Neurology Asia 2020; 25(4) : 563 – 568

CASE REPORTS

Reversible Parinaud's syndrome during the first 24 hours following a transient ischemic attack – A case report and review of literature

Hamzeh Mohammad Alrawashdeh, Omar Al-Habahbeh, Mahmoud Al-Salem

Ibn Al Haytham Hospital, Ophthalmology Department, Amman, Jordan

Abstract

Among three types of stroke, ischemic and hemorrhagic types are well-known causes of Parinaud's syndrome while transient ischemic attack (TIA) is not. We present a case of a 45-year-old man, who presented with neurological features of Parinaud's syndrome due to TIA. Our first impression was either a stroke or a compressive brain mass. However, urgent investigations were normal. He was commenced on a loading dose of oral antiplatelet and acetylsalicylic acid then admitted for observation. Surprisingly, his neurological features resolved within 24 hours from the presentation. Therefore, the diagnosis of TIA was established.

Keywords: Parinaud's syndrome, upgaze palsy, stroke, TIA.

INTRODUCTION

Parinaud's syndrome, also known as dorsal midbrain syndrome, collicular syndrome, pretectal syndrome, Koerber-Salus-Elschnig syndrome, and Sylvian aqueduct syndrome. It was first described by the father of French ophthalmology Henri Parinaud (1844–1905). His description was limited to upgaze palsy along with convergence paralysis attributing the underlying cause to a lesion in the tectal or quadrigeminal plate and not to the direct involvement of the oculomotor nuclei. Nowadays, Parinaud's syndrome is defined as a group of abnormal eye movements and pupillary dysfunction involving upgaze paralysis, convergence retraction nystagmus, light-near dissociation in addition to bilateral lid retraction (Collier's sign) and conjugate down gaze in the primary position (setting-sun sign)[1,2]

CASE REPORT

A 45-year-old male patient, heavy smoker with no significant past medical history, presented to the emergency department complaining of sudden onset of binocular diplopia and mild dizziness for two hours after waking up in the morning. There was no history of loss of consciousness, blurring of vision, headache, vomiting or any other neurological symptoms. Moreover, he denied having a similar condition before.

His examination revealed best-corrected visual acuity of 20/20 in both eyes, no relative afferent pupillary defect, normal confrontational visual field, bilateral lid retraction, limited upgaze with convergence retraction nystagmus and light-near dissociation. Both anterior and posterior segments were within normal limits besides normal vital signs and neurological assessment. (Figure 1)

Our first impression was either a stroke or a brain mass. Thus, brain magnetic resonance imaging (MRI) was urgently ordered and the result was normal. Accordingly, the patient was commenced on a loading dose of clopidogrel (600 mg) and aspirin (300 mg) then admitted for observation and neurological consultation. Further, brain MR venography, magnetic resonance angiogram (MRA), and neck MRA were done and showed normal results. In addition, blood tests including complete blood count, C-reactive protein, thyroid function test and renal function test were within normal limits apart from lipid profile that revealed high levels of cholesterol (240.8 mg/dl), Triglyceride (268 mg/dl), and VLDL (53.6 mg/dl). Results of diagnostic imaging studies are shown in Figures 2, 3, 4 and 5.

On the next day, the patient's previous

Address correspondence to: Hamzeh Mohammad Alrawashdeh, Ophthalmology Department, Ibn AL Haytham Hospital, Amman, PO Box 410739, 11141 Amman, Jordan. Tel: +962797274355. E-mail: dr_hmsr@yahoo.com

