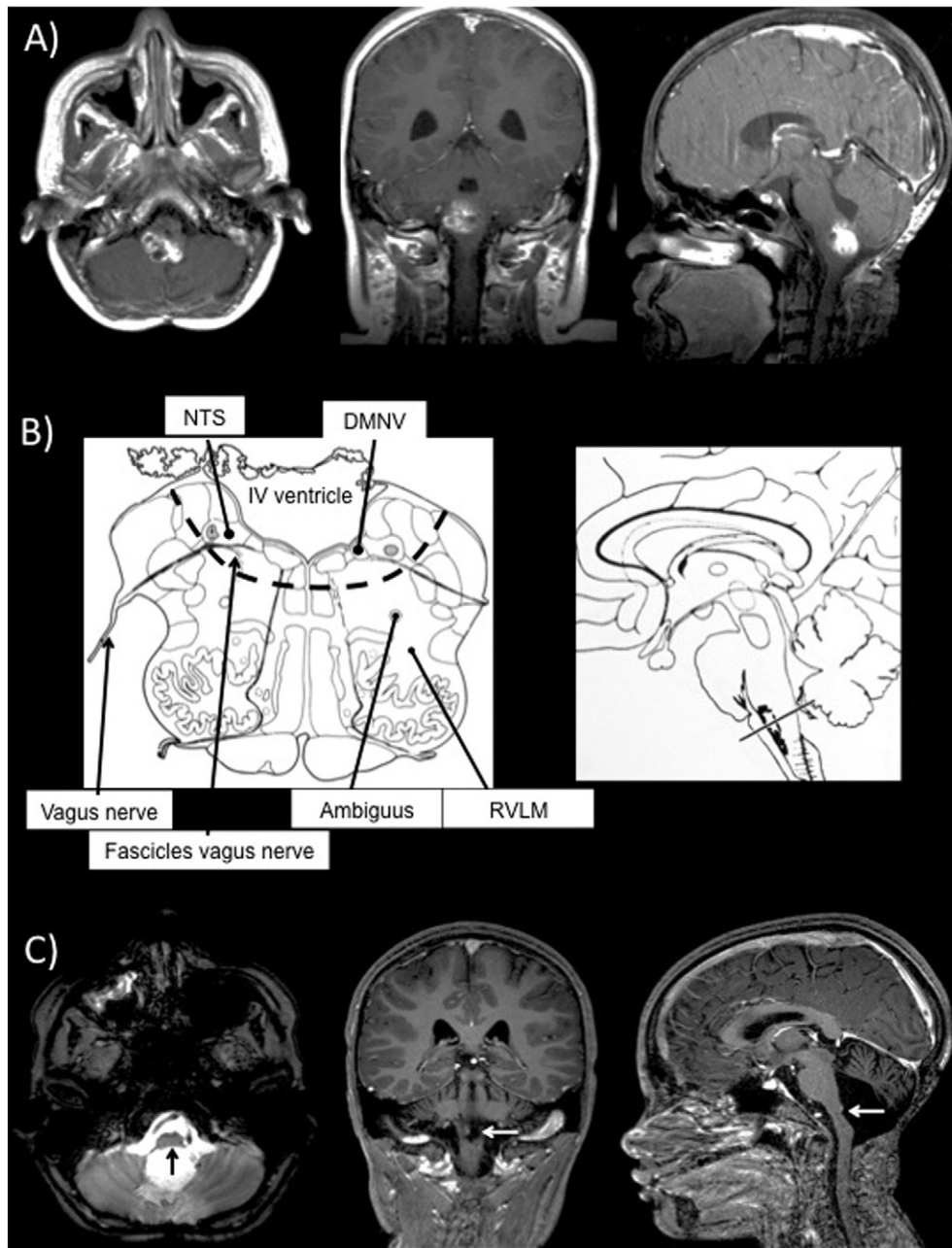


Fig. 1. A) Axial, sagittal and coronal views of preoperative MRI showing new recurrence of anaplastic ependymoma with infiltration of the fourth ventricle's floor. B) Axial view of the upper medulla oblongata on anatomic atlas (DeArmond et al., 1989). A discontinued line points the possible location of the injury. C) MRI showing postoperative distortion/injury of medulla oblongata. Black and white arrows point the area of injury. This MRI was performed on the same day of autonomic tests.

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