Date of Submission: 23 June 2020; Date of Acceptance: 3 July 2020

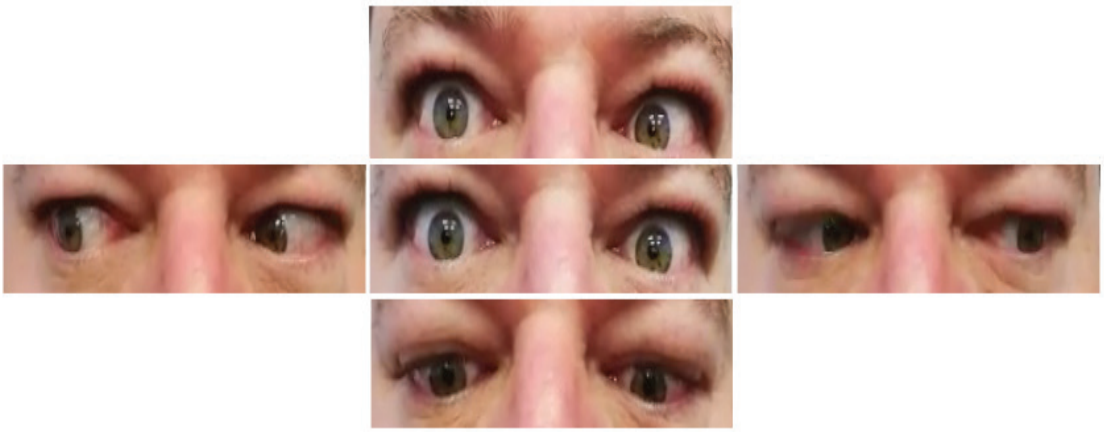

Figure 1. Shows paralysis of upgaze and eyelid retraction

symptoms disappeared and the ocular examination was normal. Therefore, the diagnosis of transient ischemic attack (TIA) was established. The patient was discharged on aspirin 150 mg and clopidogrel 75 mg daily besides referral to an endocrinologist for further management of dyslipidemia. On subsequent follow-ups, he was doing well.

DISCUSSION

Parinaud's syndrome results from damage to the superior colliculus, posterior commissure, and pretectum.[1] It occurs commonly due to upper brain stem lesions that lead to compression on the vertical gaze center in the medial longitudinal fasciculus (MLF).[3] It represents a group of abnormalities in ocular motility and pupillary dysfunction characterized by vertical supranuclear palsy that presents usually with paralysis of upgaze. However, both upgaze and downgaze are affected in some patients. Besides, pupils show impaired reactivity to light and a light-near dissociation. Convergence-retraction nystagmus is considered a classical sign in which the globes retract and the eyes direct toward the nose with jerky nystagmus upon fast upgaze. Moreover, setting-sun sign or conjugate down gaze in the primary position and Collier's eyelid retraction sign also present.[1] Although upgaze paralysis, convergence retraction nystagmus, and pupillary light-near dissociation are considered the cardinal signs[1], pretectal lesions may induce minimal presenting signs such as slow vertical saccades rather than a limitation of the vertical range of eye movements, and lid lag instead of lid retraction in some individuals.[4]

The most common causes of Parinaud's syndrome are pineal tumors, brain stem hemorrhage and ischemic strokes.[1,2,5] These etiologies have a correlation with patient age, with the pineal gland or midbrain tumors such as pineocytoma and germinoma being more common in younger individuals, and the vascular causes being more common among the elderly.[6] Furthermore, obstructive hydrocephalus, midbrain and thalamic infarction or hemorrhage, giant posterior fossa aneurysms, subdural hematoma, arteriovenous malformation, trauma, hypoxia, demyelination, brainstem infections (e.g. toxoplasmosis, tuberculosis, syphilis, encephalitis, Whipple disease), barbiturate overdose and metabolic disorders are also related to vertical supranuclear gaze palsy.[8,9]

The control of the vertical gaze center depends on the posterior commissure, the interstitial nucleus of Cajal (INC) and the rostral interstitial nucleus of the medial longitudinal fasciculus (riMLF).[7] Dorsal to the superior end of the cerebral aqueduct the PC is located which aids in the coordination of all vertical eye movements, particularly upward movement. The fibers responsible for upgaze are crossing at the level of the posterior commissure; as a result, any defect or injury at this level can induce vertical gaze palsy, especially the loss of vertical gaze holding. The INC present in the midbrain and it aims mainly in coordinating all vertical eye movements except for saccades. Unilateral lesions will affect gaze holding as well as the vertical pursuit, while bilateral lesions lead to a reduction in the range of all vertical eye movements but do not affect saccadic movements.[7,10] The riMLF mainly aid in both vertical and torsional saccades. It is laying in the midbrain bilaterally and dorsally connected through the posterior commissure. It controls the elevator muscles of both eyes and the

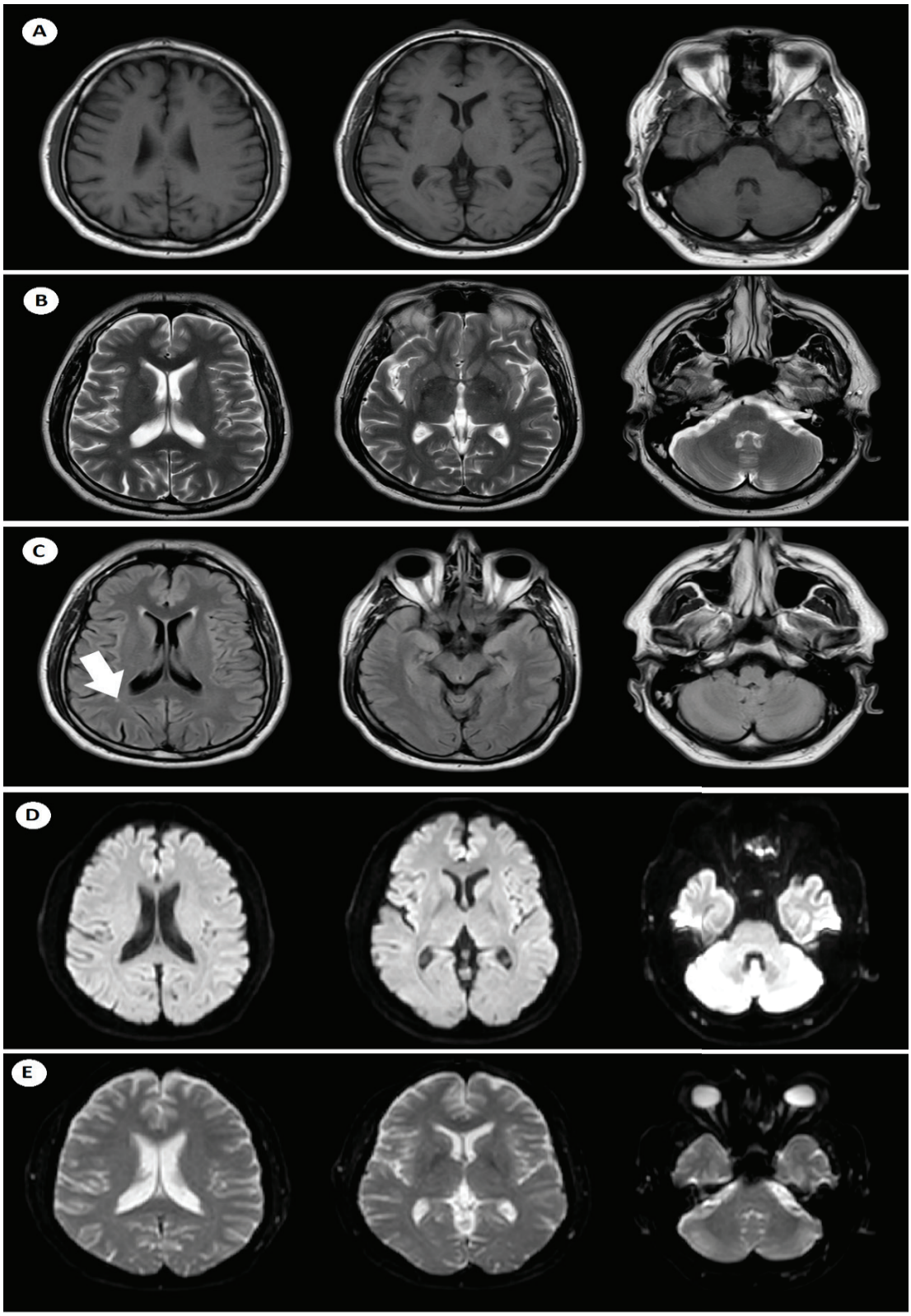

Figure 2. Normal brain MRI. Axial T1 (A), T2 (B), FLAIR (C), diffusion-weighted imaging (DWI) (D), and apparent diffusion coefficient (ADC). A tiny non-specific hyperintense FLAIR focus in the right occipital periventricular deep white matter (Arrow).

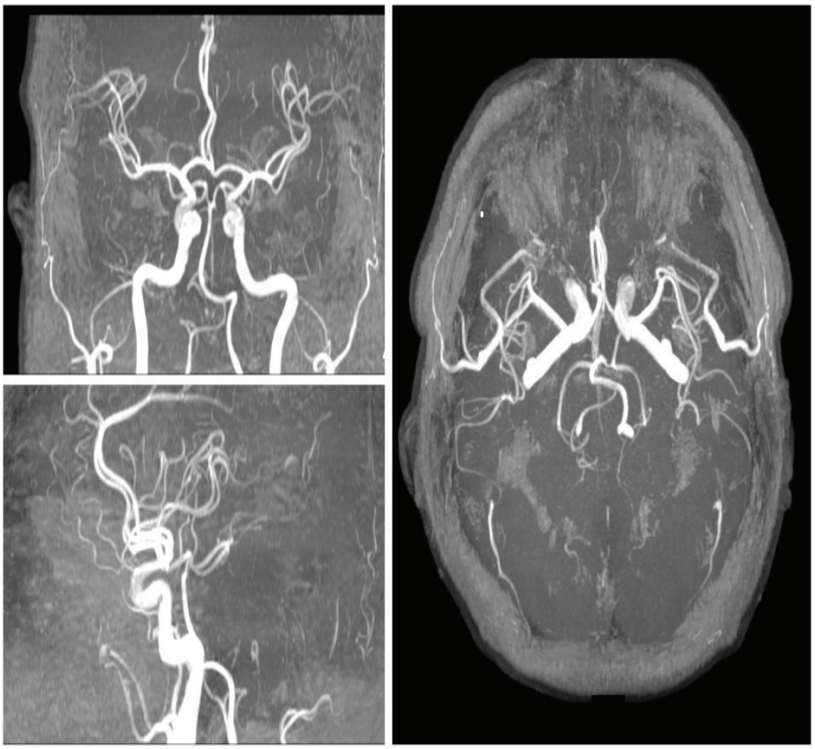

Figure 3. Normal brain MRA.

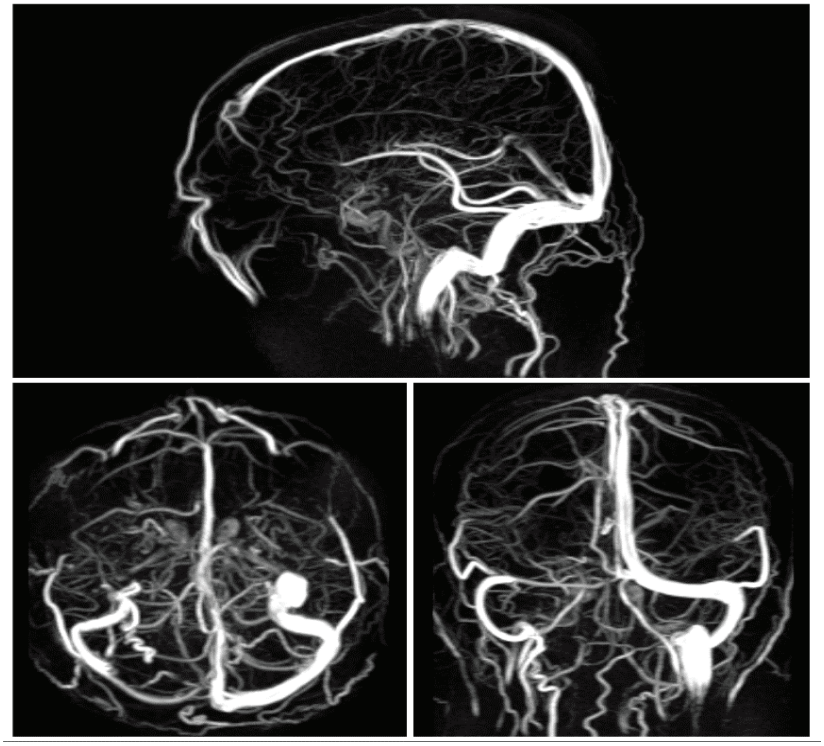

Figure 4. Normal brain MRV.

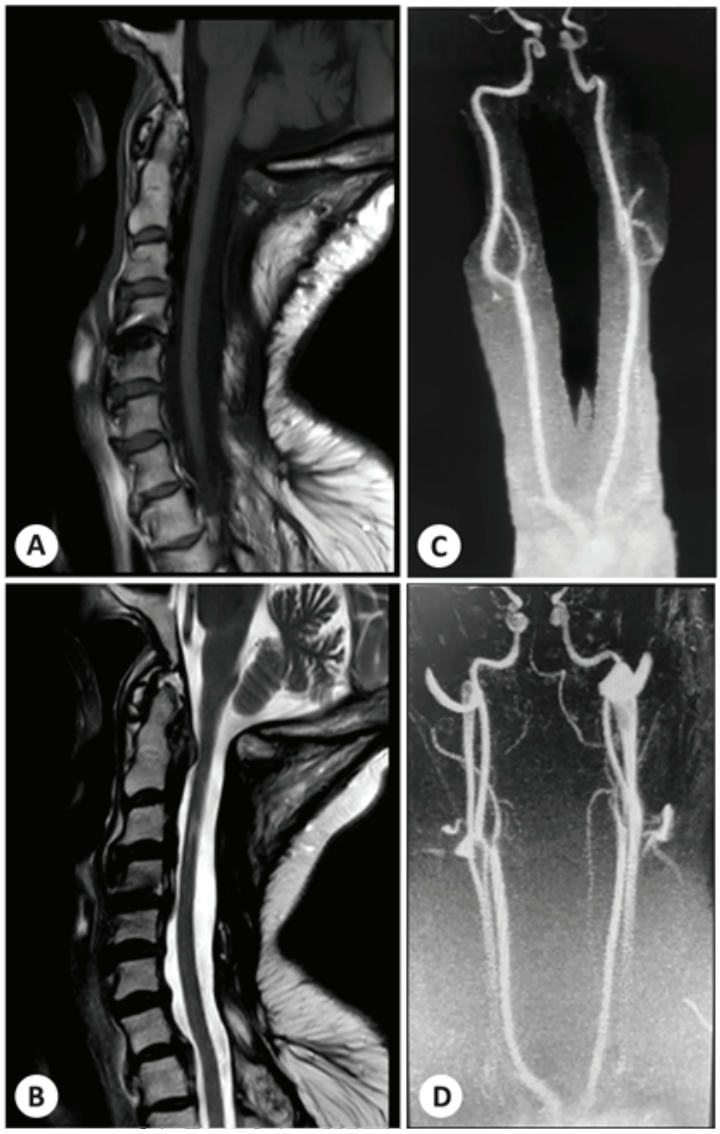

Figure 5. Normal neck MRI (A and B) and MRA (C and D).

ipsilateral depressors via the oculomotor subnuclei to the elevator muscles. Therefore, lesions to riMLF will affect downward saccades more than upward. However, vertical gaze holding, pursuit, and horizontal saccades are not affected usually.[7,10] There are two pathways for vertical gaze innervation, an ascending pathway from the vestibular system up to both sides of MLF to the oculomotor and trochlear nerve nuclei, riMLF and INC in addition to descending nerve fiber pathway from the cerebral hemispheres through the pretectum reaching the oculomotor and trochlear nerve nuclei. The two inputs of these pathways translated into eye movement by riMLF.[11]

Convergence retraction nystagmus caused by damage to supranuclear fibers in the midbrain that have an inhibitory role on the oculomotor nerve nucleus prohibiting the activation of extraocular muscles.[7] Thus, both superior and inferior recti continue receiving constant stimulation that leads to globe retraction. Furthermore, overpower of medial recti versus lateral recti, resulting in involuntary convergence.[12] The same mechanism leads to bilateral lid retraction due to the constant stimulation of the levator palpebrae superioris via the oculomotor nerve.[7] Light-near dissociation results from injury to the Edinger-Westphal nuclei and pretectal nucleus or due to damage to the posterior commissure at the site where fibers of

the pretectal nucleus decussate.[7,13] As a result, loss of parasympathetic innervation to sphincter muscles in both irides leading to failure of pupillary constriction. Typically, dorsal midbrain lesions lead to loss of the pupillary light reflex with sparing of the near reflex. This is because the nuclei responsible for the pupillary light reflex are more liable to compression as it lie more dorsally.[7,13]

A stroke is a common cause of Parinaud's syndrome[1,2] but a TIA is not. TIA, also known as mini-stroke is a brief episode of neurological dysfunction due to focal cerebral ischemia without permanent cerebral infarction. TIAs and ischemic strokes have the same underlying mechanism, as both are a result of a disruption in cerebral blood flow. Classically, the definition of TIA was established on the duration of neurological symptoms. Recently, a definition relays on the absence of acute infarction is accepted and known as "tissue-based".[14] Neurological symptoms generally persist for a long time in ischemic stroke but resolve within 1-2 hours in TIA. Nevertheless, it may occasionally last longer but not more than 24 hours.[14] TIA is a risk factor for having a stroke. Thus, early management is essential to prevent or reduce the risk of stroke in the future.[14,15]

To the best of our knowledge and after a thorough review of the literature, there are no reported cases about reversible Parinaud's syndrome during the first 24 hours due to TIA. This combination represents a rare scenario. However, a rapid disappearance of ocular symptoms after treatment of early hydrocephalus has been reported.[1] Additionally, there are rare reported cases of reversible Parinaud's syndrome following intraventricular thrombolysis[16] and a resolved thalamic hemorrhage.[17]

In conclusion, TIA is an unusual cause of Parinaud's syndrome. Therefore, ophthalmologists must consider this among their list of differential. Moreover, urgent management is essential in preventing further cerebral injury or strokes in the future.

DISCLOSURE

Conflicts of interest: None

REFERENCES

1. Keane JR. The pretectal syndrome: 206 patients. *Neurology* 1990; 40:684-90.
2. Shields M, Sinkar S, Chan W, Crompton J. Parinaud syndrome: a 25-year (1991–2016) review of 40 consecutive adult cases. *Acta ophthalmol* 2017; 95(8):e792-3.
3. Fang AS, Meyers SP. Magnetic resonance imaging of pineal region tumours. *Insights Imaging* 2013; 4(3):369-82.
4. Galetta SL, Raps EC, Liu GT, Saito NG, Kline LB. Eyelid lag without eyelid retraction in pretectal disease. *J Neuroophthalmol* 1996; 16(2):96-8.
5. Hankinson EV, Lyons CJ, Hukin J, Cochrane DD. Ophthalmological outcomes of patients treated for pineal region tumors. *J Neurosurg Pediatr* 2016; 17(5):558-63.
6. aroff, R, Jankovic, J, Mazziotta, J, Pomeroy, S. Bradley's neurology in clinical practice. London: Elsevier; 2016; 206.
7. Leigh RJ, Zee DS. The neurology of eye movements. New York, NY: Oxford University Press, 5th ed.; 2015; 877-87, 923-6.
8. Isao K, Tomoyuki O, Ichiro A, Toshiharu S, Tsutomu K, Hiroshi S. Vertical Gaze Palsy Induced by Midbrain Lesions and its Structural Imaging. *Auris Nasus Larynx* 1998; 25(4): 339-47.
9. Salsano E, Umeh C, Rufa A, Pareyson D, Zee DS. Vertical supranuclear gaze palsy in Niemann-Pick type C disease. *Neurol Sci* 2012; 33(6):1225-32.
10. Kim JH, Kim WJ. Bilateral vertical gaze palsy after cerebral digital subtraction angiography due to unilateral midbrain infarction. Korean J Ophthalmol 2018; 32(2):154-6.
11. Rea P. Essential clinical anatomy of the nervous system. New York: Academic Press, 1st ed. 2015: 173.
12. Johkar K, Komiyama A, Kuroiwa Y. Pathophysiologic mechanism of convergence nystagmus. *Eur Neurol* 2002; 47(4):233-38.
13. Wilhelm BJ, Wilhelm H, Moro S, Barbur JL. Pupil response components: studies in patients with Parinaud's syndrome. *Brain* 2002; 125(10): 2296-307.
14. Easton JD, Saver JL, Albers GW, *et al*. Definition and evaluation of TIA. *Stroke* 2009; 40(6):2276-93.
15. Ferro JM, Falcão I, Rodrigues G, *et al*. Diagnosis of transient ischemic attack by the nonneurologist. A validation study. *Stroke* 1996; 27(12): 2225-9.
16. Laforce R Jr, Khuong H, Gariépy JL, Milot G, Savard M. Reversible parinaud syndrome following intraventricular thrombolysis. *Can J Neurol Sci* 2009; 36(1):95-7.
17. Waga S, Okada M, Yamamoto Y. Reversibility of Parinaud syndrome in thalamic hemorrhage. *Neurology* 1979; 29(3):407-9.